

Redevelopment guidelines for railway urban areas in satellite towns of Wrocław Functional Area

General strategy to rationally steer urban regeneration potentials

MASTER THESIS IN EUROPEAN SPATIAL PLANNING AND REGIONAL DEVELOPMENT

PLANET Europe Master's programme

Marcelo Sagot Better

s4656644

TABLE OF CONTENT

Abstract	I
Introduction	II
Research problem	IV
Content overview	V
1- Wrocław Functional Area: Satellite towns and their railway urban areas	CHAPTER 1
1.1- From garden cities to satellite towns – Theoretical basis for urban analysis	1
1.2- Causes and consequences of Wrocław Functional Area	6
1.3- Reasons for the (re)development of railway urban areas of WFA	11
1.4- Understanding the image of the railway urban area of WFA	15
1.5- Research justification	18
2- Research Strategy and Methodology	CHAPTER 2
2.1- Research Strategy	20
2.1.1 Inductive approach	22
2.2- Research Design – Mixed methods	23
2.3- Research Methods	23
2.3.1 Case studies criteria	23
2.3.2 Quantitative approach: Content analysis	24
2.3.3 Qualitative approach: Mental maps	24
2.3.4 Triangulation	25
2.4- Research limitations, reliability and validity	26
2.5 Ethical considerations	27
2.6 Sampling	27
2.6.1 Case studies selection – Satellite towns analysis	27
2.7 Case studies	31
2.7.1 Oleśnica	31
2.7.2 Siechnice	32
3- Underlying Structures: Description and analysis of inductive findings	CHAPTER 3
3.1- General findings – Spatial directions for railway urban areas of WFA	34
3.1.1 Suburbanization process and new developments in satellite towns	34
3.1.2 Demographics and housing in WFA	36
3.1.3 Commuting to the satellite towns of WFA	37
3.1.4 Summary – Spatial planning effects of WFA policy framework	39

3.2- Specific findings: Legibility and imageability of railway urban areas	40
3.2.1 Identity	41
3.2.2 Structure	43
3.2.3 Paths	45
3.2.4 Nodes	47
3.2.5 Edges	49
3.2.6 Landmarks	52
3.2.7 Summary - Qualitative findings influencing the perception of railway urban areas	54

4- Conclusions – Underlying structures **CHAPTER 4**

4.1- Triangulation of quantitative and qualitative findings	55
4.1.1 Node in the functional network	56
4.1.2 Place in the satellite town	58
4.2- General functional and spatial guidelines for (re)development of railway urban areas of WFA	60
4.2.1 Functional guidelines	60
4.2.2 Spatial guidelines	61
4.3- Comments on contribution to the literature and potential enhancement of the research	62

Bibliography

References	63
Policy documents	69
Polish Legal Acts	69
Reports	70

List of Tables

Table 01 - WFA Cities (Population and Distance to Wrocław)	9
Table 02 - WFA Train Stations Data (Station, Population, Users, Operator, Distance).	28
Table 03 - Comparison between selected case studies (Satellite towns).	30
Table 04 - Spatial guidelines for (re)development	61

List of Figure

Figure 01 - Howard’s diagram N. 5	2
Figure 02 - Purdom’s Satellite towns round London Diagram	3
Figure 03 - Wrocław Functional Area	8
Figure 04 - Net internal migration for permanent residence per 1000 people in 2015	10
Figure 05 - Train connections of WFA	12
Figure 06 - Degree of dependency of satellite towns towards Wrocław	29
Figure 07 - Oleśnica station	31

Figure 08 - Siechnice station	32
Figure 09 - New developments in relation to train station and town centre	35
Figure 10 – Buildings and identity	41
Figure 11 – Buildings and identity	42
Figure 12 – Unidentified buildings	42
Figure 13 - Identification of Oleśnica Train Station	43
Figure 14 - No clear connections between elements	44
Figure 15 - Bus stops in front of Oleśnica and Siechnice stations	45
Figure 16 - Services (school, clinic and factory) around Siechnice station	46
Figure 17 - Street leading to Oleśnica station	47
Figure 18 - “Nothing” around Siechnice station	48
Figure 19 - Edges around Oleśnica station	49
Figure 20 - Border dividing Siechnice station and line of tress as barrier	50
Figure 21 - Word “dziury” indicating where the holes are in Oleśnica Station	51
Figure 22 - Elements surrounding Oleśnica station	52
Figure 23 - Elements used as landmark or reference points	53

Abstract

As train stations are recovering their role assuring livable urban conditions in many European cities, planning professionals are redirecting their efforts to the broader concept of railway urban areas to tackle not only urbanity issues, but also sustainability and connectivity demands. A dominant accountability has been placed on these areas in order to strategically interconnect satellite towns to the central city – an urban planning concept known as Functional Urban Areas. From this perspective, railway areas in the most important European cities are one of the critical frameworks to potentially steer urban development and prompt a wider range of externalities. Nevertheless, there is a substantial lack, in both practice and theoretical approaches, on how to apply similar strategies at local level in satellite towns outside the city. As well on how to improve urban development of railway urban areas through a combination of quantitative and qualitative strategies. The research follows this rationale to develop an inductive analysis of the current spatial planning framework of the railway urban areas located in the satellite towns of Wrocław Functional Area. Through the combination of methods and different layers of findings the research aims to elaborate a general strategic framework to improve the efficiency, competitiveness and overall urban quality of the railway urban areas.

Introduction

Train stations can be seen as one of the more critical subjects of analysis in urban planning, they play a fundamental role integrating both transport and land (Suzuki, Cervero, & Iuchi, 2013, p.3) making them one of the key tools to steer development in urban areas (Bertolini 1995, 1996, 2007; Bertolini & Spit, 2005; Conticelli, 2011). Across urban Europe, train stations and their surrounding areas are once again the focus of ambitious redevelopment plans (Bertolini, & Spit, 2005, p.3; Suzuki, Cervero, & Iuchi, 2013, p.13). Accordingly, many planning and design professionals are once again directing their attention towards train stations in order to (re)discover their role connecting smaller settlements to the larger urban realms or central cities, and consequently improve the urban conditions of broader metropolitan areas. Nevertheless, there is a substantial lack, in both practice and theoretical approaches, on how to apply similar strategies at local level in satellite towns outside the city.

Historically, it was the train that enabled metropolitan centres to spread and bring the adjacent countryside closer to the city, broadening its area of influence, relocating housing settlements and expanding public services. Throughout the 20th century, Wrocław faced an increasing demand for private vehicles that brought decline to railway transportation, especially during the post-war period as many citizens increased their power of acquisition and switched to cars. Consequently, train stations in the periphery of the city lost their relevance in the aforementioned key role, leading to deterioration, demolition or – partial or total – functional reassignment. A wide number of train stations areas in local centers of Wrocław, move in to the 21st century in a rather poor conditions, while the introduction of the free-market economy was the last step into a further decrease for redevelopment in these urban facilities.

However, current planning problems like: “the promotion of sustainable transport and land use, the stimulation of local economies, technological and institutional change, the business cycle and the spatial impact of globalization” (Bertolini, & Spit, 2005, p.3), have been some of the complexities prompting once again a critical discussion towards a more integrated approach to railway urban areas. Local authorities in the largest Polish agglomerations – Warsaw, Trójmiasto, and Poznan – are turning their attention to railway urban areas as “essential frames to assure

accessibility and reduction of traffic pollution and congestion, as well as they provide opportunities for urban regeneration” (Conticelli, 2011, p.1096).

As a consequence, development projects for railway urban areas located in the satellite towns of Wrocław Functional Area (WFA) can be distinguished as a complex urban development scheme in terms of planning, design, and management. Likewise, these urban areas should be reformed implementing an integral approach; focusing not only in quantitative aspects of the station or transport network, but also in more qualitative characteristics of the surrounding quality of the urban built environment in which are located.

Coupled with the above mentioned circumstances in Poland as like many other metropolitan areas in Europe, WFA serves as the major subject of analysis on which the following thesis is focused on. While the urban areas around train stations in its satellite towns are approached as study cases to illustrate the extent to which and how more useful and attractive railway urban areas could improve the overall urban conditions in smaller towns of WFA. Therefore, the present research investigates the broader planning framework of WFA and the relation between railway infrastructure and urban development, in order to elaborate on general guidelines for potential interventions applicable to all the train station urban areas located in the satellite towns of WFA, focusing on urban quality rather than transport issues.

Research problem

While researching urban sustainability, transportation systems acquire a leading part to guarantee high levels of efficiency and livability in metropolitan systems (Conticelli, 2011, p.1096). Regarding the subject of analysis, there are three key elements that need to be addressed in order to explain how urban (re)development around train stations can steer spatial planning and improve urban quality in local railway urban areas of WFA. Firstly, train infrastructure is a complex spatial planning problem that requires consideration of multiple conditions: legal, political, economic, technical, or geographical aspects. Thus, it is necessary to approach the spatial planning context of WFA at regional in order to understand how the outcome of a general policy is shaping the development of train stations and its surrounding areas in the same degree.

Secondly, a compulsory conceptual framework embedding the main epistemological and ontological considerations, coupled with a theoretical strategy for analysis, will highlight the necessary approach to this specific planning problem. Understanding what satellite towns are, will be the first step to elaborate on further recommendations on how to steer development to these settlements by focusing on the combination of both qualitative and quantitative approaches too railway urban areas as main subjects. Hence, the evolution of the concept of garden city to satellite towns offer the right approach to understand the historical centre building approach linked to transportation requirements, combining planning theory with user needs.

Lastly, the study aims to elaborate on the potential outcomes for urban (re)development for the railway urban areas located in WFA, as a set of general guidelines for plan preparation and urban intervention. These principles will represent a useful guide for stakeholders and policy makers involve in either planning or design processes around the stations in Wrocław.

Therefore the **main aim** of the current research has been defined as follows:

Redevelopment guidelines for railway urban areas: Which and to what extent a strategic framework of intervention around train stations could generally improve the development of railway urban areas of the satellite towns of Wrocław's Functional Area (WFA)?

The following **specific research questions** have also been distinguished in order to clarify the above mentioned subject:

- A) *How does the current spatial planning framework of Wrocław's Functional Area guides spatial development in railway urban areas located in the satellite towns?*
- B) *How and in what ways urban interventions can influence the perception of the built environment around train stations?*
- C) *Which general strategies can be identified for urban (re)development in railway areas around train stations in the satellite towns of WFA?)*

The formulation of specific research questions will help to develop further insights in order to: a) analyze the spatial planning framework of WFA and its satellite towns; b) understand physical consequences of redevelopment in railway urban areas; and c) suggest a framework of general strategies for the development of railway urban areas of Wrocław functional area.

Content overview

The research consist in four chapters. Chapter 1 offers a review of the theoretical perspectives employed to address the main subject of study, focusing on the historical evolution and fundamental characteristics of satellite towns as concept relatable to Wrocław; towards the description of the current planning framework of railway urban areas within the current Functional Urban Area definition; and concluding on current debates regarding socioeconomic impact of (re)development efforts in railway urban areas; and the theory of mental maps as a scope to analyze both quantitative and qualitative features in urban spaces. Consequently, the research methods are describe as part of the methodological section in Chapter 2, followed by an in depth discussion describing the main findings from the empirical analysis in Chapter 3. The research ends with a section of conclusions and recommendations in Chapter 4 with further suggestions for local authorities and researchers on how to apply the strategies and possible enhance of the research. The final document is also supplemented with both Bibliography and Annex Sections.

Chapter 1.

Wrocław Functional Area: Satellite Towns and their railway urban areas

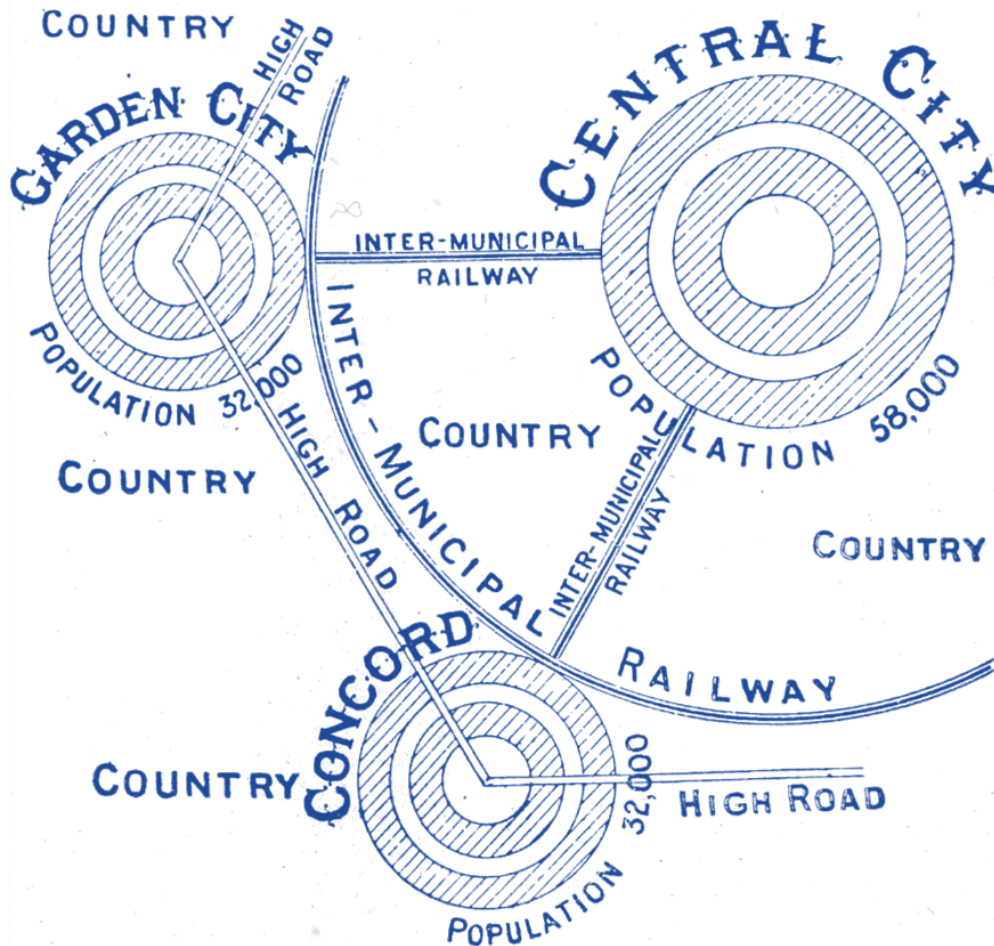
Many reasons are readily apparent for the allocation of smaller settlements around major city centres or capitals. As early as 1847, Friedrich Engels was debating the ideas that coined the concept of “urban and rural integration” as one of the principles of communism (Shao, p.29, 2015). Historically, authors like Ebenezer Howard, Charles Purdom, and G. R. Taylor distinguished elements like the impulse for cheap land, low taxes and ‘elbow-room’ environments (Fishman, 2003), as some of the reasons that motivated people to move out from the large centers of population or industrial complexes, towards rural milieus. Coupled with technological innovations in transport systems like the train specially, cities were able to spread over larger territories and become metropolitan areas. This was the case of the urbanization process that took place in Lower Silesia Voivodship and prompted the modern consolidation of a Functional Urban Area into the current planning framework of Wrocław. The following chapter explores the historical evolution of the satellite town. The discussion will be focused on the role of train stations and the connectivity to the central city as a mean to improve urban conditions at local level. A debate to clarify if the satellite town is still a scope to understand the current functional urban area. The literature review aims to identify basic characteristics and patterns of these urban development model and the influence prompted by the time’s emerging railway, in order to identify the inherited influence of the satellite towns within the current spatial planning framework of Wrocław.

1.1 From garden cities to satellite towns

It is impossible to analyze satellite towns without gazing at its theoretical predecessor, the garden city. During the 19th and 20th centuries, issues like industrialization, disorganized growth and unhealthy living conditions, propagated alongside the development of these cities, while a later popularity and accessibility to cars impoverished these conditions even further. Planners like Ebenezer Howard – perceiving these negative issues – advocate for ‘country-side’ living conditions coupled with all the facilities found in urban environments, in order to steer the development of new cities away from these type of undesirable outcomes.

The above mentioned impression was the centrifugal force shaping the garden city theory, which is described as a “reaction to the environmental and social legacy of Britain’s industrial revolution” (Gossop, 2006, p.1). The idea emerged in 1898 when Howard published one of the most noticeable contributions to planning theory (Fishman, 2003, 31), *To-morrow: A Peaceful Path to Real Reform*. The garden city was promoted as a local centre surrounded by an agricultural belt and followed specific guidelines like size, population, and railway connection. These settlements were envisioned as independent of the larger “central city” (Fig. 01), and they were characterized by having a healthy life and a moderate growth of the urban space. The dimensions were usually not very large, making it appropriate for the authorities to have some control over their inhabitants and provide maintenance with regularity (Howard, 1902, p. 15).

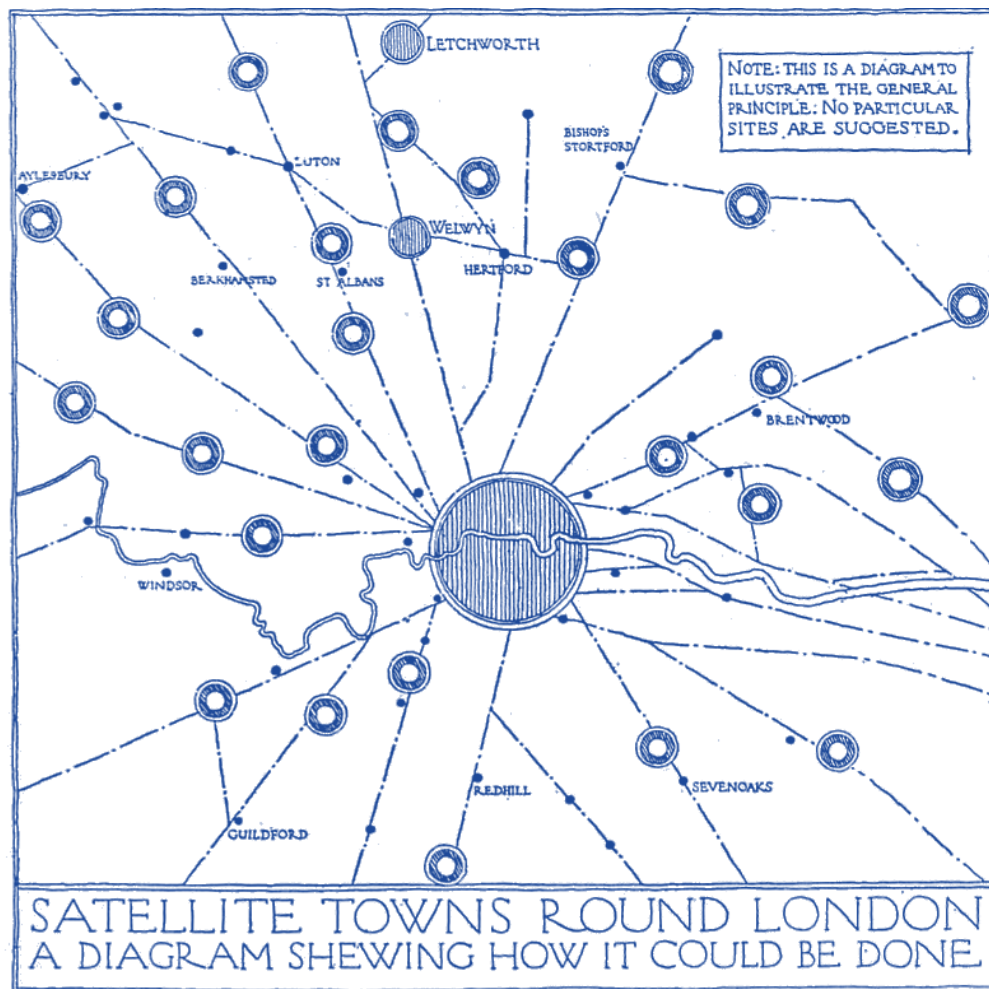
Fig. 01. Howard’s diagram N. 5. Source: <http://urbanplanning.library.cornell.edu/DOCS/howard5.gif>



Howard tried to place his ideas at the service of the British Government as a mechanism for reconstruction after the I World War, which led to the creation of Welwyn garden city during 1920 (Fishman, 2003, p.31). The town was located about 40 km north from London, and the railway line leading Letchworth offered a reliable connection between the two centres. Howard, who considered himself more of an inventor than a planner, noticed that a complete level of independence was impossible to achieve due to the proximity to a major urban core that led to a high dependency to London that was regarded as a crucial aspect for the success of the development. Which was the main reason that persuaded him to perceive Welwyn as a “satellite” (Buder 1990, p. 127; Shao, 2015, p.26).

Fig. 02. Purdom’s Satellite towns round London Diagram. Source:

<http://cashewnut.me.uk/WGCbooks/bigImages/web-WGC-books-1925-1-21.jpg>



Even if the concept of **satellite town** was initially conceived in Great Britain, it was in The United States where G. R. Taylor prompted the theory behind these type of developments. With a homologous publication in 1915 — *Satellite Cities: A study of industrial Suburbs* — Taylor understood that these towns were the products of the central city and all its complexities, in an attempt to decentralize industry and population from major centres. These “outer ring towns” were at service of major industries that migrated from the expensive city centre to the cheap country land (Fig. 02).

Contrary to the garden city, satellite towns are not exclusively depending on local industries as they do rely on major urban cores or a central city to supply work, education, or public services the local residents who commute regularly as an extension of the urban functions (Shao, p.26, 2015). Nevertheless, the concept does not have a precise definition but a set of conditions or characteristics that define the settlement always in relation to the central city. For instance, some of the variables of this dichotomy define that the satellite towns are spatially separated from a large city, but closely dependent to the latter, in terms of social and economic development, whilst, the existence commuting patterns as an observable phenomena of the working population inhabiting the satellite town.

Albeit, a major difference can be distinguished regarding the level of independence, both theories acknowledge the influence of a major urban centre or central city. In the case of the satellite towns these are more openly dependent to major urban cores. Taylor sought the use of railway connections as a tool to: “offer new industries the advantage of the city, with the low costs of outlying sites” (1915, p.266) while these: “Healthy and well-equipped factories and workshops will be grouped in scientific relation to transport facilities” (Purdum, 1949). Following this vision, transportation becomes a central issue in these industrial suburbs, as the proximity of train stations might tend to reduce the risk in home ownership because houses can also be conveniently occupied by people who work in nearby towns and relieve the local industry from being the sole source of income (Taylor, 1915, p.18).

For the purpose of the present research, satellite towns are sought as a further step in the evolution of the garden city due to the above mentioned dichotomy regarding the proximity of a central city and the independence of the satellite towns. The theory recognises ths interplay

between city and town, which is facilitated via railway. It is possible to illustrate the same interplay between Wrocław and its satellite towns. The historical evolution of the concept imply that the main feature of a satellite town is its reliance to the larger urban centre or capital (Wrocław). Moreover, the degree of this interaction varies depending on the conditions of the central city and it usually takes the form of a commuting scheme in order to access work opportunities in the central city, or to take advantage of its wide ranging variety of services (public facilities, cultural services, or recreation). Like its predecessor, the satellite town can also retains some of its self-containment conditions or independence, providing workplaces for its inhabitants and recreation destinations that later on constitutes an additional bond with the central city.

Nevertheless, there is a substantial lack of theoretical deliberations regarding the role of train stations, especially vis-à-vis complex issues of urban design around them at the local level. Both practical and theoretical approaches to this topic are still needed to address the subject of spatial development for the concept of railway urban area in satellite towns, and how to apply similar or transfer strategies from the central city to the town.

The multi-dimensional conditions of the satellite towns can be explored from many perspectives that are still relevant to support the study of railway urban areas, as many particular elements of the design, social structure and economic perspectives of both garden city and satellite town, in a lesser and major extent respectively, offer a critical scope to analyze the current spatial planning framework of local centres or smaller settlements, whilst some of these ideas and planning schemes are still embedded into the observable urban planning principles of some areas in Wrocław (Hulicka, 2014).

The purpose of this reflection is a twofold. Firstly, to serve as a theoretical basis for the analysis of the current planning framework of Wrocław Functional Area; and secondly to answer the first specific research question. However, the historical development of the satellite town does not exhaust all the issues present in the above mentioned interplay between local centres and their proximity to a Wrocław as central city. Therefore, it is necessary to elaborate on the consequences of jobs concentration or access to services that lead to a further understanding of the role of train stations interconnecting satellite towns, and how commuting shapes the functioning of these areas.

1.2 Causes and consequences of Wrocław Functional Area

Despite the clear relation between development and planning (Cowell, 2013, p.2447), the discussion regarding the role of planning in railway urban areas in smaller settlements or satellite towns has been left aside by the political, economic and social innuendos linked to the competitiveness and development of the larger central cities. However, the role of planning in satellite towns is a complex debate that needs to be oriented towards the comprehension of a whole metropolitan area. Likewise it has to take into account: “not only the “centers but also the surrounding municipalities with a close functional relationship to these zones, as current urban functions are not restricted to historical jurisdictions” (Perlik, Messerli, & Bätzing, 2001, p.243). According to Robert Skrzypczyński, this applies particularly to small towns situated close to large cities “since the influence of the latter strongly affects their functioning and structure” (2016, p.9).

Regarding the aforementioned influence, the Organization for Economic Cooperation and Development, and the European Commission referred to a concept of **Functional Urban Area** (FUA) or European Functional Area (EFUA) as an administrative unit and model to describe and understand what metropolitan areas are, and how planning can improve their functioning. The definition recognizes commuting as an aspect defining the relations in the area. Both institutions agree on the following definition for FUAs:

Densely populated municipalities (urban cores) and adjacent municipalities with high levels of commuting towards the densely populated urban cores (hinterland). Functional Urban Areas can extend across administrative boundaries, reflecting the economic geography of where people actually live and work. (OECD, 2016, p.16)

Likewise, in 2013, the Ministry of Regional Development of Poland defined the criteria for the delimitation of a FUA for all the major provincial centers of the country. The functional area delineation drives an integrated policy to the three levels of the metropolitan area (regional, municipal and local). This includes steering of funds for urban planning and infrastructure development. Under these guidelines a functional area is featured as a set of linkages that define a “spatially cohesive sphere of influence of a city, characterized by functional connections as well as the advancement of urbanization processes” (*Kryteria delimitacji miejskich obszarów*

funkcjonalnych ośrodków wojewódzkich, 2013, p.7). Following Le Jeannic guidelines: “The name assigned to each urban area is the one corresponding to the urban centre” (1996, p.28), Wrocław, as capital of the Lower Silesia Voivodship (administrative region), adopted the above mentioned notion as **Wrocław Functional Area (WFA)**, in order to deliver better planning policies and development strategies (*Ustawa z dnia 27 marca 2003 r. o planowaniu i zagospodarowaniu przestrzennym*).

From both EU and Lower Silesia perspectives, the concept of functional area is especially useful as it not only helps to strategically allocate funding, but also to rationally steer development from the main urban core towards satellite towns in order to benefit a complete region as a functional network (Barska A., Jędrzejczak-Gas, J., 2016, p.25). The cohesion among satellite towns creates a polycentric network, with a wide ranging set of characteristics like size, population and functions. Nevertheless, this unified perspective places a major emphasis on the polycentric commuting zone and the figure of the railway urban area that encompasses the necessary transport services to move people within the aforementioned network. Specifically, the delimitation of WFA is a fundamental urban system that allows Lower Silesia’s government to strategically decentralize economic and social development from Wrocław to the satellite towns with general directions for: “integrated public transport systems, and a coherent investment, particularly in the area of railway and communal infrastructure” (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*, 2015, p. 11), that has been distinguished as one of the critical elements for the metropolitan area

These are among the reasons why WFA has become a necessary instrument to counteract the high levels of commuting that are leading to urban sprawl conflicts as one of the key priorities for the period 2014-2020 (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*, 2015, p.11). Accordingly, Wrocław is also the first Polish city attempting to “create a holistic framework for cooperation between municipalities located in its area of impact” (Skrzypczyński, 2016, p.53).

WFA is delimited by 28 municipalities (Table 01 & Fig. 03) of which, 3 are completely urban (Wrocław, Oleśnica and Oława); 10 have an urban-rural conditions (Jelcz-Laskowice, Trzebnica, Wołów, Brzeg Dolny, Środa Śląska, Oborniki Śląskie, Sobótka, Siechnice, Kąty

Wrocławskie, Prusice); while the remaining 15 municipalities are completely rural. As a result, the urban settlement of WFA delimitation comprises a capital city and 12 towns or nodes of sub local importance. (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*, 2015, p.12).

Fig. 03. Wrocław Functional Area (Symbols listed below) Source: own elaboration

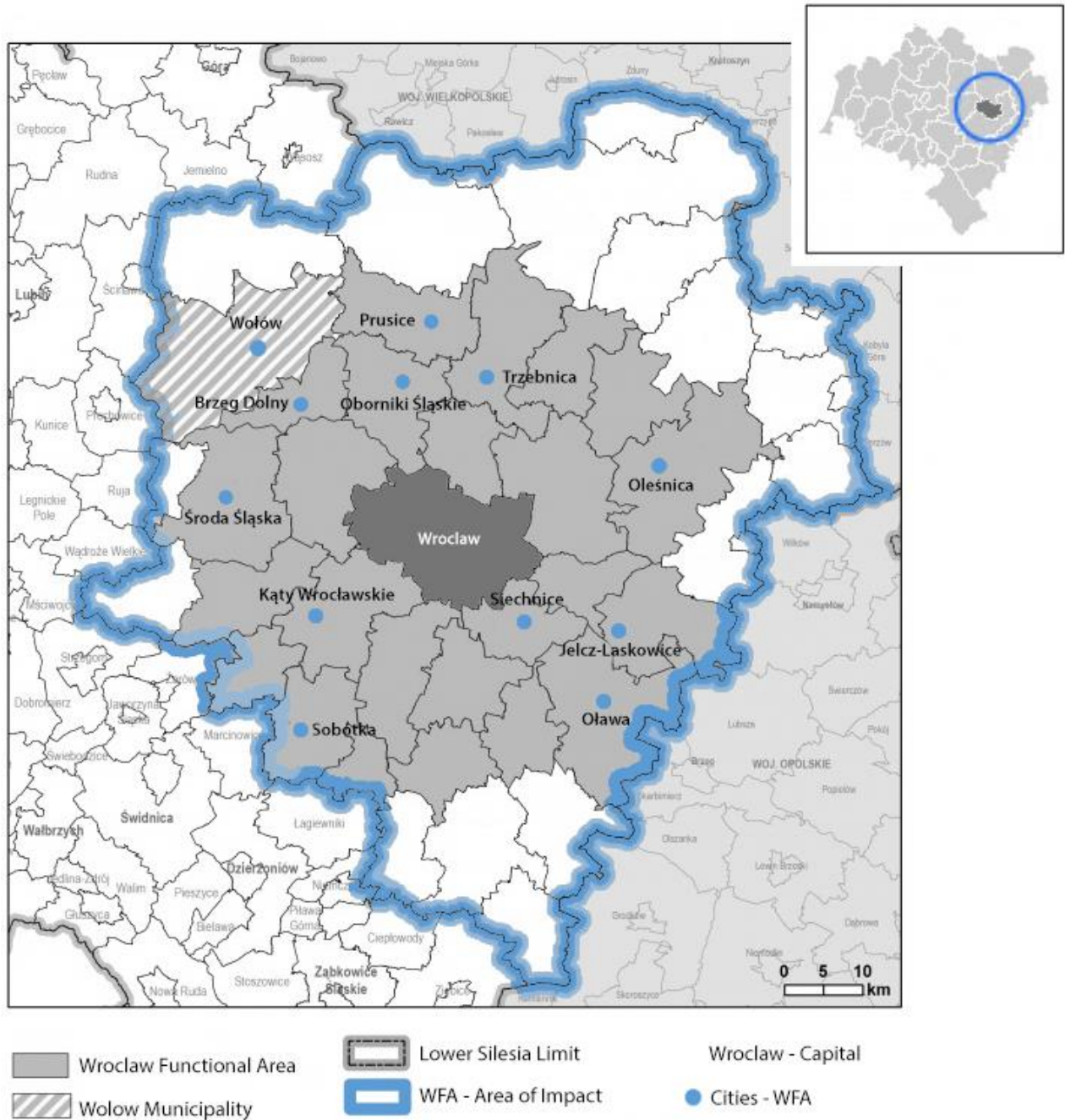


Table 01. WFA Cities (Population and Distance to Wrocław) Source: Wrocław Statistical Office
(Urząd Statystyczny we Wrocławiu, 2016)

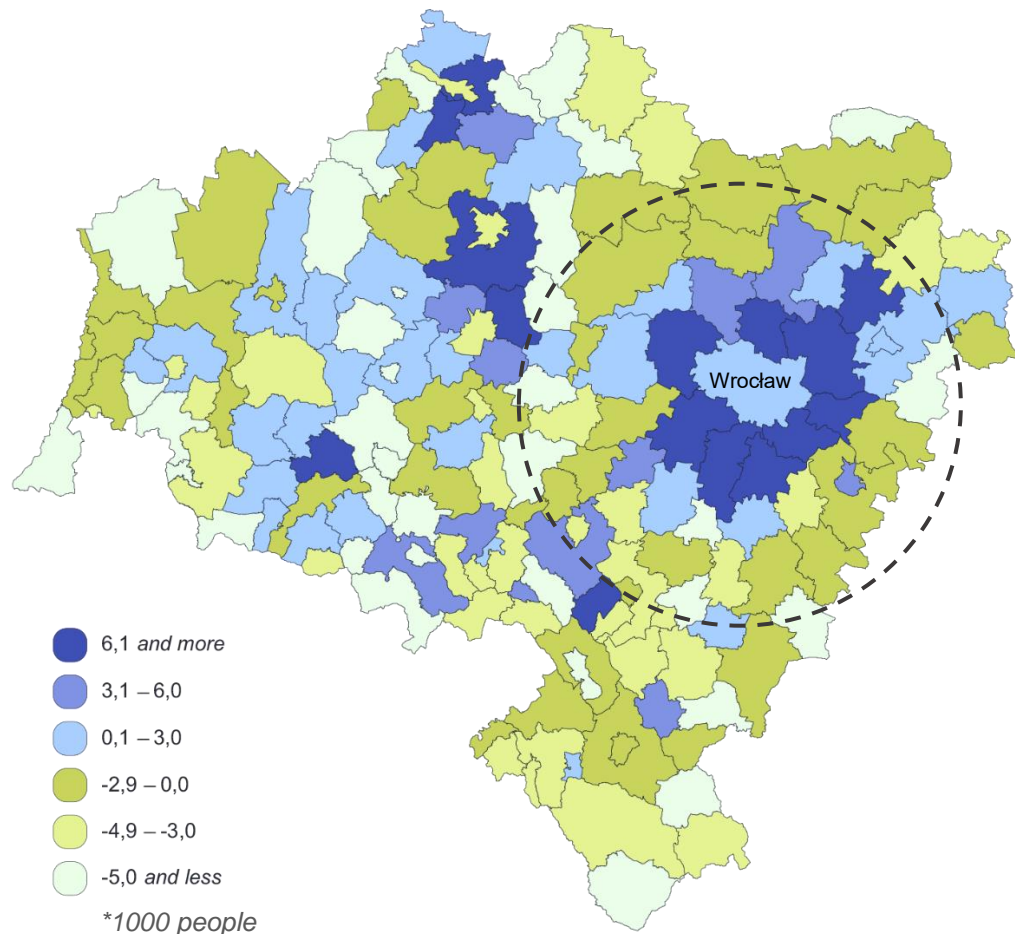
City (Urban Area)	Urban Population (2016)	Distance Approx. between train stations (Km)	Urban Area (Km ²)
Wrocław	635,759	-	293
Oleśnica	37,450	32.2	21
Oława	32,572	26.3	27
Jelcz-Laskowice	15,853	26	17
Trzebnica	13,099	26	8
Wołów	12,522	40	19
Brzeg Dolny	12,420	30	17
Środa Śląska	9,337	33.5	42
Oborniki Śląskie	9,108	26	45
Sobótka*	6,972	35	28
Siechnice	6,791	10.8	44
Kąty Wrocławskie	6,621	21.7	32
Prusice*	2,239	36	11
Total	800,743	-	604 Km²

* Sobótka and Prusice do not currently have an operating train station

Related to the current research, WFA also offers a remarkable scenario to analyze the specificities of planning for functional areas and the consequences of urban redevelopment around train stations, as railway urban areas are designated as key elements on a major network of relations to achieve the economic and social development for WFA (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*, 2015, p.11). This outcome depends on the rest of the satellite towns surrounding Wrocław and the strategic connectivity among them. The spatial planning framework of WFA aims to develop guidelines for locating nodes of services outside Wrocław not as a measure to reduce the dependency towards Wrocław, but to tackle the high levels of commuting usually done by car (Skrzypczyński, 2016, p.83).

According to Wrocław Statistical Office, in 2015 all the neighboring towns (*gminas*) immediate to Wrocław presented the highest levels of internal commuting in whole Lower Silesia Voivodship (Fig. 04). Meaning that, for a variety of reasons, these populations commute to the city in a regular basis.

Fig. 04. Net internal migration for permanent residence per 1000 people in 2015. Source: Wrocław Statistical Office 2015 (*Urząd Statystyczny we Wrocławiu*)



The Study of the functional cohesion in Wrocław Functional Area states that this action will allow to define a common strategy in order to effectively locate the aforementioned services in two levels: a) Housing services for Wrocław, b) Service nodes for local centres (2015, p.12). Both strategies are relevant for WFA as they follow the creation of new housing schemes outside the city centre and to allocate services for these new developments and their residents in these satellite towns. This will ensure a more rational allocation of resources while the local authorities take into account the conditions in the municipalities of its neighboring area.

1.3 Reasons for (re)development of railway urban areas in WFA

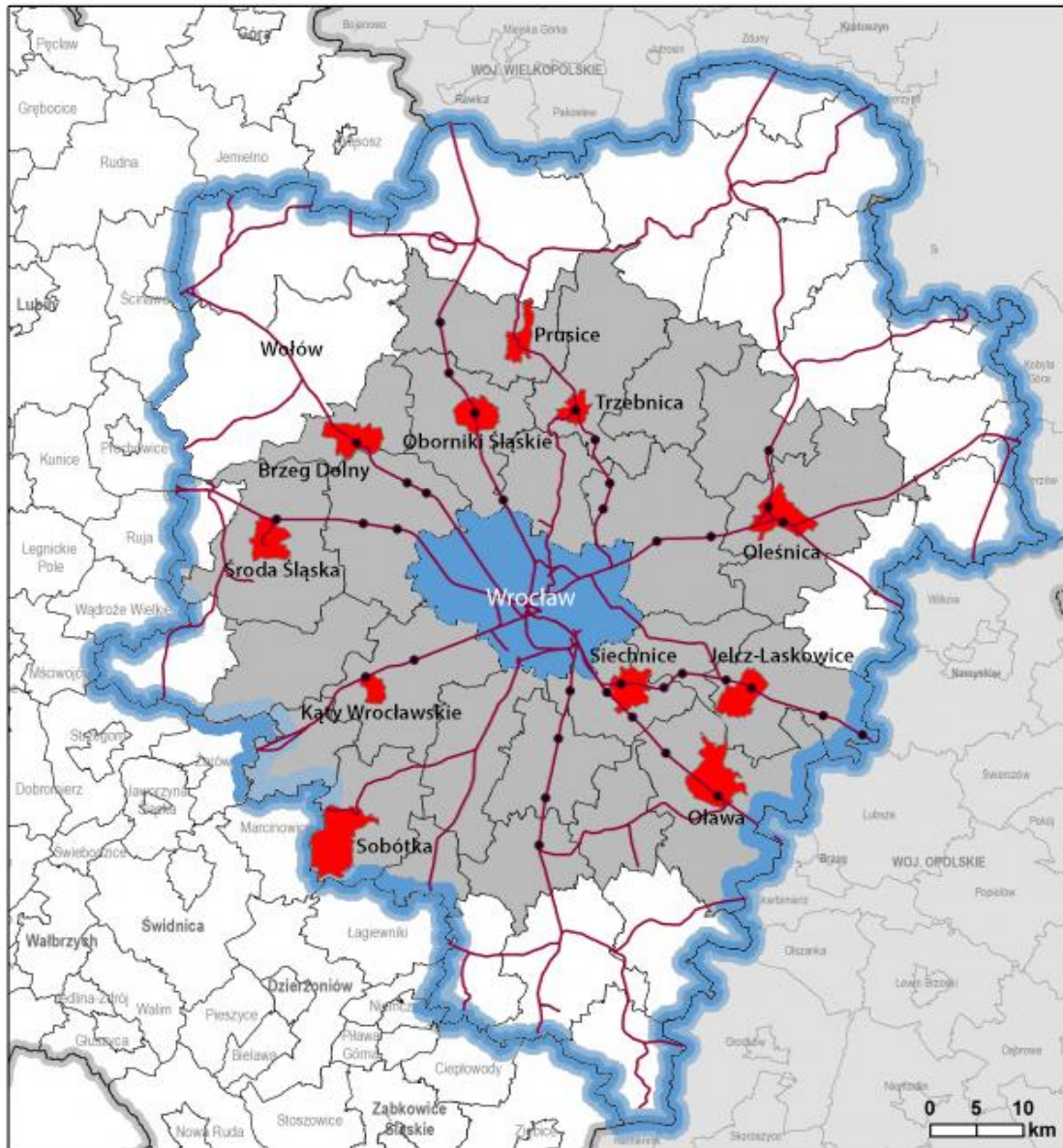
Luca Bertolini argues on the nodal potential of railway infrastructure to integrate not only stations but a major multi-centered urban structure (1996, p.331). As mentioned above, the delineation of WFA is a tool for driving integrated policy at different levels from the major urban core to the local level. Hence, steering public funds for railway development in WFA will continue the necessary functional integration towards the satellite towns. From this perspective, investment in railway infrastructure also has the potential to transform the surrounding spaces beyond the train station, a perspective that follow the logic that these railway urban areas have a “double soul” (Conticelli, 2011) that needs to move forward to “nodes and places” (Bertolini, 1996), or a dual role of “transport networks and urban places” (Bertolini & Spit, 1998).

Therefore, train stations and their surrounding urban areas can become spaces of high liveability or “placemaking areas” (Nelson, 2016, p.2) with the extent might to enhance development in the community in which are located and become spaces of social value and urban sustainability (Conticelli, 2001, p.1096). However, it is necessary to first clarify the current situation of the satellite towns and their railway connection to Wrocław, especially in terms of the commuting factors that define WFA.

Accordingly, rail stations in Poland are operated by a combination of public and private companies. Polskie Koleje Państwowe or PKP is the nationally owned operator in charge of the majority of rail services (Grupa PKP, 2014, p.13). In 2016 their real estate portfolio was opened for private bidding. The majority of stations in the local centres of WFA were offered in the market to new entrants – companies with a license to provide infrastructure services or railway operations – a Revitalization Project of Train Stations in WFA that included: Brzeg Dolny, Jelcz-Laskowice, Kąty Wrocławskie, Oleśnica, Oława, Siechnice, and Środa Śląska. (*Projekt rewitalizacji przestrzeni kolejowej Aglomeracja Wroclawska*, 2015) (Fig. 05).

The main aim of the project is to encourage private contractors to redevelop railway stations in order to increase the quality of the transport services and the overall ridership towards the local centres. Therefore, railway stations can be approached as pivotal points to improve the functionality of WFA as they are not only gateways to the local centres but potential nodes for urban regeneration.

Fig. 05. Train connections of WFA. (Symbols listed below) Source: own elaboration



As a result of the defining multi-centered condition present in functional areas, railway urban areas in WFA hold a very important role connecting the satellite towns among the transportation network (Fig. 05). A particular aspect of these areas is found in their historical value. The majority of the stations were built between the mid-19th and early 20th century with the purpose to connect the towns located in the hinterlands to Wrocław (Pudło & Pudło, 2009). Nowadays,

these stations can be found in the middle of the revitalizing and densifying local centres of WFA. While their accessibility remains remarkably easy, due to their proximity to Wrocław, they also comprise in their surroundings large, un-fragmented and sometimes disused land. The potential for these underdeveloped areas is continually growing alongside the level of development of the satellite towns. Simultaneously, accessibility to train services in small stations can increase the appeal at local level to attract more visitors to assets like: cultural events, natural attractions, or outdoor activities. Nevertheless, without strategic planning these unique contributions to WFA could be overlooked and subsequently decimating the overall functionality of the metropolitan initiative. Hence, the interest of Wrocław's local government to encourage several stakeholders to take part on this development effort, and to offer investment opportunities that will benefit all the parties involve (government, private sector and civil society).

Regarding redevelopment of railway stations and their surrounding urban areas many authors argue that these locations are certainly more than a place where trains arrive and depart (Celinski, 1992; Bertolini, 1996; Komornicki, 2005; Conticelli, 2011). New spatial planning issues and social patterns have emerged demanding the incorporation of innovative services, modes of transport and new "interpretations of the urban phenomenon" (Bertolini, 1996, p.332). Likewise, the following research aims to elaborate on potential new interpretations for the specific case of satellite towns and the railway urban areas positioned at local level.

The availability of information regarding this specific type of urban redevelopment is remarkably abundant, yet it is mostly project-oriented, widely spread among institutions, and subject of rapidly obsolescence (Bertolini & Spit, 2005, p.3). Nevertheless, most of the railway station redevelopment plans share problems that are more evident when compared to similar stations. Needless to say, the possibility to enhance these potential contributions largely depend on factors such as the ridership, number of station users, accessibility, safety, aesthetics and even the land-use patterns in the surrounding areas of the stations. For instance, the Crossrail project in the UK is currently one of the largest infrastructure redevelopment projects in Europe and the "first transport project in this country to design its stations, together with property developments and urban realm improvements in an integrated and complementary way". (Crossrail, 2016, p.4). The project, is an initiative of Transport for London and the local authorities on the Crossrail route. The key scope of the project recognizes that the success of the overall railway system does not

solely depends on the train services and stations but also on the user experience, as they arrive at and leave the stations. Nevertheless, the approach to tackle urban spaces outside the stations is ambitious and innovative. The scope of the redevelopment programme includes improvements in the public areas outside the stations coupled with transport interchanges (bike, bus and taxi), while the adopted designs need to be attractive and pleasant enough so users will be keen to use public spaces and spend time in.

The key principles for the designs were agreed in 2010. As major goal the redevelopment in these stations need to retain “the identity, diversity and characteristics of local centres giving confidence to local communities and to potential investors” (Crossrail, 2016, p.4). More specific aspects of the design also included the aspects like attractiveness, adaptability and sustainability so their use can change over time; aspect like accessibility included, step-free, legibility and security. In March 2014, 31 “urban realms” were completed for stations (27 stations in the London area and 4 outside), including station forecourts, pedestrian crossings, landscaping and 1,335 new bike parking spaces (Crossrail, 2016, p.4).

Judging from the success of projects like London’s Crossrail, railway urban areas in major European cities like Paris, Berlin and Madrid are central places in larger metropolitan systems (Docherty, 2000, p.1465, Mulders-Kusumo, 2007, p.201; Conticelli, 2011 p.1097), they operate as individual hubs in a larger retail and business networks. Despite the potential economic benefits, railway urban areas in smaller communities or satellite towns cannot strictly follow the same utilitarian objectives like their central city counterparts. An important factor to take into account is that the applicable strategies for major urban cores do not necessarily coincide with the strategic steps for smaller local centres. While large cities usually generate the suitable conditions for areas around train stations to thrive; smaller towns and villages might not be able to generate similar conditions with the same ease, or the necessary demand to support complementary services. Therefore, it is necessary to take a closer look at local level and understand the specific requirements of satellite towns.

Likewise, for the “compressed space of railway stations and their environs”, Bertolini mentions that: “a diverse array of 'residents', 'commuters', 'city users', and 'metropolitan businessmen' is present. Each of them asks something different to this one compressed space” (1995, p.332). As a result, redevelopment areas around train stations in satellite towns must include

a thoughtful and detailed analysis of the basic conditions generated by the both users and visitors of the railway urban area, especially in the case of WFA where redevelopment efforts have recently started.

The aforementioned authors and theoretical contributions are strictly focused on cities as these are often appreciated as the sector to address competitiveness at metropolitan level (Bertolini & Spit, 2005, p.4-5). The following research does not antagonize with this particular or similar assumptions. However, as one of the main objectives, the research aims to open the discussion to tackle similar approaches but at local level, focusing on the hypothesis that railway urban areas can also be the subject of (re)development interventions and contribute to the overall functional area through the satellite town. Likewise, as the research attempts to move forward into the incorporation of more qualitative and intangible aspects of the urban quality into this discussion it is necessary to elaborate on the particular theories to analyze these aspects in urban fabrics.

1.4 Understanding the image of the railway urban area of WFA

Regarding the potential intervention of railway urban areas in WFA, it is necessary to approach a rather contradictory phenomenon. On the one hand, all the satellite towns operate within the same planning framework aiming to achieve a set of common objectives or general targets. On the other hand, these areas are visited and used by large numbers of users, non-commuters, local residents, and visitors that require different levels of access, services and amenities. This requires a deeper and detailed understanding of the elements defining a railway urban areas but a set of general guidelines to facilitate strategies to achieve the outcomes indicated in the Study of the functional cohesion in Wrocław Functional Area (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*).

In order to understand how subject-object relationships take place, Kevin Lynch elaborates on a method of concrete studies through the verification of urban images. Lynch considers that in urban design every localized entity or physical element is experienced through its contours. Tacking the perceptual activity of the individual, Lynch later uses a large amount of fragmented perceptions to build a combined and general image of what it is understood as city.

Lynch's studies are commonly related to large urban realms or cities. However, some scholars have applied his methods into particular urban districts, neighborhoods or commercial districts. In the specific case of urban areas surrounding railway stations, mental maps can show the ease with which people access different spaces of the railway urban area, how they find recognizable elements to locate the station or how can they organize these urban elements into a coherent pattern. The method is based on observation and recognition of common features found in the maps, for instance: open areas, panoramic views, boundaries around the station and the localization of obstacles. Accordingly, Lynch elaborates on the concept of **Legibility** of urban environments (1998, p.11) to indicate the ease with which users and visitors of a railway urban area can recognize and organize these parts into a coherent pattern.

Legibility may be analyzed into three components: identity, structure and meaning (1998, p.11). Accordingly, railway urban areas can be analytically distributed among these three. However, Lynch mentions that it must be remembered that they actually always appear together (1998, p.17). Identity and structure can be analyzed together as they respond to physical elements and the connections between them. On the other hand, meaning does not necessarily relate to the physical presence of elements, it refers to the relevance of the object regarding the observer, having some level of meaning, whether practical or emotional.

- Identity: Possibility to identify and object within an image. This implies the distinction from other elements as a separable entity, individuality or oneness (1998, p.17). Regarding this element the participants were asked to: 1) identify the recognizable objects of the railway urban area, and 2) to locate or indicate the most relevant qualities of the station.
- Structure: This refers to an image that has a pattern of relation to other objects. And this relation is at the same time visible to the observer. Once the participants located different elements on the map they were indicated to: 1) draw logical routes to get to the railway urban area, and to 2) explain which elements they would use to indicate directions in order to access the railway urban area.

Lynch mentions that “meaning” is impossible to recognize through the maps due to the complexity of its definition, and if the goal is to build urban spaces suitable for large groups of people and diverse backgrounds, as mentioned by Bertolini, “we will be sensible if we focus only

on the physical clarity of the image and allow the meaning to develop without direct guide” (1998, p.18). Thus, even if the meanings were easily communicated, it seems possible to separate the meaning from the structure and the identity (1998, p.18). In order to further define a more accurate methodological approach, the current research process is strictly focused on the physical elements of the legibility: identity and structure.

The second part of the analysis is related to the evaluation of **Imageability**. For Lynch, this definition is more physically invariable, it is focused on the identification of physical qualities that relate to the attributes of identity and structure in the mental image. Lynch classifies these elements into categories that constitute the mental maps that people formed of the urban environment:

- Paths: Ways people use to travel to and from the station, like sidewalks, pedestrian trails, streets, bus routes, and bridges (1998, p.62).
- Edges: Linear elements that do not function as paths. They are divisions or borders along which two parts of an urban area coincide, for instance railway tracks or rivers (1998, p.62).
- Nodes: Confluence zones or strategic points around the station from where people gather and move. A roundabouts, a market square, a park, or the railway station itself (1998, p.63).
- Landmarks: Points that are observable and recognizable from a distant point. A clock, a dome, or a great tower (1998, p.63).

A fifth category corresponds for what Lynch refers as districts. These are medium to large sectors of the city that have a distinctive character (1998, p.103). However this larger division do not apply to smaller urban areas like the case of railway areas.

Therefore, representing the mental image of the railway urban areas of WFA will appeal to the memories generated through their perception and shaped on the paper by means of geometric relations between the five mentioned elements. This method gives the possibility to understand the imaginable urban landscape through the eyes of the people involved in it. As Lynch mentions, the intention is not only to represent urban life through symbols, but also to present possibilities to be achieve (potential interventions), first from an individual point of view and in second instance for the achievement of a generalization that lead to the collective image of the study area (1998).

As previously mentioned the identification of redevelopment potentials for urban areas around the train stations located in the satellite towns of WFA may include the collection of general

data like: number of daily connections, number of weekly passengers, number of residents within certain radius from the station, and the location in relation to urbanized areas. It also needs to take into account the mixture of housing, business premises and informal public spaces of the station's neighborhood that are an expression of this local dimension (Bertolini, 1995, p.332).

However, if the context of the satellite towns is not able to provide enough ridership demand or economic dynamics link to the chances offered by new urban configurations, any redevelopment attempt is likely to fail (Conticelli, 2011, p.1098). In order to determine proper redevelopment potentials it is necessary to combine the aforementioned data with the perceptions generated through the recollection of mental maps. This is one of the main reason to propose a strategic framework of intervention for urban areas around the train stations located in the satellite towns of WFA.

1.5 Research justification

From a spatial planning perspective, the **scientific relevance** of WFA as a subject of analysis entails the necessity of paradigmatic change: from the individual notion of the city as a unit towards the more diverse dynamic of a polycentric metropolis. Many scholars agree that the evolution from a monocentric notion of the city, to a wider multi centre urban system of integrated nodes may have important implications for the overall performance of a country (Brezzi, M., Veneri, P., 2013). Consequently, it is necessary to understand these connections between Wrocław and its surrounding settlements, as relations that will lead, firstly, to changes in urbanization and economic growth for the towns: and lastly, to overall performance of the full Functional Area. As Tomasz Komornicki mentions that spatial development plans in Poland need to be coupled with infrastructural development focused on railway transport systems (2015, p.51), the present research aims to prompt a better understanding of WFA as a metropolitan system, through the elaboration of general spatial interventions applicable to the redevelopment of all the urban areas around train stations in satellite towns of WFA, as these are a key component to improve the quality of the urban built environment and the overall spatial development of WFA.

Likewise, another justification for the present research relies on the academic requirement to elaborate on redevelopment plans for urban railway areas. Urban interventions at local level are

in some cases overlooked by major cross-border efforts or larger EU projects, causing that the study of urban areas around trains stations to appear “fragmented” (Bertolini, & Spit, 2005, p.3), in both theoretical and practical approaches. In order to address the competitiveness of European Metropolitan Areas it is necessary to share this knowledge (Bertolini, & Spit, 2005, p.4) for a wide ranging variety that will contribute to narrow this relevant academic gap.

To conclude, the **social relevance** of the research is embedded in the above mentioned objective as it is necessary to assign development efforts once again to urban areas around train stations and to re-evaluate their vital role as social scenarios, in these sense, they have the potential to act not only as gates to the nearby communities but to become one of the key elements to rationally steer development and contribute to the economies of the satellite towns of WFA. This will potentially lead to a series of positive outcomes in the future, like the decrease in the amount of vehicles, the cohesion between neighbouring towns and the expansion of the local economies.

Chapter 2.

Research Strategy and Methodology

The following section provides an overview of the selected methodology applied in the empirical approach to the subject of the research. Likewise, the research strategy is developed following a “general to specific” rationale: beginning with the current spatial planning framework of WFA, which addresses the specific research question A (*How does the current spatial planning framework of Wrocław’s Functional Area guides spatial development in railway urban areas located in the satellite towns?*). Consequently, substantial research has been made regarding how the perception of urban areas can improve the built environment and steer economic development, but not in the direction of railway urban areas in satellite towns. In the case of WFA, it is necessary that the selected methods lead to the explanation of similar characteristics but this particular subject of analysis. This approach will answer the specific research question B (*How and in what ways urban interventions can influence the perception of the built environment around train stations?*). Finally, the specific research question C (*Which general strategies can be identified for urban (re)development in railway areas around train stations in the satellite towns of WFA?*) is answered by synthesizing the findings of the previous two questions and integrating them with the theoretical framework of the literature review that serves as a scope for the discussion of the findings.

The selected method to answer these questions requires an inductive approach in order to use observations and findings to identify and conceptualize on potential interventions that will be systematized into a strategic framework through the triangulation of the outcomes from the previous questions. This is aimed to be the final outcome of the research that will lead to further recommendations of the application and potential enhancement of the framework as a tool for local authorities and urban planners.

Accordingly, Section 2.1 briefly discusses the research strategy based on the ontological and epistemological considerations, whilst, the selected approach applied in the further development of the study. Section 2.2, offers an in depth description of the mixed methods selected as part of the research design. Section 2.3 discusses the application of the different methods for the collection of quantitative and qualitative approaches and the triangulation method to analyze

the two sets of findings, whilst, selection criteria, identification of participants and the materials applied for the collection of the empirical data are also explained in this section. Section 2.4 elaborates on the limitations or constraints of the research, and the potential mitigation strategies, coupled with Section 2.5, which offers a brief explanation of the ethical concerns of the selected research methods. Finally, Section 2.6 and 2.7 explains the sampling process for the study cases and a brief introduction of the selected satellite towns, respectively. This will be used as an introductory section for the following exposition and discussion of the findings addressing the research questions (Chapter 3.).

2.1 Research Strategy

Urban development on railway urban areas and its particular effects on the perception is a broad subject of analysis that requires a methodology to translate ontological and epistemological principles into guidelines that show how research address the research questions (Sarantakos, 2005, p.43). Likewise, ontological considerations are concerned with *being*, or the nature of the entities that are subject of study (Sarantakos, 2012, p.29). Regarding railway areas around train stations, these have a reality external to social actors, but have an effect on the perceptions and actions of users. (Bryman, 2012, p.32). In view of that, positivism is a suitable perspective that will allow to explain human behaviour in terms of cause and effect or “prediction and explanation of phenomena” (May, 201, p.10), meaning that railway areas can be identified and explained through the analysis of how they affect social issues and their meanings, and have an independent existence external to the social actors (Bryman, 2012, p.32).

Likewise, critical realism is consequent to positivism and the notions that there is a basic natural order to which reality subscribes and social phenomena emerges from it (Bryman, 2012 p. 29). Nevertheless, Roy Bhaskar mentions that this natural order or **underlying structures**, causing this relation, “we will only be able to understand – and so change – the social world if we identify the structures at work that generate those events and discourses” (1989, p.2). For specific purposes related to the study subject, Bhaskar also mentions that critical realism is a suitable perspective that “helps to guide, empirically controlled investigations” (1989, p.2) which is the case with the following research methods and it is also a justification to clarify why urban spaces around train stations have to be studied from a positivist but realistic perspective.

Conversely, issues regarding epistemology are concerned with *knowing*, or the question of what is (or should be) regarded as acceptable knowledge in the discipline (Bryman, 2012, p.27), or the “nature of knowledge” (Sarantakos, 2012, p.29). Likewise, enough research have been developed explaining the correlation between transport infrastructure and urban development. As mentioned before, there is a lack of substantial discussion about the specific role of railway areas as a strategic framework to rationally steer urban development in satellite towns; thus, the fundamental aspects and correlations explaining the influence of railway urban areas in the urban development and perception of local centres can be studied following a theory to understand this phenomenon, whilst, this strategy also have influence on what is researched and how the findings will be interpreted (Bryman, 2012, p.5).

A more critical position to the scientific model is defined as, interpretivist (Bryman, 2012, p.30), as “the subject matter of the social sciences — people and institutions — is fundamentally different from that of the natural sciences” (Bryman, 2012, p. 28), an interpretivist stance, is regarded as an alternative for social researchers and a suitable theory for the study of urban areas that according to Bryman “is predicated upon the view that a strategy is required that respects the differences between people and the objects of the natural sciences and therefore requires the social scientist to grasp the subjective meaning of social action” (2012, p. 30).

As both **critical realism** and **positivism** agree on an objective reality and that it can be empirically explained (Sayer, 2000, p.14), both perspectives should help to identify the objective underlying structures behind the phenomenon in a further depth, but also how railway urban areas around train stations are continually reshaped by the actions of social actors and institutions as a consequence of a critical reality stratified into events (Gurney, 2016). Likewise, the proposed epistemological position to conduct the analysis is **interpretivist** as the relation between railway urban areas and social actors will focus on documented evidence of the decisions made by planning professionals and urban designers, for instance.

2.1.1 Inductive Approach

Regarding railway urban areas as a social research process, one of them main objectives of the study is to assess their role in relation to the quality of the urban built environment and the potential spatial outcomes for the satellite towns of WFA and their inhabitants. The conceptual

nature of the analysis meant that a level of inference was essential in investigating the complexities of this phenomenon in depth. The identification and explanation of the basic features (underlying structures) involved in framing this subject of analysis certainly require the application of inductive research methods in order to reach a greater level of interpretation by the researcher (Bryman, 2012, p.25).

2.2 Research Design – Mixed methods

Consequent to the selected research meaning system, the research design employs a mixed methods approach aiming to address the general subject of the research. In order to answer the specific research question A, a desk-study (Section 2.3.2) will help to conduct a **content analysis** in order to discuss the current spatial planning policy of WFA.

As the mixed method approach uses both qualitative and quantitative data collection methods, which allows the findings to address a wider range of questions (Denscombe, 2007: 56), the specificities of the satellite towns of WFA demand the application of a more inductive approach in order to collect the necessary qualitative data related to the current conditions of the railway urban areas located in these centres (Section 2.1.1). Therefore, and in order to address specific research question B, the application of the specific tool of **mental maps** (See section 2.3.3) on two selected **case studies** (Section 2.3.1) provides the complementary input to produce a more comprehensive result aiming to explore how urban areas around train stations as “stationary physical parts are as important as people and their activities” (Lynch, 1960, p.2). Combining both methods in the same study leads to “partially overcome the deficiencies that flow from employing one single research or one method” (Nachmias, 2007, p.12).

2.3 Research Methods

2.3.1 Case Studies Criteria

Case study analysis is applied when it is necessary to develop a detailed understanding of what is happening in complex situations (Moore, 2000, p.134). As it is necessary to generalize on the potential interventions for urban areas around train stations of local centres of WFA. The large

number of locations but the similarity in the conditions and general characteristics found in each of the towns suggest that this approach is a suitable method if further understanding of the satellite towns of WFA needs to be developed. However, it is not possible to carry the analysis in each of the satellite towns, meaning that a few number of stations have to be selected for the purpose of the research. Likewise, only two satellite towns are selected as case studies. This approach allows to obtain not only the necessary data based on the planning documents and land use plans but also to carry the qualitative study based on a comparison between the two cases.

The selection criteria follows a logic of comparison. Thus, it is necessary that two contrasting case studies reflect on general characteristic issues of the railway urban areas, but differ on the degree of impact these have on a given satellite town. Accordingly, the statistical data from Wrocław Statistical Office (*Urząd Statystyczny we Wrocławiu*) is focused on town population, weekly users, distance to Wrocław, number of daily services, and ticket prices. Through a brief analysis of all these combined factors the selection is carried out as detailed in Section 2.6.

2.3.2 *Quantitative approach: Content analysis*

The current spatial planning framework of Poland and its administrative division is clear in terms of the policies involved in development of urban areas. Accordingly, this section is focused on the only planning policy addressing the metropolitan scale in Wrocław: the Study of the functional cohesion in Wrocław Functional Area (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*), whilst, the statistical data gathered from Wrocław Statistical Office which comprises up-to-date data of the Voivodship (2016).

2.3.3 *Qualitative approach: Mental maps*

The second part of the empirical research is conducted by applying Kevin Lynch's method of mental mapping. This is an appropriate research methodology for the analysis of perceptions based on the elements exposed in Section 1.4. For Gustavo D. Buzai, the study of mental maps corresponds to a line of urban research in which "interesting links between qualitative and quantitative analyzes are produced" (2011, p.2). As urban areas around train stations present an external reality, that has an effect on the perceptions and actions of social actors (Bryman, 2012, p.32), this selected method will address the aforementioned perspective and it will function as a

scope to register and analyze how individuals face and grasp elements of the railway urban areas at personal level, through the interpretation of maps the participants draw in situ. Accordingly, it can be used in the design of urban environments according to a general understanding of their personal needs.

The analysis is developed by the researcher through the review of every map and generalization of the main findings. The amount of collected maps is defined by the application of the method theory. Two train station areas were selected and 15 randomly designated visitors and users found in the surrounding areas of the train stations were consulted.

Nonetheless, as the aim of the thesis is rather to organize the topic of railway urban areas and prepare a framework for understanding their specificity in satellite towns, this process can be then deepened by further studies, meaning that this specific method has the potential to be enhance to larger samples in following studies.

2.3.4 *Triangulation*

According to Rolf Johansson, triangulation “provides an important way of ensuring the validity of case study research” (2003, p.8). As the empirical study follows a study cases approach, the triangulation of the outcomes of the above mentioned methods will lead to recognize and conceptualize the general strategic guidelines for urban areas around train stations as a general framework for urban planners and local authorities based on a better understanding of qualitative perceptions and quantitative approaches to urban redevelopment. Moreover, these set of strategies to achieve integration between railway stations and urban environment need to be defined through the combination and discussion following methodology proposed by Luca Bertolini and Tejo Spit in *The Redevelopment of Railway Stations and Their Surroundings*, (2005). The structure offers a scope for the analysis of the findings by categorizing the observation into key processes needed to justify further actions:

- Transportation interchange: the strengthening and integration among heterogeneous transportation systems as response to the mobility gridlock.
- Activity pole: the emerging multi-centred urban region as the mature form of an industrialized metropolis with diversity of services and dynamics for investment.

2.4 Research Limitations, Reliability & Validity

A series of methodological issues are subject to consideration regarding the case study approach as a method of analysis. The most critical one is related to the issue of generalization. As many case study approaches, the aim of the research is to draw conclusions about two particular railway urban areas, and then apply these findings to other satellite towns. The validation after carrying quantitative and qualitative research sometimes create confusion when they are combined, as they often are in case studies. However, it is possible to achieve a valid generalization through induction as: “in case studies this is done through inductive theory-generation, or conceptualisation, which is based on data from within a case” (Johansson, 2003, p.9). The result of the research aims for a strategic framework which consists of a set of related concepts similar to the theory-generation logic mentioned by Johansson.

Equally important, some researchers stated their concern regarding the validity of the application of mental maps as these images are: “a duplicate of the extra-mental reality: the lived and the known” (de Castro, 1997). This double dimension based on the existence of two distinguishable spaces: the objective space as external reality and the subjective or lived space. As mentioned before, the ontological considerations of the research follow an approach combining positivism and critical realism, which are focused on the external reality of the urban space and its effects on social actors. This is not only justified by the nature of the subject of the study but also serves as a strategy to avoid harmful objections regarding the subjectivity of the results.

The most common method is to draw maps following the scheme provided by Lynch, which consist on the participant drawing on a blank sheet and asking him or her for some environmental context. However, this method has some limitations, since its internal and external validity is questioned, due to the lack of clarity in the precision and complexity of the maps and its reliability, which is relative, since it varies according to the ability of each individual. Therefore, the provided map incorporates a basic grid with the quadrants of the town and the shape and location of the train station, the map is located in the centre of the white sheet and is surrounded by a blank area in order to provide people with the necessary space to expand the area of interest. A verbal description of the exercise is also provided in order to clarify the task.

2.5 Ethical considerations

Regarding the first set of data for the empirical process all the consulted policy documents and statistical information are of public nature. These were collected in either digital or physical format during the first months of the research and no significant ethical issues were experienced during the conduction of the empirical process. On the other hand, the mental mapping method is not intrusive in nature and all the involved participants were not vulnerable in any sense during the process. As a mitigation measure, an explanatory paragraph was included in each of the maps stating the purpose of the research and what was intended to be done with the collected information. All the participants were assured of confidentiality in the presentation of results and no personal data was collected during the process. The collected mental maps, therefore, are completely anonymous, enabling the participants to draw without constraints. Participant consent was also sought in verbal form, who was fully informed regarding the nature of the research. To each mental map a number from 1 to 10 was assigned only in regards of the location of the participant within the railway urban area.

2.6 Sampling

2.6.1 Case Studies Selection – Satellite towns analysis

The two satellite towns selected as case studies to frame the collection and analysis of data have been chosen on the basis of the delineation carried out in the Study of Functional Cohesion in the Wrocław Functional Area (Section 1.2) and the analysis of the preexistent conditions of the data presented in Table 02.

Within the administrative area of influence of WFA, train stations range from just 11Km from Wrocław (Siechnice), up to roughly 30 km (Środa Śląska, Oleśnica and Brzeg Dolny). The biggest satellite town also has the biggest number of weekly users, Oleśnica. Both stations in Oleśnica amount almost 10,000 riders. Contrariwise, the smallest town do not have the smallest ridership, which is the case of Kąty Wrocławskie.

Table 02. WFA Train Stations Data (Station, Population, Users, Operator, Distance). Source: Institute for Territorial Development, 2016 (*Institut Rozwoju Terytorialnego*)

Station Name	TYPE	Population 2015	Weekly Users	Coef.*	Operator	Distance to Wrocław (Km)
Oleśnica	Station	37,450	8,732	0.23	PR	34
Oleśnica Rataje	Stop		1,188	0.03	PR/PKP	33
Oława	Station	32,572	3,015	0.09	PR/PKP	27
Jelcz-Laskowice	Station	15,853	3,054	0.19	KD	26
Trzebnica	Stop	13,099	4,623	0.35	KD	33
Brzeg Dolny	Station	12,420	7,869	0.63	PR/PKP	30
Środa Śląska	Stop	9,337	2,043	0.22	KD	34
Oborniki Śląskie	Station	9,108	7,227	0.79	PR	26
Siechnice	Station	6,791	908	0.13	PR	11
Kąty Wrocławskie	Station	6,621	2,660	0.40	KD/PKP	24

*Coefficient of operation: Population / Weekly users = Coef.

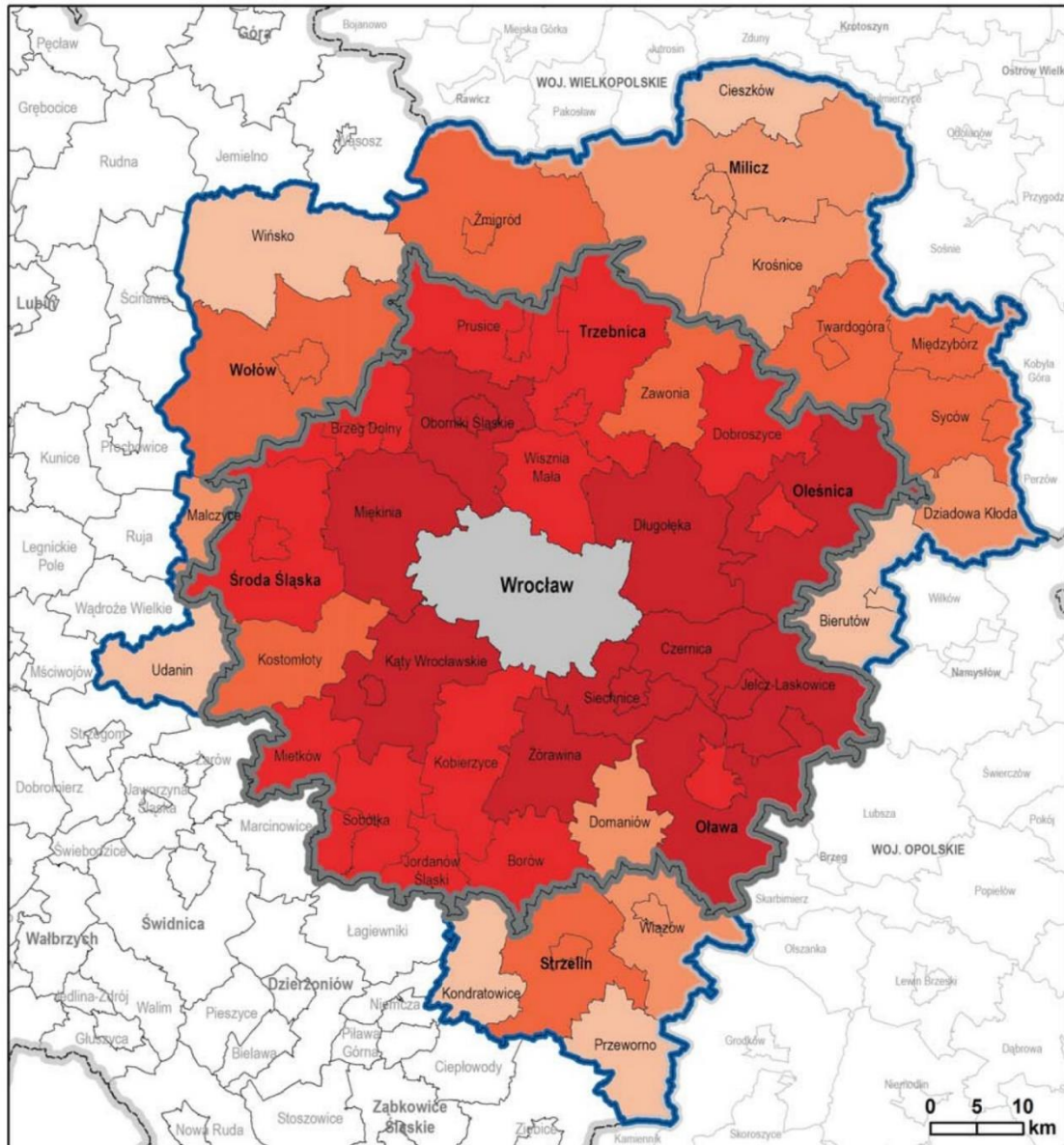
Looking further in to the data presented above (Table 02) it is possible to speculate on more specific findings. For instance, one of the first figures to draw attention is related to the comparison between users and population; the smallest town, Kąty Wrocławskie, with only 6,621 inhabitants is directly contrasting with bigger settlements like Oleśnica and Oława, which have 37,450 and 32,572 respectively. However, 2,660 people in Kąty Wrocławskie use the train in weekly basis, a coefficient draw at 0.4 (highlighted in green); while both Oleśnica and Oława present really low coefficients based on their weekly user basis, a difference worth to notice especially for Oleśnica Rataje that has the lowest coefficient of all the stations, only 0.03 (highlighted in bold red). Oborniki Śląskie is the town with the best figures in terms of weekly users compared to its population, it has the best coefficient at roughly 0.8 (highlighted in bold green). Towns like Jelcz-Laskowice and Oława, located at similar distances have coefficients of 0.19 and 0.09 (highlighted in red) respectively.

Siechnice is another case worth noticing, the town has roughly the same population as Kąty Wrocławskie but presents the lowest ridership of all the towns, 908 weekly users. Contradictory

enough, it has a strategic location close to the functional area, at only 11Km to Wrocław main station – Kąty Wrocławskie is located at two times the distance to Wrocław, but it nearly has three times the amount of weekly user – and it also has the second biggest urbanized area with 44 Km² – only behind Oborniki Śląskie with 45 Km² (Table 01).

Fig. 06. Degree of dependency of satellite towns towards Wrocław. (Symbols listed below)

Source: own elaboration



The above mentioned differences and comparisons does not solely depend on the users and distances of the stations. It is possible to rely on other socioeconomic factors to justify the selection of the study cases. For instance: in the Study of Functional Cohesion in the Wrocław Functional Area contains an analysis of the satellite towns and of the degree of dependency to Wrocław (on the scale from 0 to 12), which serves as a further criteria to select the cases (Fig 06).

The study shows a categorization for further subdivision of the municipalities into ‘high’ (6-8) and ‘very high’ (9-12) degree of dependency towards Wrocław and belonging to the WFA delineation (Fig. 06). Among the former sub-group, there are two urban municipalities – Oleśnica and Oława – with high degree of dependency and population above 30,000 inhabitants; and four urban-rural municipalities – Katy Wrocławskie, Oborniki Śląskie and Siechnice – with very high degree of dependency and less than 10,000 inhabitants.

The above mentioned categorization is important in order to compare strategies that would benefit both highly developed towns vis-à-vis less populated-rural municipalities. The selected case studies need to serve also as illustrations of each category. Therefore the selected satellite towns are illustrated in Table 03.

Table 03. Comparison between selected case studies (Satellite towns). Source: Own elaboration

Criteria	Oleśnica	Siechnice
Population	High - More than 30,000	Low - Less than 10,000
Weekly train users	High – 8,732	Low - 908
Connectivity to Wrocław	Low - More than 30km	High - Less than 10km
Category	Completely urban	Urban-rural
Dependency	High	Very high

Nevertheless, there are spatial factors that need to be analyze in order to draw a clearer image of the current situation and main differences observed in the data. These could include the location of the station, the physical conditions of the surrounding urban area or the degree of accessibility. These are factors that can only be analyzed through the application of the method of mental mapping in the selected study cases, this will allow the examination of the most particular qualitative characteristics before drawing any suggestions for potential redevelopment.

2.7 Case studies

2.7.1 Oleśnica

Oleśnica is the biggest satellite town of WFA and it is the seat of both urban and rural municipalities. Its population of 37,450 is distributed in 2,096 ha of urban land; and 1,304 ha of arable land, meadows and pastures. Oleśnica is located 30 Km north-east Wrocław and it is located on the left bank of the river with the same name that flows from the town to the river Widawa in the north of Wrocław. In Oleśnica there are two train stations: Oleśnica (main station and selected case study - located in the south of the city) and Oleśnica Rataje (located in the west bound of the city). The large railway junction in serve as connection not only to Wrocław, but to other major cities like Łódź, Warsaw, Poznań, and Katowice, and it is currently one of the station along the international lines connecting Poland to Czech Republic and Germany. However, the station do not present the correlation between its population and its weekly train users, mostly due to the efficiency and flexibility provided by private bus operators that offer services to Wrocław every hour (Polbus time table for May 2016), against the regular train services provided every 3 hours by PR.

Fig. 07. Oleśnica station. Source: Author's photograph



2.7.2 Siechnice

Located in Lower Silesia 11 Km south-east from Wrocław, the municipality Siechnice is a relatively young satellite town that since 2010 became the seat of the municipality under the same name (Robert, 61). In 2016 had a population of 6,791 inhabitants allocated in 1,563 ha, out of which 338 ha are urbanized, and the remaining areas are used in either agricultural production or are covered by forest, which includes a Natura 2000 protected zone of 987,8 ha shared with Oława, Jelcz–Laskowice, Czernica, and Wrocław (Natura 2000 - Grady Odrzańskie, 2009). The town has been suffering a noticeable increase of its population that was 3,887 back in 2004 (Wrocław Statistical Office, 2016). As mentioned above, the short distance to Wrocław is a strong advantage the satellite town as it takes less than 15 min. to reach the centre of the city from Siechnice station. depending on traffic conditions. However, Siechnice presents the lowest ridership of all the satellite towns of WFA, meaning that these characteristics are not attractive enough to encourage more people to use the train.

Fig. 08. Siechnice station. Source: Author's photograph



Chapter 3

Underlying structures: Description and analysis of inductive findings

According to the selected research strategy, the inductive approach leads to an empirical research process that begins with the description of the general findings regarding railway urban areas within the spatial planning framework of WFA, and the specific findings from the application and interpretation of mental maps carried on the selected case studies. As mentioned before, the different layers of findings follow a bottom-up approach starting from general or broader perspectives to the specific and more empirical findings (Section 2.7).

Moreover, among the main problems in the organization towards the identification and description of the underlying structures (Section 2.1.1), “the lack of planning documents in this field and the lack of research or studies of transport behaviour in WFA are among the most important aspects that would allow to plan the range of services suitable to the actual demand” (*Studium spójności ...*, 2015, p.236). The specific research question A (*How does the current spatial planning framework of Wrocław’s Functional Area guides spatial development in railway urban areas located in the satellite towns?*) will address the correlation between the general planning documentation in the field of railway urban areas, while the latter theoretical gap regarding specific behaviour will be tackled by answering the specific research question B (*How and in what ways urban interventions influence the perception of the built environment around train stations?*). As mentioned above, the first findings exposed in Section 3.1 correspond to the content review of the Study of the functional cohesion in Wrocław Functional Area (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*). Section 3.2 presents a description of the more specific findings from the application of the mental maps, comparing and generalizing the findings from the cases in Oleśnica and Siechnice. Both sections will allow to discover and discuss the underlying structures between the different elements of the subject analysis in Section 3.3.

Consequently, the aforementioned discussion is based on the theories delimited in the literature review in order to develop the **general functional and spatial guidelines for (re)development of railway urban areas in WFA** as the main contribution of the research.

3.1 General findings – Spatial planning directions for railway urban areas of WFA

From the review of the policy documentation, it was possible to identify and describe three general findings which are related to how the spatial planning framework of WFA is currently shaping development in railway urban areas of the satellite towns. Based on the Study of the functional cohesion in Wrocław Functional Area (*Studium spójności ...*), these topics correspond to: suburbanization process (*proces suburbanizacji*); demographics (*demografia*), and economic activity and commuting (*aktywność gospodarcza, migracje wahałowe*).

3.1.1 Suburbanization process and new developments in satellite towns

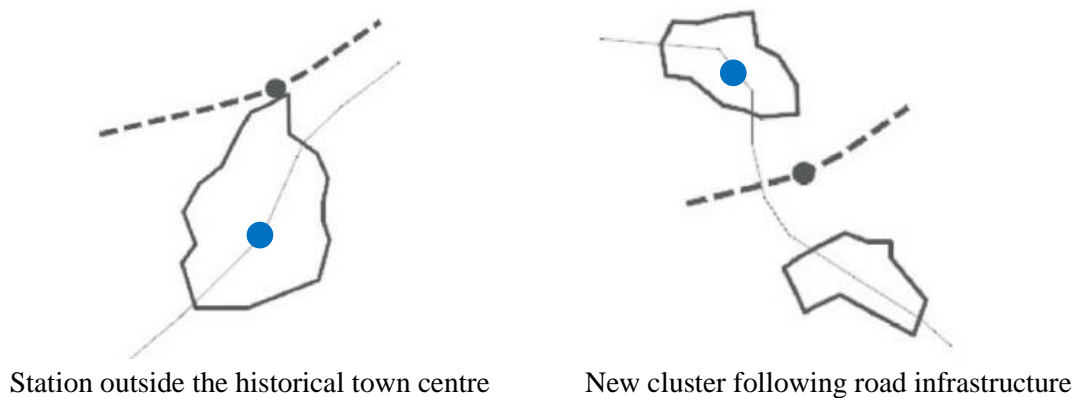
The first element shaping the development of railway urban areas in WFA corresponds to suburbanization processes and the consequences of extensive urban sprawl of the metropolitan area. This common suburban phenomenon is evidenced on the lack of correlation between the number of inhabitants and the size of the satellite town (Table 01). The process is not only a reality in the satellite towns of WFA, but also in many villages of the municipalities more distant to Wrocław, where the process is evident as a consequence of “the many years of faulty spatial planning in Poland” (*Studium spójności...*, 2015, p. 112-114).

As mentioned in the policy document, suburbanization processes have important economic repercussions in terms of production capacity, employment opportunities and labour force. In order to respond to these demands, it was possible to identify that new development efforts within the current planning framework of WFA follow either one of the following two schemes. The first one correspond to new development efforts arising at the historic core of the old village (*Studium spójności ...*, 2015, p. 12), which are the majority of the cases in the satellite towns of WFA. However, none of the existent railway urban areas within WFA are located in or close to the historical town centres. Consequently, every new development remains disconnected from the local railway urban area as an inevitable consequence of the current planning framework and the lack of specificity of proper measures to be applied.

The second scheme arises as a consequence of the growing demand for accessibility to the satellite towns, which has been translated into the expansion of the road network in WFA (*Studium spójności...*, 2015, p.237) and the isolation of new buildings from the existing town layout. As

new developments are often been planned parallel or close to road infrastructure new clusters of services or work are being created without following any strategic connection to reduce the dependency to individual means of transport. This finding shows that this particular scheme has proved to be critically negative as the concentration of new development parallel to roads and highways leads to a direct promotion of car use.

Fig. 09. New developments in relation to train station (gray point) and town centre (blue point).
Source: Study of the functional cohesion in Wrocław Functional Area (*Studium spójności...*, 2015, p.121)



Both of the aforementioned patterns are one of main barriers to achieve strategic integration of railway urban areas into the urban layout of the satellite town. Which is congruent with the consulted policy document that states “A perennial negligence in spatial planning has led to a lack of proper coordination of land use and the development of the building and spaces located in railway urban areas (*Studium spójności ...*, 2015, p. 235).

The review of the document shows that within the current planning framework of WFA, there is a lack of coordination in the integration of railway urban areas to the satellite towns, leading to a dispersal of services in the town centre and the creation of jobs parallel to roads that have an appropriate level of access. A correct balance of these conditions becomes difficult to achieve in the satellite towns of WFA, as higher investments are required in order to functionally and physically interconnect the railway urban area with these new developments. As a consequence, social demands in suburban areas has not been taken into enough consideration in order to properly reach the required access to housing, services, and most importantly, the railway connection to Wrocław and other satellite towns (*Studium spójności...*, 2015, p.237).

The current planning framework is directing development in railway urban areas to counteract the lack of infrastructure investment and functionally integrate new developments into existent railway urban areas. Therefore, suburbanization and urban sprawl in the satellite towns is highlighted as one the main findings that causes poorly developed railway urban areas outside Wrocław.

3.1.2 Demographics and housing in WFA

Like the previous general finding, the correlation between older population and the demand for housing in the satellite towns is a twofold that can be regarded as the second set of findings from the policy content review. Nevertheless, this is a wider challenge, faced not only by Poland, but by the whole EU in terms of the declining and aging of future population. Statistics project a further reduction of Polish population to 34.5 million by 2050, roughly 10% compared to the 38.6 million of the base year 2017 (Matysiak & Nowok, 2007, p. 20).

Likewise, from the review of the policy document it was possible to identify that the topic of demography is superficially considered. For instance, regarding the role of transport infrastructure it was only possible to find the following: “The topic of demographics has to be taken into account when planning railway urban areas in satellite towns” (*Studium spójności ...*, 2015, p.237). Nevertheless, changes in demographics will affect not only the current traffic demands of the functional areas or the availability of public transport within the satellite towns, but within a panorama of a growing older population, this will produce a switch in the expanse of local residents inhabiting satellite towns neither being actively engaged in the local railway urban areas nor actively using public transport to leave their residence. This issue has been identified, in the current empirical research process, as one that will have profound consequences on the strategies for railway urban areas from a long-term projection that will shape development the development perspectives in the future.

This general finding in the overall distribution of ages among the population is leading to several consequences. For instance, a decline in the number of people within working age will lead to a future reduction in the commuting levels to the city or other towns; to a diversification of the type of services and amenities focused on a mature population with different need sets and health

conditions; or at urban level, this will also increase the demand for more accessible and universally designed railway urban areas that requires to be adapted to a wide range of users with reduced mobility.

Similarly, it was possible to identify a high relevance of this topic in relation to railway urban areas and of housing demands. Related to the decline of the population, this trend will lead to a gradual decline in the amount of young people demanding access to housing solutions. As highlighted in the policy document, strategies to attract new residents to the satellite towns of WFA follow the SUIKZP master plan, “which is often associated with an excessive liberal approach to real estate management” (*Studium spójności ...*, 2015, p. 125). This has led to an excessive transformation of large pastoral lands into residential areas that are usually disconnected from the existent railway area. Potentially, this can be tackled through efficient strategies related to the first general finding through legal mechanism to regulate new developments outside the urban layout of the satellite town (Section 3.1.1). However, a decline in the number of occupied units will undermine any potential integration even further if there is less and less housing demand.

As many as 98% of the projected decline in population will affect the urban areas of WFA, because here “the process of aging occurs faster than in rural areas of the satellite towns, which is why this problem should be considered in any spatial strategies for railway urban areas” (*Studium spójności ...*, 2015, p.237-238).

Therefore, the second general finding from the policy consultation is described as the efforts within the current planning framework of WFA to strategically guide the development of housing coupled to railway urban areas in order to continually attract new residents and actively involve a broader range of residents in to the activity of the satellite town.

3.1.3 Commuting to the satellite towns of WFA

Regarding the third category of findings, the policy documentation of WFA mentions that “the concentration of work, administration, health, education and cultural facilities in Wrocław” – coupled with the intensive development of the suburban sprawl mentioned before – “has led particularly to the dynamic of the so-called circular migration” (*Studium spójności ...*, 2015, p.237). Whereas, the regular daily routine of travelling from residence to work, study or services

has become a basic characteristic of the satellite towns of WFA, “Commuting is one of the most important spatial elements shaping the functional relationships in the area and the impact of urban centres”. (*Studium spójności ...*, 2015, p.237).

As mentioned before, in the interest of decreasing the amount of daily commuters by private means of transport and increasing the share using public means, the policy document mentions that “given the mobility of the inhabitants of Lower Silesia and their access to higher education, an important element of the public transport system will be the connection of all satellite towns and Wrocław” (*Studium spójności ...*, 2015, p.238). This third task was clearly identified within the current framework directing the development of railway urban areas. The aim is to link together – using the train – the satellite towns that are capitals of counties in the immediate vicinity. However, the document also argues on the existence of an underlying stigma for raising the competitiveness of public transport, particularly railways, and how this issues is constantly undermining the accomplishment of this objective.

The concept of a "new culture of mobility" (*Studium spójności ...*, 2015, p.238), mentioned in the document, claims that it is necessary to achieve the optimization of travel through “different modes of transport and co-modality acting between them” (*Studium spójności ...*, 2015, p.238). This strategy, good in principle, is strictly related to the proposed solutions focused on a more efficient use of the car with Park & Ride combinations. Whereas, there is a lack of clarity on how other solutions can become part of this scope. This car-focused approach explains the explicit absence in strategies for bicycle, bus and pedestrian options integrated into the railway urban areas (re)development efforts.

Nevertheless, equal access opportunities in the area should be a subject of the strategic development for WFA and railway urban areas should play a role guaranteeing development on this direction. For the case of WFA, train connections are in principle a sustainable mean of transport that also offers the fastest and shortest connection from the satellite towns to Wrocław and vice versa (*Studium spójności ...*, 2015, p.238). From the review of the policy document it is visible the correlation of investment in railway urban areas and the attraction of entrepreneurship development and placement of large jobs and services areas. This, by allowing better labour mobility between the satellite towns.

The reasons behind this vis-à-vis relation (railway urban area and business attraction) is reflected on the findings from the study concerned to examine the economic activity of the satellite towns. A specific diagnostic in the study shows that in 2009 WFA registered a total of 134,822 businesses and they accounted for 42% of total entities operating in the whole Lower Silesian Voivodship. In 2013 the number increased to 152,335 (44%) in the same area (*Studium spójności ...*, 2015, p.238). The biggest growth occurred in Siechnice, but it was also noticeable in other satellite towns that experienced a similar dynamic of growth of the number of new companies and businesses.

Regarding the railways urban areas of WFA, what the third set of general findings highlights is that “good transport accessibility is a factor that enhances the attractiveness of investment areas” (*Studium spójności ...*, 2015, p.238). Therefore, the current planning framework of WFA is aiming to operate railway urban areas to control commuting in both ways, to attract investments and new jobs to the satellite towns and to play a major role in this internal migration of highly qualified professionals and staff that commute every day.

3.1.4 Summary – Spatial planning effects of WFA policy framework

From the above mentioned observations it was possible to find and describe the correlation between the objectives of the Study of the functional cohesion in Wrocław Functional Area and how the document serves as a strategy to direct further physical interventions in the railway areas of the satellite towns (specific research question A). These general strategies shaping the railway urban areas of WFA can be summarized as follows:

3.1.1 Strategic development of new infrastructure to functionally integrate railway urban areas to either the town centre or into emerging clusters parallel to roads.

3.1.2 Attraction of new inhabitant to the satellite towns and inclusion of a broader range of residents into the regular activity of the railway urban area.

3.1.3 Correlate new investments, jobs and services into railway urban areas as mechanisms to control commuting patterns of workers.

Nevertheless, as the three aspects answer the specific research question A, they also cast more interrogations on the particular influence of general strategies and how these findings can be translated into potential actions for (re)development of all the urban railway areas of WFA in the same degree.

Consequently, Bertolini and Spit suggest that railway urban areas evoke the coexistence of quantifiable qualities in space, together with immaterial qualitative attributes (1998, p.11). Which is why the perceptual aspects related to the apprehensions and use of these spaces and the potential interventions need to be approached and understood. The reason to create these link from general findings to further specific and more empirical observations are exposed in both the literature review and the theoretical framework. For instance, Buzai elaborates on the necessity to link quantitative and qualitative data in empirical analysis (2011); while Nachmias argues that these combination serves to avoid deficiencies while applying only one method (2007); and Bryman that argues that the external reality of the subject of analysis has a direct effect on the individual perceptions and actions (2012). The study of this effect has to move into the analysis from the general urban planning guidelines at metropolitan level, to more empirical and site-specific findings in order to explain the ways urban interventions affect the perceptions of the built environment around train stations.

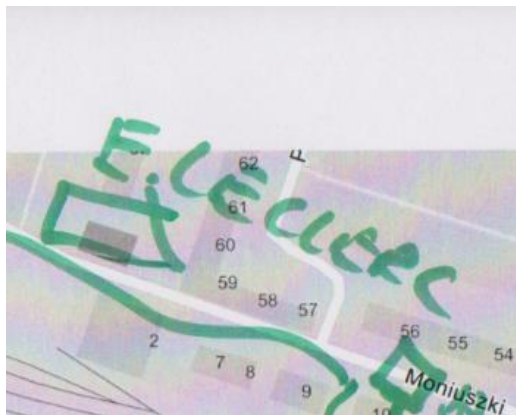
3.2 Specific findings - Legibility and imageability of railway urban areas

As mentioned before legible urban areas make their various outstanding elements easily identifiable within an overall image, “this implies the distinction from other elements as separable entities that express individuality or oneness” (Lynch, 1998, p.17). As part of the designed qualitative method, participants were asked to carry two tasks: firstly, to identify and locate on the map recognizable objects of the railway urban area and indicate the most relevant qualities of the station itself and the surrounding area. Secondly, and after the participants located different elements on the map, they were indicated to draw logical routes to get to the railway urban area, and to identify specific elements they use to indicate directions to access the railway urban area. This second task is aimed to show how easily the individual elements can be “grouped together into a global plan” (Lynch, 1998, p.17). The interpretation of the results is presented as follows:

3.2.1 Identity

After the analysis of maps carried out at the selected railway urban areas (Oleśnica and Siechnice), the results show that all the participants are able to recognize elements around the station area and read specific characteristics of the urban realm. The first specific finding is related to how this information was almost strictly expressed on the maps through the location and identification of buildings in the surrounding areas or within the station boundaries. For instance, in both cases service buildings like libraries, clinic and commercial areas were widely located on the maps (Fig. 10).

Fig. 10. Buildings and identity. Source: Participants (left) and Author's photograph (right)



Supermarket located close to Oleśnica Station



Power plant located close to Siechnice Station

Point of access, barriers and even the participant's specific location regarding the railway urban area showed how legible the spaces are, as many were able to indicate the location of their house (*Dom*), or place of work within the railway urban area as "It's me" (*To ja*) (Fig. 11), even going beyond to locate elements outside the designated area of the map (As expressed by Lynch in his methodology).

Fig. 11. Buildings and identity. Source: Participants.



In the case of Oleśnica Station participants also recognized individual buildings that give character to the area but do not currently have any function or they were unaware to recognize the current use, this was particular indicated with the word "Railway" (*Kolej*) or question mark (?) (Fig. 12).

Fig. 12. Unidentified buildings. Source: Participants

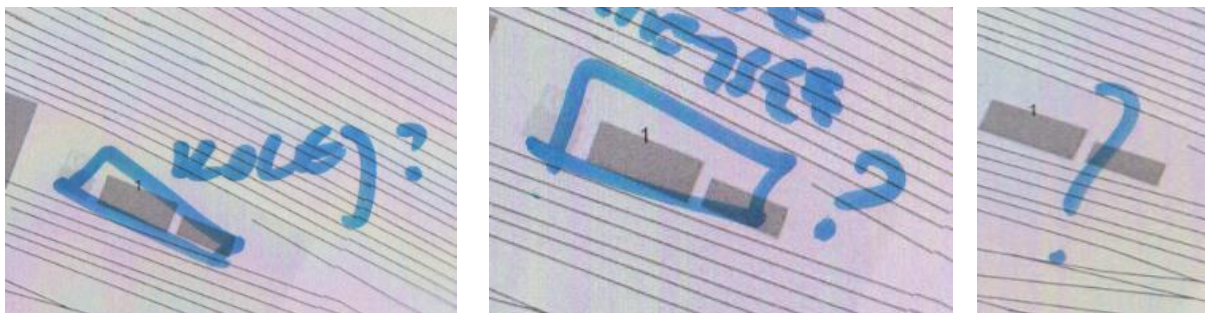


Fig. 13. Identification of Oleśnica Train Station. Source: Participant (left) and Author’s photograph (right)



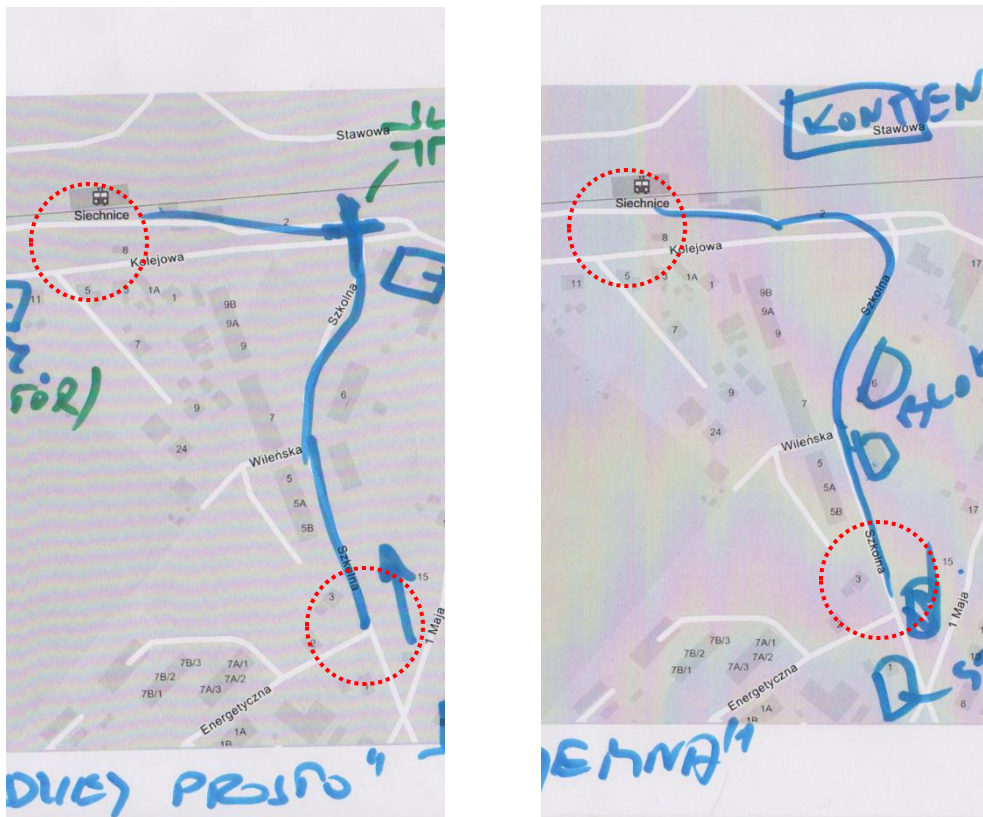
These specific set of findings show that the perceptions of identity within the railway urban area are focused, firstly, on other building and elements in the area, and secondly on the station itself. For instance, participants drew crosses in the case of churches, or chimneys in the cases of factories as elements that give identity to these elements, but regarding the station only one of the participants identified its location on the map with the word “PKP” which does not give any sign of identity but the recognition of the company in charge of the trains (Fig. 13). Therefore, it is important to claim as part of the first set of findings that identity is clear for individual perception as long as it is the outcome of specific symbols or elements that give uniqueness to buildings or individuality to open spaces.

3.2.2 Structure

The second task related to the evaluation of the legibility of the selected railway urban areas corresponds to the possibility to establish links between the different elements mentioned above. This process was congruent with the findings from the spatial planning framework of WFA as the results showed that the continuous growth of the satellite towns is heading away from the centres (Section 3.1.1), making difficult for the participants to indicate routes or give directions coming from the town centre. The consulted participants used the elements of the surrounding railway area to indicate the beginning of the route from these starting points. For instance, in

Siechnice all the participants indicated that the best route to arrive to the train station is following Szkolna Street. However, in any of the cases the maps showed a clear beginning of the route, even if this same pathway is actually the most direct connection between the centre of the town and the railway urban area. This indicates that patterns of relation to other objects exist but they are not as visible to the observer as the elements that constitute the route.

Fig. 14. No clear connections between elements. Source: participants

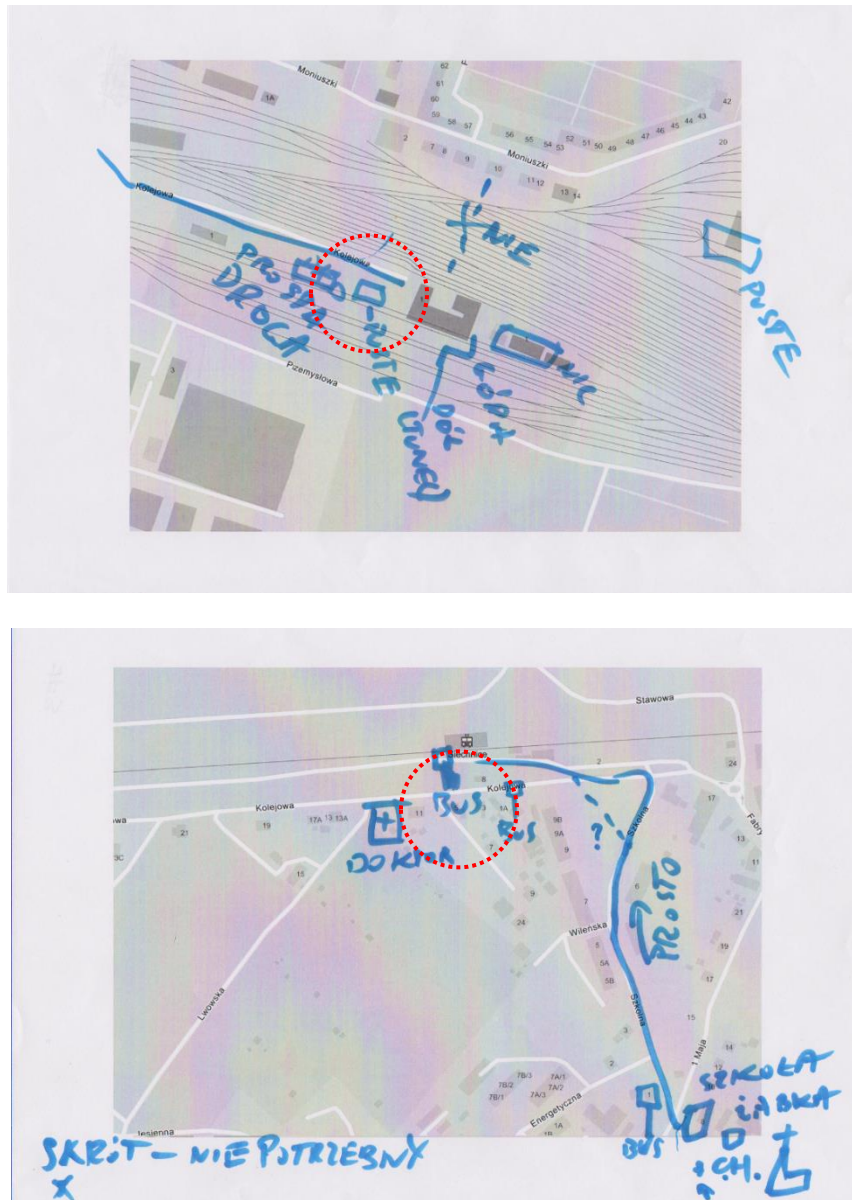


The relations between one specific element and the observer are defined by Lynch as structure (1998, p.8-9). However, as the results of the mental maps indicated was not possible to recognize from the participatory qualitative income any perceptual connection of the train station and the satellite town, besides the aforementioned shortest route. This finding can perhaps be the result of misinterpretation of the request as a consequence of the selected research method. Nevertheless, it is arguably valid to say that the result also indicates that among the participants, both railway urban areas only appear connected to the urban layout of the satellite town when the need to approach them surges.

3.2.3 Paths

From an empirical perspective, in the mental maps of both Oleśnica and Siechnice stations it was possible to identify a difficulty to perceive or recognize specific paths within the railway urban area. This is consequent with the aforementioned findings on Structure (Section 3.2.2). For instance, the consulted participants, in and around both train stations, were only able to perceive paths to the bus stations because they were conveniently situated right in front of the buildings (Fig. 15), but were not able to locate paths towards other forms of communication infrastructure.

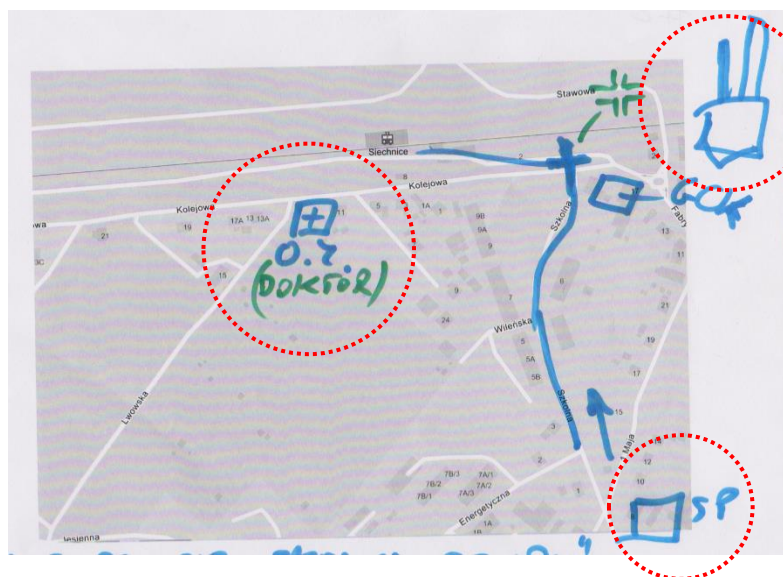
Fig. 15. Bus stops in front of Oleśnica and Siechnice stations (red circle). Source: participants



This is particularly critical in the case of Oleśnica (top map Fig. 15) that has both large and spacious train and bus stations, but it was not possible to observe any correlation in the city structure suggesting the interchange of passengers between both stations. For instance, it is possible to see the word “No” (*Nie*) over the bridge that crosses the tracks towards the town, meaning that the participant does not recognize this particular path as a suitable connection to other stations or forms of transport in the town centre. Likewise, this potential connection between modes of transport is currently one of the biggest challenges for satellite towns that needs to be developed. (*Studium spójności ...*, 2015, p. 235).

Likewise, a proper management of paths is not limited to the connections to others means of transport. Redevelopment of railway urban areas must increase the perception of connectivity to other services through physical interventions. For instance, “modernization attempts in train stations must include railway areas beyond the buildings themselves connecting nearby parks, services or other public facilities like libraries or clinics (*Studium spójności ...*, 2015, p. 235). Similar to what the policy document indicates, the majority of the participants successfully located factories, schools, parks and medical services within the railway urban area and manifested that they use them to give directions to others. Nevertheless, the delineation of these paths on the maps did not show direct connections from the stations to these buildings (Fig. 16). This was particularly noticeable in Siechnice station where the children’s playground is located on the other side of the street in front of the station but no participant suggested a path through the park.

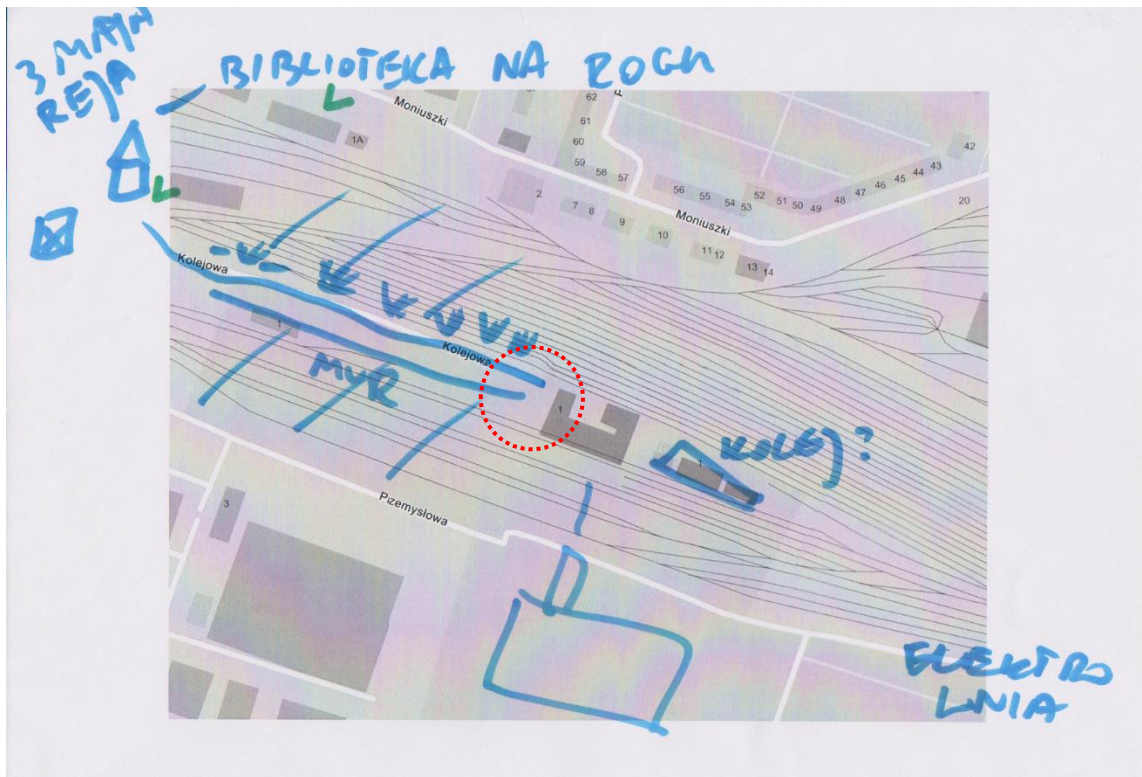
Fig. 16. Services (school, clinic and factory) around Siechnice station (red circle). Source: Participant



3.2.4 Nodes

The problem of integration between satellite towns and railway urban areas was clearly visible in the perception of public spaces around both selected stations. Unfortunately, the empirical process suggested that land use zoning is not heading in the direction of building the capacity of this urban areas as the nodal places both highlighted by Conticelli and Lynch. Clearly noticeable is that in both cases mental maps draw by participants skipped the zones in front of the stations as areas functioning as a nodal places. For instance, the main street leading to Oleśnica station end on a sidewalk just in front of the station access (Fig. 17). As indicated by the participant, there are any sort of welcoming or gathering areas for both users and visitors of the station.

Fig. 17. Street leading to Oleśnica station. Red circle indicates lack of welcoming or gathering area as indicate by the participants. Source: Participant



Currently both courtyards in front of the station buildings in Oleśnica and Siechnice are being used only as parking lots, which means that the transport function has become dominant over the public space function. These functions are reduce to private vehicles, buses or taxis briefly stopping to pick up or drop passengers. Historically this areas were part of a representative feature

of the station that even lead to enhance the prestige of the railway urban areas (*Studium spójności ...*, 2015, p. 23). However, in terms of gathering or meeting capacity, the participants did not perceive these courtyards as joining nodes or gates to the community.

Another important characteristic is that in both cases paths were identified on a basis of efficiency or as a “shortcut”, meaning that the participants in Oleśnica and Siechnice drew paths that head directly to the access of the station and not to a gathering point. This aspect is particularly critical in Siechnice where supporting services are currently available for users of the station or local residents, as evidenced by the regular use of the word “Nothing” (*Nic*) on the maps (Fig. 18), meaning that the participants do not recognize any sort of readily apartment reasons for people to stay in the railway urban area.

Fig. 18. “Nothing” around Siechnice station (red circle). Source: Participant



However, it is also important to notice the phrase: “No need to improve the road!” (*Nie trzeba usprawnić drogi!*) (Fig. 18), for some participants even without proper connections to other services, as mentioned before, the existing paths to the town centre is appropriate to fulfil the necessary connection to the railway urban area in Siechnice.

Regarding nodal functions, the policy document is congruent with the aim of locating services within the railway urban area, as it states that: “It is necessary to plan ahead corridors for the development of basic transport and elements and services related to travelers. Excessive freedom in the development of traffic generating sites without maintaining gathering areas will cause lack of opportunities to develop the necessary elements (eg. Land for parking near the railway station)” (*Studium spójności ...*, 2015, p. 240).

3.2.5 Edges

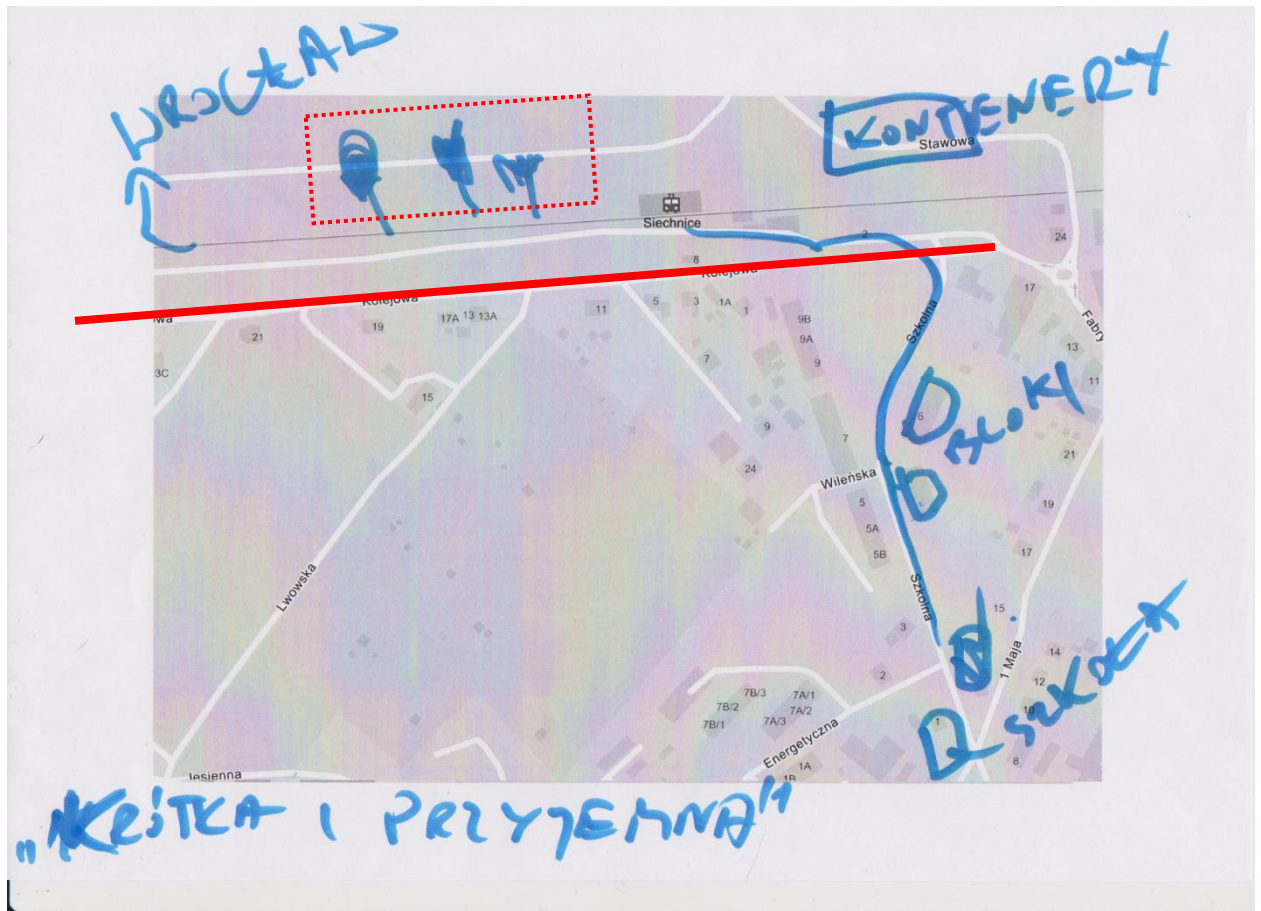
Lynch mentions that edges correspond to linear elements that do not function as paths. However, one of the first findings collected from the application of the mental maps method, is that participants also identified divisions or borders along which two parts of the railway urban area disconnect from each other. This was the case in both stations where elements like fences, walls, lines of trees and even the tracks marked a distinction between the being inside or outside the railway urban area.

Fig. 19. Edges (red dash line) around Oleśnica station. Source: Participant



Fig. 20. Border dividing Siechnice station (red line) and line of tress as barrier (red dash figure).

Source: Participant

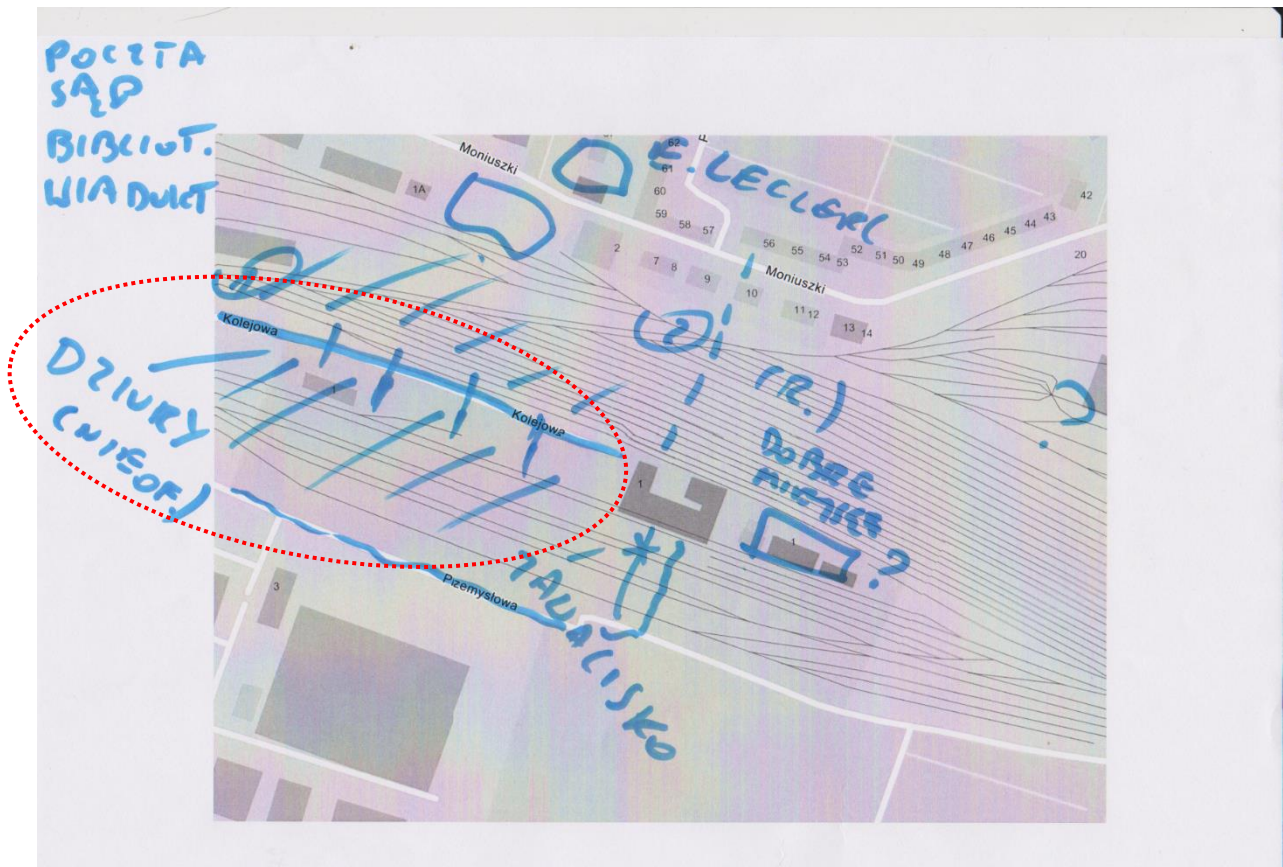


For instance, Fig. 19 shows how one of the participants perceived the fences around Oleśnica station as barriers to access the main station building, even the existence of the pedestrian bridge does not discourage this perception among some of the users. Likewise, a really interesting finding highlights how the tracks or the position of the station itself are perceived as borders in Siechnice station. Fig. 20 shows how one of the participants indicated that “cuts and limits” (*Krótką i przyścienną*) are the main perceived elements in the railway urban area. Lines of trees and stacks of containers inside the area do not interfere with the access to the station as much as the road that is cutting the pedestrian connection to the main building.

Regarding the treatment of borders like fences and walls, an important finding highlighted the necessity to consider every case with particular care on regards the size of the station. For instance, comparing both case studies, the number of trains regularly crossing Siechnice allows a rather flexible management of the station. A variety of points of access were noticed in the drawings as well as the possibility to perpendicularly cross over the tracks, due to the smaller size of the platforms and less number of tracks.

Contrariwise, Oleśnica as a major station of the transport network of WFA, has a major number of trains (passengers and cargo) crossing the station on a daily basis. This heavy demand requires a major control for access points and security in the railway area to avoid pedestrian access through informal paths. Nevertheless, the size of the station spurs people to find shortcuts to the station. Many participants marked “holes” (*dziury*) on the maps, where the fences have been cut or presented openings in order to serve this purpose (Fig. 21).

Fig. 21. Word “dziury” indicating where the holes are in Oleśnica Station. Source: Participant



The application of the mental maps in Oleśnica station was also particular in the sense that the main buildings are located between railway tracks, which leads to further deficiency in the level of access mentioned above. When the participants were asked to mark obstacles around the station it was hard for them to recognize entrances for pedestrians as the map drawing was surrounded by borders (Fig. 21).

3.2.6 Landmarks

As mentioned before, the rationale for the creation of new projects in the satellite towns is focused on isolating strips of buildings or land for industrial nature (Section 3.1.1). This issue tends to favor bus lines in order to connect the urban centers but leads to large disparities for the functioning of railway stations of the satellite town (*Studium spójności ...*, 2015, p. 239). For instance, the location of the main bus station in Oleśnica is far more competitive than the railway urban area, as the former one is located just a few meters walking from the historic market square. As a consequence, the participants of the mental mapping processes perceived the latter one as completely disconnected to the town centre, also evidenced in the overlooking or lack of perception of the pedestrian bridge towards the town centre (Fig. 15 and Fig. 17 respectively).

However, this practice is particularly hard to achieve partly due to the desire to ensure the development of areas with easier access, to improve the image of the satellite town, or to avoid nuisance for the environment. Accordingly, after the analysis of the mental maps it was possible to observe among both exercises the repetition of the word “nothing” (*Nic*) in regards some of the areas around train stations that were perceived but not identified (Fig. 18).

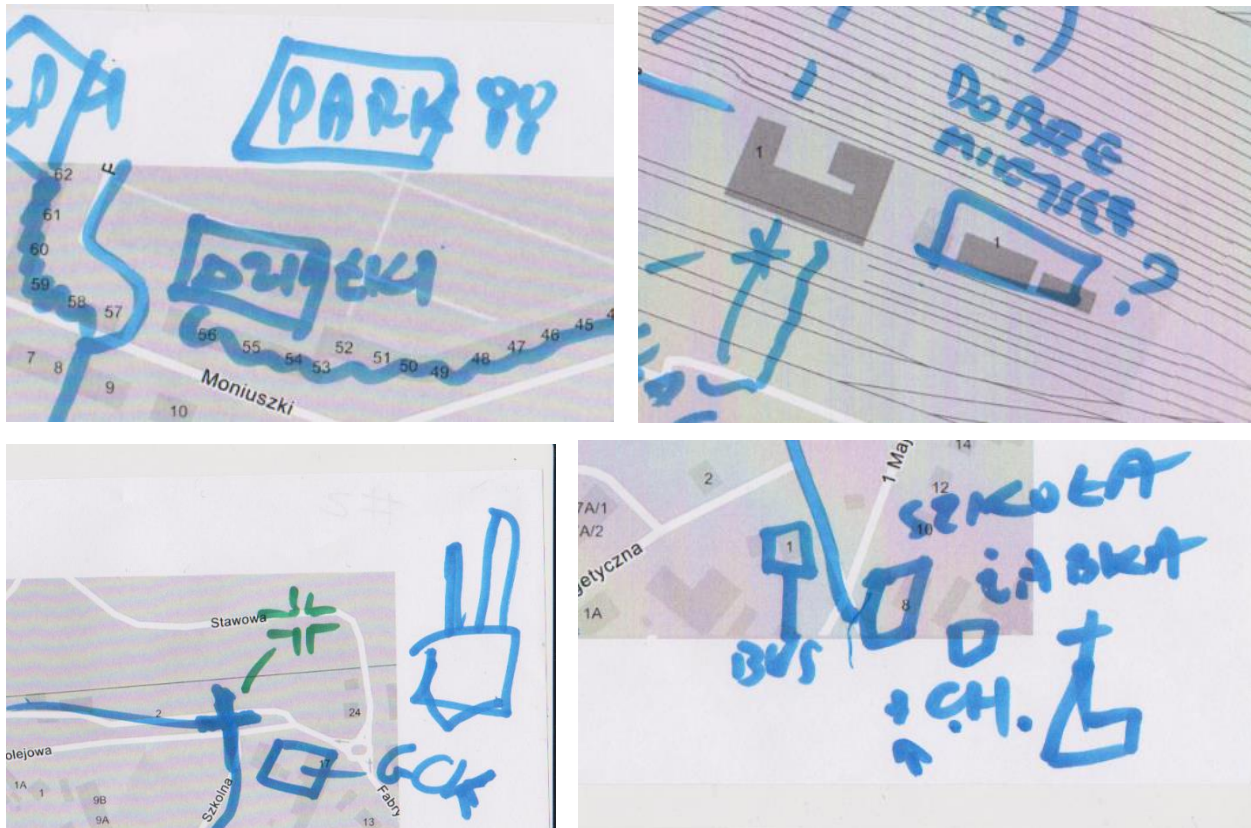
Fig. 22. Elements surrounding Oleśnica station. Source: Participant



The results also shows that there was an incapacity among the participants to recognize a clear relation between railway transport and access to other services and facilities around the station (Fig. 22). This topic in particular is considered to be critical in Siechnice where the participants recognized to be unfamiliar with the railway urban area because nothing encourages them to remain in these area before or after the train arrives.

Specific elements in both stations make them recognizable among the participants. For instance, in Oleśnica Station the pedestrian bridge over the tracks on the north side is recognizable element that most of the participants instantly located within the railway urban area. Even surrounding towers, factories or the station itself were less present in the participant's apprehensions than the bridge. In the case of Siechnice station, elements that are not actively involved in the functioning railway urban area were recognized as dominant elements of the station. This was the case with the chimneys of the local power plant located even beyond the space of the map but the majority of participants clearly laid on the drawings.

Fig. 23. Elements used as landmark or reference points. Source: Participant



3.2.7 Summary – Qualitative findings influencing the perception of railway urban areas

Regarding the specific research question C, the current state of the railway urban area in both satellite towns is influencing the perception of the built environment in different levels. From the comparisons between the two selected cases it was possible to discover that, as one might expect, people adapt to their own urban environment and extract the identity and structure of the railway urban areas from the scarce materials at their disposal.

For instance the types of elements used to build the imageability of the railway urban areas, and the qualities to make strong or weak connections among these elements (structures) seem perfectly comparable between the two satellite towns. Both highlighted problems in the level of orientation and satisfaction that the participants perceive in the different physical spaces. Among other things, the maps show the lack of identification of the train station and the spaces surrounding them. Similarly, there is little scope for visual connectivity at both stations.

Regarding legibility, the edges seem to become dominant and hide the accesses to the railway urban areas. While the open spaces in front of the train stations, as means to mitigate this issue, are ineffective due to the lack of reasons people perceive to remain in them. This is evident in the mismanagement of green areas and deteriorated conditions in paths and nodes.

From both outcomes, it seems to be a lack of “sense of a whole” in railway urban areas. The structure between elements makes weak perception of imageability and this is the outcome of the lack of qualitative interventions on the physical conditions of the different aspects people use to build legibility. A deficiency in the detail and quality of nodes and edges drives the perception away from the paths as a result the railway urban stations is not readable as part of the overall structure of the satellite town. Perhaps through physical interventions to radically improve the physical presence of the station area building could result in railway urban areas fully integrated in to the satellite town fabric and attract further externalities like transport integration and spur socioeconomic activities, which will certainly go in a “hand to hand” direction the directions of the current planning policy framework of WFA.

Chapter 4

Conclusions - Underlying structures

If satellite towns are implicitly understood as a higher form of the garden city, train stations and their surrounding areas have to be instrumental to achieve the aims of both planning theories. Therefore general guidelines for these areas have to spur connectivity towards the central city and other satellite towns, and steer efficient allocation of services within attractive urban environments (Bertolini & Spit, 2005, p. 4-5), as exposed in both literature review (Section 1.3) and methodological approach (Section 2.3.4). Therefore, it is fundamental that railway urban areas in WFA contribute to take a full advantage from integrated transport and socioeconomic activities. The following section moves into this direction with the triangulation of both general findings from the urban planning guidelines for WFA, and the specific findings from the mental maps.

4.1 Triangulation of quantitative and qualitative findings

According to Bertolini and Spit, economic development objectives at metropolitan level and transport infrastructure improvement, go hand to hand while redeveloping urban railway areas, as “these constitute one of the sectors to address competitiveness at metropolitan level” (2005, p.4). However, literature review evidenced a theoretical gap regarding how these potential outcomes can raise the competitiveness or improve the perception of urban quality for the specific case of satellite towns, in other when applied outside big cities at local level.

Moreover, the combination of both layers of observations contribute to the discussion regarding the delineation of strategic guidelines for the railway urban areas of WFA (specific research question C). In order to suggest the correct integration between development objectives and transport improvement is actually the outcome of a twofold of planning identities of the railway urban areas, or nodes and places (Bertolini & Spit, 2005, p.9), the following conclusions analyze in further depth this subject as follows:

4.1.1 Node in the functional network

The notion of node in the functional network suggest that railway urban areas are the combination of links (railway lines) that are knotted in one point (station) to raise the functionality of the whole metropolitan area. Likewise, the general findings from the Study of the functional cohesion in Wrocław Functional Area (*Studium spójności ...*) suggested that these nodes mostly facilitate access to trains. While the connections to other modes of transportation are prompted in a lesser extent. The close location of these nodes into a metropolitan area allows this network to functionally operate in order to enhance the overall competitiveness in WFA. Following this externality, Shao mentions that a constitutive characteristic of satellite towns nowadays is that they belong to a “multi-centered and open city structure” (2015, p.26), which means that the satellite towns and Wrocław are connected in order to distribute these functions into multi-centre networks. However, the following section discusses the possibility to reform or advance forward the general observation that railway urban areas constitute just a point to access public transport within WFA.

The current planning framework of WFA will strengthen aforementioned integration between different transportation systems as response to the suburbanization patterns currently shaping the functional area (*Studium spójności...*, 2015, p. 112-114). Like its predecessor, the modern satellite towns share a strong connection towards the central city, Wrocław. This was evidenced in the general findings as commuting patterns, from satellite towns to the capital city (*Studium spójności...*, 2015, p.237). Reflected on the large numbers of inhabitants that “spend a large part of their weekdays outside the town in which they live” (Skrzypczyński, 2016, p.44), a pattern that is likely to change as the age distribution of the population is projected to change. However, even if satellite towns are dependent to the larger city to access some of the more specialized services that are not available in the town, they still have some level of independence that is expected to improve by following the current spatial planning framework and if more transport options are accessible within one station.

Likewise, the combination of the main three findings from the policy content analysis (suburbanization, demographics and commuting), coincide on one perspective: that transportation systems will increase their importance into the current spatial planning framework. However, satellite towns are a contrasting case compared to a larger city like Wrocław, as the latter has larger

ridership. In the case of railway urban areas in satellite towns of WFA development cannot be carried by solely depending on externalities from the policies intended to increase demand or by offering more transport services “under one roof”. This is one of the major theoretical gaps the following section is intended to address and expands the aforementioned concept exposed by Bertolini and Spit, as the notion of node in the network needs to go beyond the potentials of transport interchange (2005, p.9).

Undeniably, a fundamental role of the railway urban area will remain focused on efficient organization of connectivity options, either in or around the station. However, the success of the node at local level in WFA also depends in similar regard on its own urban characteristics or physical qualities. In other words, nodes have to be successfully designed in order to operate as facilitators of seamless journeys and as a standalone spaces that appeal to users, commuters and visitors in similar degrees.

This additional underlying structure of the node means that commuting and internal mobility patterns place railway urban areas in a “strategic position while planning the functional area” (*Studium spójności ...*, 2015, p. 2). It is possible to argue that the aforementioned “strategic position” refers to nodes embedded in the means through which people apprehend and experience their local settlements; and interventions of railway urban areas that appeal to the personal experiences or individual apprehensions of the node. Basically, high quality urban railway areas are as important as the ease in the connectivity or frequency of links established among them.

The extension of railway urban areas into node in the network is not an explicit observation found in the policy content analysis. The current planning framework of WFA is almost strictly focused on directing the development of railway urban areas towards the attraction of new businesses (*Studium spójności ...*, 2015, p.238) and new residents through housing development (*Studium spójności ...*, 2015, p.125) as the consulted policy document evidenced

Nevertheless, from the above mentioned considerations it is arguably to say that both roles of the railway urban area have the potential to spur a wider range of outcomes from this additional or extended comprehensive responsibility. For instance, high quality nodes will play a major role inspiring people to opt for railway services, either to commute to Wrocław or to travel to other satellite towns, or will serve to promote the satellite towns by trademark (landmark) facilitates that

are individually recognizable within the network. Under these conditions these areas will have a closer relation with the urban fabric at local level, where according to the specific findings they constitute structural relations to other important facilities of the town.

4.1.2 Place in the satellite town

As expressed before, these areas are not only a train station per se but, as many authors agree, they are also a place that constitutes a specific section of the satellite town. According to Lynch, as these sections are a wide ranging concentration of buildings and open spaces, a varied collection of links or connections can be established among them. Nevertheless, if the notion of place in the satellite town is intended to proportionally spur the impact of the railway urban area according to its size, it is necessary that these places achieve a proper level of integration into the existent urban layout. In other words, the aforementioned connections need to create efficient connections with the other elements of the satellite town. The notion of place in the satellite town indicates a general underlying structures enhancing or broadening potential of the railway urban areas into the urban layout in WFA.

Accordingly, this lack of proper integration is one of the specific findings from the generalization of the mental mapping results. From the imageability perspective aspects like paths, borders, and landmarks have to be managed differently in order to conjoin in achieving this enhancing effect. For instance, in both railway areas it is evident that the inclusion of coherent and seamless paths connecting the aforementioned components of the railway urban area (Section 3.2.3) will potentially allow more people to foreseen connections to the stations from different areas of the town. Likewise, a correct management of the borders and edges of the railway urban area could potentially reveal the station itself to more users, including visitors that are not familiar with the town (Section 3.2.5). While, a stronger connection to surrounding landmarks or distinguishable buildings in the satellite town has the potential to increase the relations with the station from further distances, or with other spaces that are not necessarily connected to the railway urban area like the suggested libraries, factories or allotments found in the mental maps (Section 3.2.6).

However, these specific results also made clear that regardless how weak or strong the structures or connections among the elements are, there is still a clear identification of the railway

area within the satellite town. This was evidenced as the participants of the mental map process recognized unidentified buildings related to the train function or unofficial accesses to the station. While, even without been explicitly designated on the map, the stations themselves were also subjects of clear recognition through the perception of relations like distances from the town centre, the historical presence of building and its function, or connections to commercial facilities or factories.

From the above mentioned findings it is possible to conclude that the underlying structures regarding the notion of place in the satellite town is related to the potential of evidencing the two type of relations between the elements of the satellite town: material and immaterial relations.

Moreover, efficient material relations between the different elements of the railway areas refer to specific physical interventions in the urban layout of both station and satellite town. These are more direct and easily identifiable interventions on paths, nodes, edges and landmarks. However, as railway urban areas are still immersed in activity poles it is also possible to enhance the structure through immaterial relations, landscape appreciations or qualitative perceptions made by users and visitors. For instance, connections to the town centre can be strengthen through commercial axis if people perceive more reasons to access specific services while walking from the railway urban area to an shopping facilities, libraries, or education centres. Another example could be the promotion of specific destination potentials like culture, gastronomy or nature can be established from the moment riders arrive to the train station. While, through information, advertising or other of channels that influence people's behaviour and choices directly can also be counted as part of these intangible measures.

What these possibilities put forward is the possibility to transform railway urban areas into liveable active places by striving appreciations on people perception of the railway area. Moving forward from being simply elements over a railway transport network, to places fulfilling a number of additional functions for the satellite towns of WFA. If people perceive railway urban areas as more than transportation hubs, but as spaces to cultivate civic pride, spur economic growth, and to allow a community to gather; this will undoubtedly constitute a more sustainable approach to equal development plans that do not need to rely on big investments as first measure for intervention. Likewise, this is potential is implicitly found in the spatial planning framework of WFA, as the

document states that urbanization processes in WFA are adopting different forms with the potential to shape not only urban development but the way public interaction is carried in the whole functional area (*Studium spójności ...*, 2015, p. 239-240). This concept will not only attract economic activity and larger ridership, but it will also enhance a new form of interaction in the railway urban area, one that relies on integration of livable spaces through the community.

4.2 General functional and spatial guidelines for (re)development of railway urban areas of WFA

After the triangulation process, it is possible to argue that the (re)development of railway urban areas may be achieved through the enhancement and combination of the aforementioned twofold of underlying structures. Regarding the subject of analysis of the present research, both concepts are focused on how to make efficient but attractive railway urban areas from two set of relations, the enhance of the station itself as **node in the functional area**; and the role of the railway urban area as **place in the satellite town**. In order to suggest the extent in which these potential outcomes can be achieved in the railway urban areas of the satellite towns of WFA the following general functional and spatial guidelines for (re)development of railway urban areas in WFA are proposed as an outcome of the discussion, and organized as follows:

4.2.1 Functional guidelines

Integrated Interchanges: Within the interchanges is necessary to adopt a hierarchical system in the nodes indicating the best availability of options between rail transport, bus, bike and other means. Focusing in communication lines at suburban and regional level equipped with Park & Ride and Bike & Ride options. Also to adopt a joint ticketing models which allow interchange of between different carriers.

Concentration of services: Railway urban areas should be considered as "trade points" that can act as an integrated transport nodes to access more specific services located in Wrocław, and to offer basic firsthand services. These services should be specially targeted to serve the needs of three subgroups: regular commuters, residents and occasional visitors.

Seamless journey: Correct integration between the different elements of the railway urban area in order to facilitate easy transfers within for passengers. This means to facilitate information of more convenient routes, disabilities, luggage, etc.), and the same between in gathering areas to other public transport modalities.

Accessibility: Increase accessibility for local commuters, and between immediate communities. In these sense, one of the major purposes of redeveloping urban areas should be to achieve universal access conditions and to assist passengers with reduced mobility.

4.2.2 Spatial guidelines

Table 04. Spatial guidelines for (re)development. Source: Own elaboration

Goal	Description	Method
Gathering nodes	Livable areas that serve as meeting, resting and waiting points	Outstanding urban conditions of open spaces and courtyards serving.
High quality spaces	Stations and paths facilitating interchange among the different means of transport.	Good aesthetic choices and seamless paths between the station and the surrounding areas
Urban identity	Train stations that could be used as efficient landmarks or gates to the community	Development of unique mixed-use environments and services through remarkable designs.
Livable stations	Raise the bad quality of station's environments and conditions of the buildings	Security measures through urban design and formal surveillance devices.
Imperceptible edges	Correct treatment of borders and barriers to deliver security and control but to reveal the railway urban area to users and residents.	Restore walls, buildings and green spaces to allow better views of the railway area

4.3 Comments on contributions to the literature and potential enhancement of the research

The tendency to disentangle transport from urban planning is not sustainable. The planning framework of WFA is focused in metropolitan integration as a way to improve the quality of living in the satellite towns. Therefore urban development strategies applied to this subject of study has to strongly include its transport nodes.

As expressed before, a broader approach, expanding the individual satellite town to a coherent multi-centered metropolitan structure or functional area, is also a key strategy applicable to railway areas, **expanding the notion from train station to the broader urban area will prompt a wider range of externalities for the nodes of WFA transport network at local level.** The notion of place in the network and place in the satellite town are perspectives to enhance this reach. This is one of the main theoretical contributions of the present research to the existent literature. It follows similar ideas to the ones exposed by many authors regarding development in many important railway urban areas in large cities at European level. However the conclusions from the developed study may slightly differ from the selected theoretical contributions.

Many of the dissimilarities were prompted from the same theoretical review, perhaps taking inspiration from Ebenezer Howard's ideas to create better urban environments through planning. These inspirations moved forward to the concept of satellite town as a justification **to incorporate qualitative aspects of urbanism, communitarism and living environments into the debate of railway urban areas.** This is the second contribution to the existent theoretical framework as the basic philosophy appears to be the same in all contexts: concentrating urban development around stations in order to increase transit use, and increase economic competitiveness. However, these aims do not fit at local level. This is why it was important to approach the phenomenon through a wider but more empirical scope.

As the incorporation of the mental map analysis enhanced the outcomes and conclusions, as well as to address one of the sought research lacunas, it also served to foresee additional perspectives on how to suggest further studies following this methodological approach. For future researchers there is still plenty of leverage to suggest more studies in railway urban areas addressing smaller settlements in metropolitan areas and build additional findings for this field.

Bibliography

References

Andersen H. T., Møller-Jensen L., & Engelstoft S., (2011). The End of Urbanization? Towards a New Urban Concept or Rethinking Urbanization, *European Planning Studies*, Vol. 19, No. 4, pp. 595-611.

Barca, F. (2009). Agenda for a Reformed Cohesion Policy. A place-based approach to meeting European Union challenges and expectations. *European Communities*.

Barska, A., & Jędrzejczak-Gas, J. (2016). The concept for the development of a functional area illustrated by the case of the Functional Area of the Oder Communes. *Ekonomia i Zarządzanie*, 8(3), 25-34.

Bartosik, M., & Wiak, S. (2016). Multi-annual Program “By Railway to the 21st Century” as Key Factor in the Development of Rail Transport in Poland. *Transportation Research Procedia*, 14, 518-527.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The qualitative report*, 13 (4), 544-559.

Beaujeu-Garnier, J., Chabot, G., & Świeżewska, W. (1971). Outline of city geography. (*Zarys geografii miast*). Państwowe Wydaw. Ekonomiczne.

Bertolini, L. (1996). Knots in the net: on the redevelopment of railway stations and their surroundings. *City*, 1(1-2), 129-137.

Bertolini, L. (1996). Nodes and places: complexities of railway station redevelopment. *European Planning Studies*, 4(3), 331-345.

Bertolini, L. (1999). Spatial development patterns and public transport: the application of an analytical model in the Netherlands. *Planning Practice and Research*, 14(2), 199-210.

Bertolini, L., & Spit, T. (2005). *Cities on rails: The redevelopment of railway stations and their surroundings*. Routledge.

Blachowski, J., Rybakiewicz, W., Warczewski, W., & Malczewski, P. (2016). Application of multi-criteria analysis in GIS for optimal planning of house development areas. Case study of Wrocław Functional Area (Zastosowanie analiz wielokryterialnych w GIS do optymalizacji planowania obszarów zabudowy mieszkaniowej na przykładzie Wrocławskiego Obszaru Funkcjonalnego). *Roczniki Geomatyki-Annals of Geomatics*, 14(5 (75)), 561-571.

Bhaskar, R. (1989). *Reclaiming Reality: A Critical Introduction to Contemporary Philosophy*. London, Verso.

Bishop, Z. (2015). *Transit-oriented development. Benefits and studies*. Ball State University, Virginia, Ball Center for Creative Inquiry. May 2015.

Brezzi, M., & Veneri, P. (2015). Assessing polycentric urban systems in the OECD: Country, regional and metropolitan perspectives. *European Planning Studies*, 23(6), 1128-1145.

Bryman, A. (2015). *Social research methods*. Oxford university press.

Buder S., (1990). *Visionaries and Planners. The Garden City Movement and the Modern Community*. New York, Oxford University Press.

Buzai, Gustavo. (2011). La construcción de mapas mentales mediante el apoyo geoinformático desde imágenes perceptivas hacia la modelización digital. *Revista Geografía Valpso*. N°44, pp. 1-17

Celinski, K. (1996). Restructuring Of Railways in Poland. *Japan Railway & Transport Review*, 10-14.

Cervero, R., Ferrell, C., & Murphy, S. (2002). Transit-oriented development and joint development in the United States: A literature review. *TCRP research results digest*, (52).

Conticelli, E. (2011). Assessing the potential of railway station redevelopment in urban regeneration policies: an Italian case study. *Procedia Engineering*, 21, 1096-1103.

Cowell, R. (2013) 'Sustainability and Planning' in S. E. Jørgensen (ed.) *Encyclopaedia of Environmental Management*. Taylor and Francis. 2446-2456

Curtis, C., Renne, J. L., & Bertolini, L. (Eds.). (2009). *Transit oriented development: making it happen*. Ashgate Publishing, Ltd.

Fishman, R. (1982). *Urban Utopias in the Twentieth Century: Ebenezer Howard, Frank Lloyd Wright, and Le Corbusier*. In Campbell, S., & Fainstein, S. S. (2003). *Readings in Planning Theory (Studies in Urban & Social Change)*.

Gossop, C. (2006). From Garden Cities to New Towns—An Integrative Planning Solution?. In *42nd ISOCaRP Congress*.

Hakim, C. (2000). *Research design: Successful designs for social and economic research*. Psychology Press.

Hulicka, A. (2014). "Garden City" Analysis of the possibilities of using urban and landscape values in promoting the city and building its brand on the example of selected Polish cities ("Miasto ogród". Analiza możliwości wykorzystania walorów urbanistyczno-krajobrazowych w promocji miasta i budowaniu jego marki na przykładzie wybranych miast polskich) . *Polityka i Społeczeństwo*, (2 (12)), 112-124.

Instytut Rozwoju Terytorialnego (IRT). (2014). Delimitation of the Wrocław Functional Area. (*Delimitacja Wrocławskiego Obszaru Funkcjonalnego*), Wrocław.

Keefer, L. E. (1984). Profit Implications of Joint Development. Three Institutional Approaches (No. DOT-I-84-50 Final Rpt.).

Kido, E. M. (2005). Aesthetic aspects of railway stations in Japan and Europe, as a part of “Context sensitive design for railways”. *Journal of the Eastern Asia Society for Transportation Studies*, 6, 4381-4396.

Kido, E. M. (2006). Railway landscape design and relationship with form, function and aesthetic. *Japan Railway & Transport Review*, 45, 22-30.

Komornicki, T. (2005). Specific institutional barriers in transport development in the case of Poland and other Central European transition countries. *IATSS research*, 29(2), 50-58.

Le Jeannic, T. (1996). Une nouvelle approche territoriale de la ville. *Economie et statistique*, 294(1), 25-45.

Lynch, K. (1998). *The Image of the City*. Editorial Gustavo Gili, SL, Barcelona, 1984, 1998.

Lynch, K. (1959). *La Imagen de la Ciudad*. Editorial Infinito. Buenos Aires. 1959

Matysiak, A., & Nowok, B. (2008). Stochastic forecast of the population of Poland, 2005-2050. *Demographic Research, Volume 17*, 17, 301.

May, T. (2011). *Social research*. McGraw-Hill Education (UK).

Mumford L., (1968). *The City in History, Its Origins, Transformations, and Its Prospects*. New York, Harcourt, Inc.

Mulders-Kusumo, C. (2005). Is a railway station a central urban place? Spatial configuration study of retail distribution pattern around railway stations. In *5th International Space Syntax Symposium* (pp. 201-210).

Kusumo, C. (2007). Railway station, centres and markets: Change and stability in patterns of urban centrality (Doctoral dissertation, Delft University of Technology).

Paulus, F. (2004). *Coévolution dans les systèmes de villes: croissance et spécialisation des aires urbaines françaises de 1950 à 2000* (Doctoral dissertation, Université Panthéon-Sorbonne-Paris I).

Perlik, M., Messerli, P., & Bätzing, W. (2001). Towns in the Alps. Urbanization processes, economic structure and demarcation of European Functional Urban Areas (EFUAs) in the Alps. *Mountain Research and Development* 21(3):243–252. [BioOne](#)

Pudło A., Pudło K., (2009), Historical and cultural memory of the inhabitants of Lower Silesia. (*Pamięć historyczna i kulturowa mieszkańców Dolnośląskiej Ziemi Obornickiej*), Studia Salvatoriana Polonica, Vol. 3, pp. 231-249.

Purdom C.B. (ed.), (1921). *Town Theory and Practice*, London, Benn Brothers, Ltd. Available from: <https://archive.org/details/cu31924025952445> Accessed: 13.06.2017.

Purdom, C. B. (1925). *The Building of Satellite Towns. A Contribution to the Study of Town Development and Regional Planning*. (Second edition published: 1949 by J. M. Dent & Sons Ltd.

Sarantakos, S. (2012). *Social research*. Basingstoke, Palgrave Macmillan, 2012.

Shao, Z. (2015). Relevant Theories on New Urban Area Development. In *The New Urban Area Development* (pp. 23-30). Springer Berlin Heidelberg.

Skrzypczyński, R. (2016). Shaping the policies of satellite towns in functional urban areas of regional capital cities. The example of Wrocław Functional Area (Poland). (Master dissertation, Wrocław University).

Strauss, A., & Corbin, J. (1990). Basics of qualitative research: Techniques and procedures for developing grounded theory. (Vol. 15). Newbury Park, CA: Sage.

Suzuki, H., Cervero, R., & Iuchi, K. (2013). Transforming cities with transit: Transit and land-use integration for sustainable urban development. World Bank Publications.

Wronka, J. (2007). Development of the railway transport in Poland. University of Szczecin, Szczecin.

Yin, R.K. (2003) Case Study Design and Research: Design and Methods, 3 rd ed., Thousand Oaks, CA: Sage Publications.

Reports and Legal Documents

2020 Development Strategy for the Lower Silesia Voivodship (2005). Wrocław, Poland.

Crossrail. Places & Spaces. Urban realm on the Crossrail Route. London.

National Council for Urban Economic Development (1989). Moving Toward Joint Development: The Economic Development-Transit Partnership. Washington, D.C.: Urban Mass Transit Administration.

Organization for Economic Co-operation and Development (2013). "Defining regions and functional urban areas", in *OECD Regions at a Glance 2013*, OECD Publishing, Paris.

Polskie Koleje Państwowe (2014). Annual Report. Grupa PKP. (2014). Warsaw, Poland.

Johansson, R. (2003, September). Case study methodology. In *the International Conference on Methodologies in Housing Research, Stockholm*.

Polskie Koleje Państwowe (2015). Revitalization project of the railway space of Wrocław Agglomeration. (*Projekt rewitalizacji przestrzeni kolejowej Aglomeracja Wrocławska*), 2015.

Sedway Kotin Mouchly Group (1996). Joint Development Entrepreneurial Study. Oakland: San Francisco Bay Area Rapid Transit District.

Stake, R.E. (1980) 'Generalisations'. Paper presented at the annual meeting of the American Education Research Association, Boston. April.

Studio Gang Architects (2016). Civic Commons. New York, USA.

Polish Legal Acts

Study of the functional cohesion in Wrocław Functional Area. (*Studium spójności funkcjonalnej we Wrocławskim Obszarze Funkcjonalnym*), 2015, Wrocław.

Ustawa z dnia 8 marca 1990 r. o samorządzie gminnym (Dz.U. z 1990 r. Nr 16, poz. 9 z późn.zm.)

Ustawa z dnia 27 marca 2003 r. o planowaniu i zagospodarowaniu przestrzennym (Dz. U. 2003 r. Nr 80, poz. 717, z późn. zm.)

Ustawa z dnia 9 października 2015 r. o związkach metropolitalnych (Dz. U. z 2015 r., poz. 1890)

Reports

Report on the First Monitoring and Advisory meeting for The European Capitals of Culture 2016. Issued by The Monitoring and Advisory Panel for the European Capital of Culture October 2013.

https://ec.europa.eu/programmes/creative-europe/sites/creative-europe/files/files/ecoc-2016-first-monitoring_en.pdf

Natura 2000 - Grady Odrzańskie, 2009.

http://siechnice.gmina.pl/strona-129-obszar_natury_2000.html