

Logical integration represents a strong element of using all advantages of the other two aspects of internal integration. Logical integration is only the first step, which is followed by external integration with other transport sub-systems. Such information should support the user in choosing between transport modes and transfer points, including dynamic information about congestions and parking spaces.

4. Conclusion

In conclusion a question emerges, how to transform the considered elements of reform of PT in Slovenia and in conjunction with other elements to practise? The research also dealt with reformed organisation of PT and we discovered that achievement of the set strategic PT development goals would need a new organisation form for planning, managing, financing and executing PT. Actors will have to be defined (institutions, companies etc.) with their functions and responsibilities. Since integration of the PT system was given high priority, the proposal for organisational changes was adapted to this goal.

In our review of possible organisation types we discovered that the basic variable is the relation between public and market-driven initiatives, which affects the PT system's level of regulation or de-regulation. Because of the defined priority of strategic goals the scope of possible organisation forms in Slovenia was narrowed. Strategic goals, such as achieving sustainable mobility within the comprehensive transport policy or integration of the PT system, proved that public interests prevail over market ones, therefore we have to search for a future organisation form, whose system expresses a higher level of regularity. Simultaneously and to avoid its deficiencies it would be sensible to complement the regulated organisation model with market-based elements or to relinquish some of the public responsibilities to market mechanisms.

In other words, to raise the quality of offer of PT, active involvement by the state is essential in the fields of planning, management, financing and implementation. Since the process of integration includes a series of actions, which can be conducted gradually, numerous measures for internal integration can be undertaken soon, before a strategic document is formulated, without relatively massive spending and with many benefits (e.g. joined information about schedules and voyage prices for the whole country in one place and ensuring its simple and free access). What it takes is minor political will and understanding of the issue by decision-makers. Complex integration measures do nevertheless demand a complex approach, longer time spans and in-depth preparation. Hopefully this article is a step in that direction.

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Notes

- [1] The research was carried out within the Goal oriented research programme »Slovene competitiveness 2001-2006«.
- [2] For example, certain cities introduced ensured transfers by providing taxi transfers free of charge when public transport connections were interrupted.

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Mojca ŠAŠEK DIVJAK

Transport corridors and settlements in a region

Linking settlements to public transport

1. Introductory remarks

Development and modernisation of transport infrastructure (roads and railroads), as well development of energy supply and communication infrastructure, significantly affect settlement development. Sustainable and comprehensive development of Slovenia will therefore be possible only if settlement development is planned parallel to the transport system (with emphasis on public transport), a concept, which should be followed in implementation of spatial strategies, various policies and national programmes. With respect to the planned regional subdivision of Slovenia, such planning is very significant also on the regional level.

Linking settlements to public transport on the regional and municipal level is the core of this article. The topic is highly multidisciplinary, after all various wider fields of physical planning and transport management intertwine, including property, housing policies etc. Urban planning tied to planning public (and combined) transport is a common topic of contemporary urban research (Frey 1999, Calthrope 2001). It can affect efficiency of regional spatial policies, competitiveness of pertaining areas and their orientation towards sustainable development (in the economic, social, and environmental sense). Of course various levels have to be considered.

1.1 International strategies and guidelines

During the ongoing period of tighter European bonding, respect for European spatial policy recommendations, concerning sustainable spatial development of the entire European continent, is vital (CEMAT, 2000). Strategies include development of efficient and environment friendly public transport, which should contribute to sustainable mobility. Similar principles that speak about settlement development and prevention of environmental pollution tied to transport, production and use, are also stated in Agenda Habitat, The Green convention on urban environment, New Charter of Athens etc. All have significance for Slovenia, since it is joining the Trans-European transport network, with links on the V. and X. corridors, which will affect increased development of macro-regional centres, especially Ljubljana, Maribor and Koper.

1.2 National strategies

Implementation of the vision, as well as general planning strategies, demand harmonisation of various policies and national programmes, but also coordination on different levels. The settlement system, with its hierarchy of cities or settlements, represents the nation's basic component of social and economic life. Capacities for performing such functions in cities and their functional regions depend on eco-

conomic, social and cultural potential, and furthermore, transport accessibility and level of traffic management.

On the national level, both diagonal connections are important (SW–NE and NW–SE), thus strengthening the role of Ljubljana as the central passenger and cargo knot and linking larger settlement agglomerations in the corridors. Simultaneously transport accessibility to other regional and local centres will improve. At present, highways are being built in both corridors, while development of a modern railway system, which would be more sustainable, is being severely neglected. We should begin the building of modern railway connections as soon as possible. In this field we are seriously lagging behind developed European countries.

1.3 Regional level

As is typical for Western Europe, even in Slovenia the hinterlands of larger cities are experiencing massive pressure for development. In areas of regional centres, where strong road-traffic flows are often hindered by congestion and frequent bottlenecks, public transport should be the traffic system's mainstay. It is also significant in consolidation of larger gravitation areas, especially conurbations. It should however be well organised, with a high level of service and thus competitive to use of private cars.

In the early nineties almost a third of all Slovene population lived in suburban areas. More than half of them commute daily to larger employment centres for work, generally by car. We can ascertain that rapid urbanisation with dispersed and relatively low settlement densities, which is tied to private car traffic, is causing negative effects on the environment as well as economy:

- Large built-up areas and poor use of land, uneconomical construction,
- Irrational development of road connections and utility networks,
- Increased environmental pollution because of daily traffic,
- Often low living standard (problems with sewage and waste-water treatment),
- Issues in cultural landscape preservation, protection of agricultural land,
- Decreasing economic investments in these areas etc.

Parallel to increased use of private cars in Slovenia, use of public transport means has decreased: today only 10 % of all the population are public transport users. The present condition demands improvements to the public transport system (efficiency, rationality, practicality, creation of exchange nodes) and, in the wider sense, denser inhabitation in conjunction with development of public transport. In view of all negative effects caused by use of private cars (traffic congestion, pollution, accidents etc.), the trends should be redirected to use of public, bicycle and pedestrian traffic. Success could be achieved only by synergetic linkages between development of public transport and physical planning, which is directed towards sustainable settlement systems.

2. The case of the Ljubljana urban region

Even in the central Slovene region, the Ljubljana region, suburbanisation ensued in the seventies, seriously expanded in the eighties and is still continuing. Between traditional settlement cores there are substantial areas of relatively

low density single-family detached housing. Almost 580.000 people live in Ljubljana and its environs; the level of motorisation is high (1 car per 2,2 inhabitants). Population mobility already reaches 2,4 voyages per day (MOL, 2002), which can be compared even with mobility in larger German cities. The most important transport problem in Ljubljana is excessive growth of private car use, therefore it is necessary to consider possibilities of more sustainable methods of settlement, above all linking denser structures of urban growth to development of public transport.

2.1 The regional city model

Within the framework of several research-development projects recently undertaken at the Urban planning institute (Šašek Divjak and others, 2000, 2001, 2002, 2004), we mainly dealt with links between public transport and settlement development. Based on comparison and evaluation of various screenplays, we developed a model of a regional city – the decentralised densening model, which was applied to the Ljubljana region. It contains two strategies:

- A) Development of the compact city and its historical core. To improve its urban tissue the immediate urban area needs rehabilitation, revitalisation and transformation of extant urban surfaces.
- B) De-concentrated densening, seen as smaller compact centres, with good network connections between them in suburban and rural areas. This strategy is also intended for improvements in suburban areas where unorganised low-density housing prevails.

Three development principles are dominant: regional structures of urban growth should be tied to public transport, zoning has to be replaced by mixed use and the urban design policy has to revert to humane dimensions, pedestrian distances and common open spaces.

The concept was integrated in the preparation of the Physical planning concept of the city municipality of Ljubljana (MOL, 2002). For the Ljubljana functional region, we laid special emphasis on links between settlement and the regional public transport system, above all the planned regional light rail lines and tram system in the urban area proper.

In the last decades, lifestyles and work have truly changed. Most industrial production has become cleaner, manufacturing is often being replaced by service activities. New electronic communications have been established, which enable faster and more accurate transport of information. All these changes are allowing working from home or nearby one's home. The functional area of work is no longer limited to industrial production. Many jobs can be found in services, which can be tied to residential areas. Thus zoning of land use for work and residences is no longer essential. Similarly, boundaries concerning life styles between the city and countryside are crumbling, urban life styles have expanded even to wider suburban areas.

2.2 Urban and regional public transport in Ljubljana

The urban and regional transport network in Ljubljana is conceptualised as radial, thus causing concentration of traffic in the central part of the city and congestion because of fast growth of motorised traffic (mainly individual car use). Traffic capacities are diminishing, motor vehicles are cau-

sing excessive pollution, parked cars are occupying streets and squares that were primarily intended for pedestrians. After all, the city was never planned to take aboard such quantities of motorised traffic.

Data in Ljubljana shows that the quantity of voyages by motor car is increasing, while the quantity of voyages by public transport is seriously diminishing. Many research studies dealing with development of urban and suburban public transport were undertaken to solve these problems, such as:

- The research Concept of long-term development of suburban public transport in Ljubljana (PNZ, 1995) presented three proposals, of which the third one, considered best, proposed extension of the urban railway into the region in the form of light rail;
- A later research, Preparation of a concept of public urban and suburban transport in Ljubljana (TTK–Karlsruhe 1997), elaborated two possible concepts: System A (improved railway system) and system B (a system of urban-regional railway, following the example of Karlsruhe). Experts considered the second concept better for further development;
- TTK continued with the research and in 1999 presented its findings concerning daily burdens and needs for public transport (buses and trains) as well as a forecast of the public transport network's needs by 2010 (buses, trams and trains). The goal of this research was to identify, which investment should be given priority, i.e. to improve regional and internal urban public transport and to stop its further dilapidation;
- Description of the network in 2010 and the long-term options (TTK, 1999): research of burdens and orientation of corridors, led to the proposed two main lines and one detached line. The main regional/urban line would connect Ljubljana's northern and southern part. Two branches would run to the South: the first to the South-West and the second South-East, which would be linked to the railway line running to Grosuplje. This line would service 102.616 inhabitants (40.079 work places). The main North-South line would have two lines: the city line WTC–Vič and the regional line (dual modality) Kamnik–Grosuplje.

The second urban line would connect Nove Fužine with the East, and the Western part of Ljubljana to Poljane. This line would service 125.378 inhabitants (44.461 work places).

The City municipality of Ljubljana and Regional development agency of the Ljubljana urban region have been planning a regional railway network for quite some time. It will connect the central urban agglomeration to its suburban hinterland. The proposal includes urban and suburban public transport, whose integrative backbone is the railway network (extension of the urban railway into the region, as a light rail system), from which bus lines start.

2.3 Development tied to public transport

Ljubljana grew from its historical core outwards and experienced various levels of growth during development. The star-shaped form typifies the city's development: within the ring road most of the compact city has already been developed, from there on, the city grew along five corridors or

prongs. Lately, especially after the new roads were built, seven development axes have been formed. The wider Ljubljana agglomeration is developing into a conurbation, so we have to consider harmonised development of the whole.

In a research, titled Urban concept of development of settlements in the Ljubljana region in the corridors of integrated urban and regional railway passenger traffic (Šašek Divjak et al., 2002), commissioned by the Municipality of Ljubljana, we focused on the area along the railway corridors outside the immediate compact city. We discovered that the area is covered by denser settlements of larger or smaller settlements, while dispersed single-family detached housing occupies the space in-between. Within the corridors denser settlement can be seen in the directions: Medvode, Kamnik, Litija, Grosuplje; in the Southwest direction there are two directions, Borovnica with its extant railway, and Vrhnika (were reconstruction of the former railway line is possible).

With respect for sustainable development, in Ljubljana we should alleviate the central city part of pressures by developing the decentralised densening model that emphasises the development of many smaller centres with comprehensive services along public transport routes. The city would develop along the railway lines in the form of dense built-up corridors with independent centres, tightly connected to efficient public transport. We also proposed traverse connections that enable communication between identity-bearing landscape features and preserve the unity of urban units. With consideration for other centres and settlements tied to the road infrastructure and intermediate traverse links, the emerging urban structure would gradually link into a grid.

The sketch of the decentralised densening model is shown (figure 1), which also includes expansive suburban areas of dispersed settlement. Regional structures of urban growth (new urban cores – densening centres) are predominantly linked to the public transport system.

3. Development in the north part of the region

As was established in the research study concerning the concept of public urban and suburban transport in Ljubljana (TTK, 1999), there are better possibilities for implementation on the subsidiary routes running North, towards Kamnik, and South, to Grosuplje. From the viewpoint of estimated investment costs of rail traffic, as well as technical and organisational aspects, priority in development pointed out the route towards Kamnik. This is the main reason for our detailed research about possibilities for densening settlement around suburban railway stops in this area. Possibilities for expansion linked to extant settlements was shown with two strategies: additions to extant built-up areas (short-term, priority) and additional new surfaces (according to needs, long-term).

The Concept of spatial development of Ljubljana (MOL, 2002) showed that from the aspect of needed building land for housing, suitable sites have to be found also outside the municipal boundaries. While working on the northern branch of the region we thought that denser settlement near public transport stops (especially the railway) was especially important, if we should provide access to public transport to all possible users (children, pupils, the elderly etc.). In this sense local plans will have to be amended and

revised, since pressures for settling will only increase. Otherwise these potential areas will be built upon very quickly and it will be impossible to organise concentration centres along communication knots.

The feasibility of such a great investment into railway infrastructure, as proposed for the North branch, demands parallel offer of new residential and other lands, which are seriously lacking in the central Slovene region.

A special chapter about the North branch (Šašek Divjak et al., 2002) presents a description of certain suitable instruments of property management, which could be applied to implement the concept (from the aspects of ownership-property structure, limitations and protection regimes, planning of settlements from the aspect of necessary investments in infrastructure construction and purchase of land, ensuring financial resources etc.). We also considered the issue of agricultural land and other protected areas. Possibilities for development on agricultural land were considered only if these lands were of poor quality or already affected by development. We nevertheless pointed out that in certain cases reconsideration is needed about the level of protection granted to agricultural land, especially from the viewpoint of social costs and benefits of well-organised urbanisation. Besides, denser settlement, as opposed to dispersed settlement, in the widest sense, implies protection of agricultural land and open green spaces.

3.1 Detailed development considerations in the suburban railway's corridor from Črnuče to Kamnik

Presently the North branch of Ljubljana has three important concentration cores: Trzin, Domžale and Kamnik. The settlement ribbon stretches from the ring road, across the river Sava to Črnuče and Trzin. Then it divides into two parts: northwards to Mengeš and eastwards to Domžale. Along the Kamniška Bistrica River it then stretches northwards to Kamnik, which is an old town and even today important local centre.

As results of the research about the concept of public transport for the city and region of Ljubljana showed (TTK, 1999), the North branch has the priority in transport improvements, so we undertook a detailed research of urbanisation possibilities in this railway corridor (Črnuče–Kamnik).

We proposed possible settlement densening in the immediate vicinity of railway stations, aligned to two strategies:

- A) Complementary structures within extant built-up areas (priority, short-term): possibilities for urbanisation in the sense of additions within extant built-up areas, clearing of degraded areas, rehabilitation of old town cores. Of course, this strategy has the advantage over green site development.
- B) Expansion to new areas (in view of additional needs, long-term).

We diligently avoided areas with limitations and protected areas (water resources, agricultural land, forests, flood plains, natural gas pipelines, important green areas, natural and cultural heritage). We studied the width of the corridor along the railway, which is interesting for further urbanisation possibilities:

- On both sides 500 m wide, as immediately accessible for pedestrians, within a radius of 10 minutes,

- On both sides 800 m wide, as wider accessible for pedestrians,
- On both sides 1000 m wide, easily accessible by bicycle.

Concerning the longitudinal development of settlements in the northern branch, most extant settlements are already included in the settlement area. We also showed potential areas for expansion of railway stations.

Proposed urbanisation concept on the Northern axis

We added several railway stops and slightly moved some others to provide a uniform or more sensible distribution of stops. Parallel to the additional tracks and electrified railway line, modernisation and equipping of extant railway stops will be necessary, especially those that will function as park and ride (the train) stations. Concentric development circles (50 m each) around the stations are also shown. Of course layouts for future development of individual settlements need further elaboration.

In Domžale we propose densening and transformation of urban tissues within the built-up area. Clearing of vacated industrial sites and their reconstruction into housing, business or market functions) is possible. The area along the Kamniška Bistrica River is a green recreational surface, which should run throughout the town. The Domžale railway station should move further North (together with the bus station), where possibilities for modernisation and additional programmes are better. Larger development zones are in Srednje Jarše and in Homec.

Based on the Urban design concept of the city (Čargo, 1998), in Kamnik we adapted the stops to the planned changes that propose a denser layout of stops that support newly organised centres of particular parts of the town. The Kamniška Bistrica River is the green N–S axis through the town. Transversely set green belts connect this area to the Mengeš Plain and separate the built-up surface into smaller, clearly defined areas. Thus they merge into a continuous traverse structure. Here are also the connections between the newly organised centres in the town and railway stops. Denser development is possible only within these built-up areas. Possibilities for expansion are proposed near the southern and northern (Fužine) railway stations, with smaller capacities near the station Trško Polje. The new urban design concept is based on reorganisation of present amorphous structure into a series of distinct settlements with a clear image of programme centres and edges.

Fužine – North railway station

One of the most important spatial changes in organisation of the suburban railway line in Kamnik is its extension and transfer of the terminal railway station further north. The main reason is the establishment of a railway station capable of handling all types of traffic, which is outside the bottleneck position near the old town centre – the present position on Graben, cannot facilitate such change. In short, in Fužine, on a vacated former chemical and warehousing industrial site, the new Northern station could be built, with all programmes pertaining to a terminal and transfer suburban railway station, including mastering tiers and a long-term vision of a central bus station for regional, suburban and urban bus lines. The master plan complements the passenger terminal with central functions that are positioned along the road running by the Kamniška Bistrica River. A vast palette of programmes adequate to the place, will be enabled, such as: offices, commercial activities, services,

multi-apartment housing and, on the extreme western rim by the forest, an area of detached single-family homes. (Čargo, E. In: Šašek Divjak, 2002).

4. Conclusion

The balanced planned settlement and transport system (especially public transport) should ensure possibilities for sustainable mobility, which means:

- Better accessibility,
- Higher quality of life,
- Efficient environmental protection,
- Higher social equity concerning accessibility (even less affluent population without cars, school going youth and children, the elderly etc.).

Consequently the public transport system should, in conjunction with corresponding settlement (compact centres: new and expanded settlement near public transport stations), should accommodate achievement of the following goals:

- Diminishing negative effects of sub-urbanisation and their alleviation,
- Better economic development and regional social structure,
- Less negative effects on the environment,
- Rational land use,
- Higher economic efficiency.

Besides physical planning, various instruments of land policy (planning, taxation, market, financial and administrative) have to be devised, to reach such a rationalised settlement system. Similarly, balanced housing policy can positively influence regional economic development and employment. Concerning housing needs and in view of the National housing programme's goals, expansive suitable surfaces in cities and their suburbs will have to be provided very soon. Therefore recollection is needed about the position, form and scope of these new housing communities (new development, additions and rehabilitation) and how to tie them into a balanced urban system, especially with public transport.

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Aleš ŠAREC

Slovenia of fifteen centres?

Where are you, architects? Urban planners? Experts from fields of regional economics, social development and environment protection? Today, when the new physical plan of Slovenia, or to use the new phrase, Strategy of spatial development of Slovenia (SSDS) [1] is being decided upon, you are showing apathy, and can't be heard voicing your opinions. We are talking about the fundamental spatial document that will determine all other spatial plans for individual areas. This debate is about what our cities, settlements, and regional spatial development will look like in the future. Don't you care about our environs? [2]

1. Prologue

The proposed acceptance of this document for spatial management is controversial from many perspectives and on all levels. Amongst other, it repeats the questionable doctrine/goal about polycentric development of a network of cities and settlements (the urban system) in Slovenia. This doctrine proposes fifteen different centres of »functional regions«. These are the so-called centres of national importance. It also talks about thirty-five other centres of regional and inter-municipal importance (which would partially also have the role of regional centres), which the SSDS proposes in a three-tier urban network of Slovenia. Altogether there would actually be fifty »regional centres«. The doctrine of polycentric urban development of Slovenia has mutated into a doctrine of a dispersed network of cities and settlements, which could compete with larger European cities as a metropolis of two million.

So many polycentric regional centres in a relatively small Slovenia definitely can't represent its polycentric urban system. Expert justification for such a dispersed network of development centres simply doesn't exist. On the contrary, at least six regional and national centres would on average pull in only 67.000 inhabitants, which doesn't constitute a large enough critical mass (number) of service users, supply, employment, management and other functions that should be located in these centres. It is unrealistic that beside »intermediate level« activities (not only »upper level«) [3], which will have to be positioned in regional centre of every region, the same functions and institutions should be placed in other »centres of regional importance« or in »inter-municipal centres« of the same region, only a few kilometres away from the main regional centre (for instance besides such institutions being in Celje, they would also be in Žalec and Šentjur). Among other problems of such a system, we can point out that these other centres can't guarantee sufficient accessibility with the public transport system, which will primarily focus on the main regional centres.

The decades old concept of »dispersed« polycentric development of Slovenia is a result of pressures, lobbying, and blackmailing by local communities, as well as liberal standpoints of those who prepare development documents on the national level (social plans, and now the SSDS). In light of public interest and benefits, this concept is harmful. Will the expert public really remain carefree of such conditions?