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Péter Wolf, Bálint Kádár

13 CONTEMPORARY PERSPECTIVES OF RAILWAY, LOGISTICS AND URBAN DEVELOPMENT IN BUDAPEST

Resume

Abstract
Budapest metropolitan area is the major logistic hub of Hungary, as major TENT-T corridors cross the city. Growth potential is high, and railway infrastructure, brownfields and new hubs of logistics are key areas of development; still none of these sectors are at their full potential. The case study introduces the historical background and evolution of logistics and the rail network, and national objectives aiming to improve efficiency in infrastructure to foster sustainability and competitiveness. The focus areas are rail freight, offshore trade, service export, intermodal terminals, air cargo terminals, suburban passenger services and investments aiming to increase the usage of railway in freight and passenger transport. The study highlights how the region is seeking its competitive edge, and how progress is hindered by the lack of railway capacities or a lack of integrated urban planning. The urban rail concept and large brownfield sites along the lines may create opportunities for exploitation, but a lack of synergies impedes strategic development for now.

Keywords
Logistics – transportation – spatial planning – railway development – Budapest

Aktuelle Perspektiven des Schienenverkehrs, der Logistik und der Stadtentwicklung in Budapest

Kurzfassung
Der Großraum Budapest ist das wichtigste logistische Zentrum Ungarns, da die wichtigsten TENT-T-Korridore die Stadt durchqueren. Das Wachstumspotenzial ist hoch, und die Eisenbahninfrastruktur, Brachflächen und neue Logistikzentren sind wichtige Entwicklungsbereiche; dennoch ist keiner dieser Sektoren voll funktionsfähig. Die Fallstudie stellt den historischen Hintergrund und die Entwicklung der Logistik und des Schienennetzes sowie nationale Ziele vor, die darauf abzielen, die Effizienz der Infrastruktur zu verbessern, um Nachhaltigkeit und Wettbewerbsfähigkeit zu fördern. Die Schwerpunkte liegen in den Bereichen Schienengüterverkehr, Offshore-Handel, Dienstleistungsexport, intermodale Terminals, Luftfrachtterminals, Personennahverkehr und Investitionen zur Steigerung der Nutzung der Schiene im Güter- und Personenverkehr. Die Studie zeigt, wie die Region ihren Wettbewerbsvorteil sucht und wie der Fortschritt durch fehlende Bahnkapazitäten oder einen Mangel an integrierter Stadtplanung behindert wird. Das Stadtbahnkonzept und große Industriebrachen entlang der Trassen können Chancen zur Nutzung eröffnen, aber fehlende Synergien behindern derzeit eine erfolgreiche strategische Entwicklung.

Schlüsselwörter
Logistik – Transport – Raumplanung – Eisenbahnentwicklung – Budapest

1 Introduction

Budapest is the capital city of Hungary, by far the largest business hub in the country, the center of domestic financial services, tourism and consumer markets, and the location of 1.7 million inhabitants. Budapest is also the center of higher education and R&D, the main location of the largest FDI corporations. The city's share of the GDP of Hungary is close to 40%, which is 50% for the wider metropolitan area (Pest County included) with a population over 2.7 million. GDP per capita is 148% of the EU average measured on purchasing power parity,[1] much over the national average and the average of Pest County (55%) signaling an extreme territorial difference between the country and the metro area.

This is a unique level of concentration in CEE comparison, as no other urban area exists in Hungary with more than 500 thousand inhabitants. Even the second largest city of Debrecen has a population of only 200 thousand, 238,000 with its agglomeration included. This is probably because of the transport infrastructure of the country, as historically all highways, railways and other transport infrastructure have one main node: Budapest. This centrality is well visible in the rail network; lines 1, 30, 40, 70, 80, 100, 120, and 150 all start from Budapest, and beside these there are six others used only for passenger commuting without freight transport.

1 KSH Hungarian Central Statistical Office, 2017.

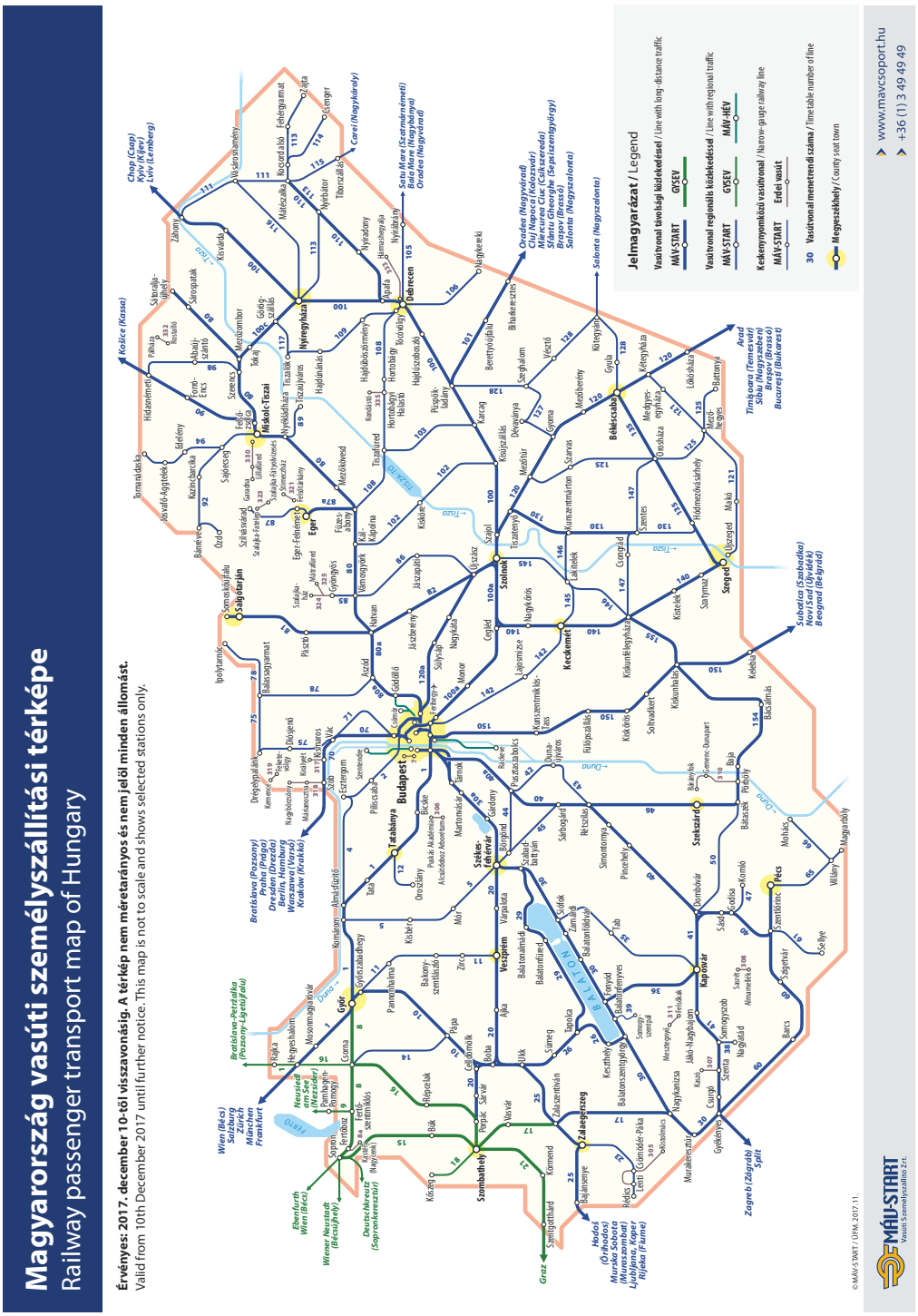

Fig. 1: Railway passenger transport map of Hungary / Source: MÁV-START Zrt; https://www.mavcsoport.hu/mav-start/media/terkepek

The exceptional position is due to the heritage of the past, when the Carpathian Basin was ruled by the Hungarian Kingdom and the predecessor settlements of Budapest were appropriate locations for crossing the Danube. Since Roman times and during the mediaeval ages these towns were linked to the main European trade routes of the east-west and north-south (the 'Amber Road'). This fundamental, geographical advantage was powered up by developing the national railway network from 1844 to 1914, whereas the development of the network promoted the radial rather than the transversal elements of the network. A very specific 'zone-tariff' system was implemented by Gábor Baross, Minister of Public Works and Transport, from the 1880s in order to support long-distance trade but restrict the access of Vienna and Prague from the eastern part of the Austro-Hungarian Empire (Oszter 2017).

Budapest today is the intersection of Pan-European transport corridors IV, V, VII and the new XI ('Amber'). It is no exaggeration to say that the future of Budapest as a hotspot depends on its central position and on major infrastructural investment along the corridors. The Orient/East-Med (OEM) Corridor is the most important axis of development, the main route for sharing goods, technologies and knowledge in Europe and beyond.

The comparison with central and eastern European (CEE) capital cities shows a more controversial picture. Even with the centrality of Budapest in the country's spatial-economic system and relative wellbeing, certain parameters (e. g., GDP per capita or property prices) are below the level of other capitals in CEE. This may have been caused by the major conflicts of the 20th century and the disintegration of the CEE markets including the decades of socialism. However, the macro-regional ecosystem is also different today, compared to the golden ages of the 19th century because, nowadays, Budapest metro is constantly searching for a position in the global value chains, whereas Hungary is primarily a manufacturing hub, but manufacturing is underrepresented in the metropolitan area compared to other Hungarian regions. The capital has a steady economic performance in services, but at the same time it has no strong comparative advantage in specific industries or R&D (Ketels/Protsiv 2016).

Yet, Budapest metropolitan area is the major logistics hub of Hungary. Almost two thirds of the major logistics service providers are located in Budapest or Pest County (Oláh/Karmazin/Balogh et al. 2017). In view of the territorial concentration of logistics and inter-related industries it is likely that an emerging logistics intensive cluster (Sheffi 2010) is developing along the M0, without a supportive policy framework or adequate spatial planning. Hence, it is important to understand how the transit corridors may impact the future of the capital region.

International-related transportation grew considerably in past decades, with high fluctuations. The engines of development vary: regional distribution, warehousing, freight transit, supply chain management, business services, air cargo and real estate development. After EU enlargement, the spending of the Hungarian government on railways, waterways and suburban transportation also contributed to the growth. The total amount of investment (without spending on motorways) exceeds € 4.8 billion between 2014 and 2020, primarily financed from the EU cohesion fund.

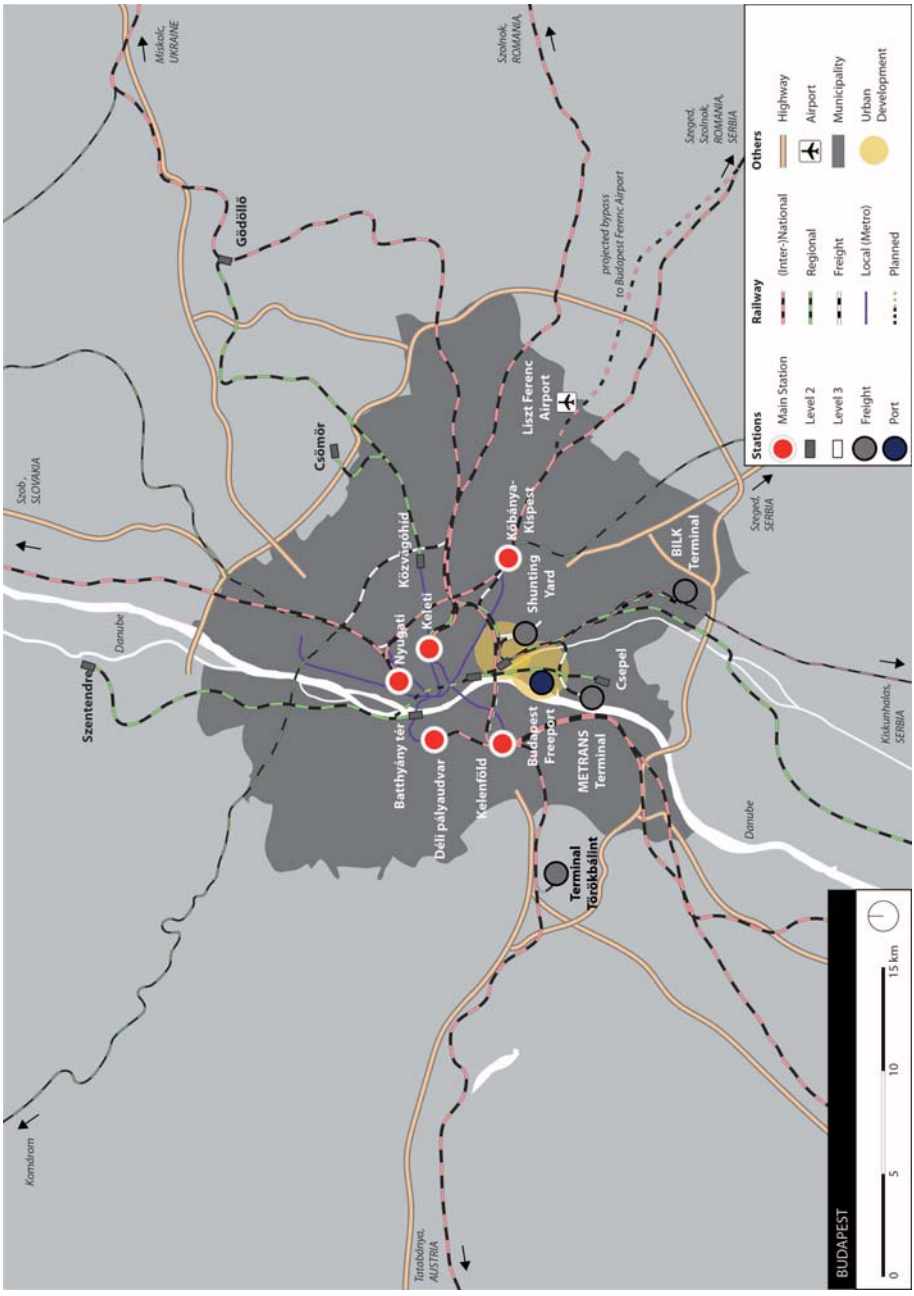

Fig. 2: Transport system of Budapest / Source: Mathias Niedermaier, ETH/IRL, Chair of Spatial Development

The overview of the Hungarian strategic and OP framework provides clarification on how controversial the national-level interventions are from the perspective of the metropolitan area. The allocation of specific funds for R&D and innovation, human resources and SME development, or other funding schemes highlights a contradiction between national objectives: (1) To be one of the largest logistics hubs of the CEE macro-region; (2) To accelerate territorial cohesion by focusing on convergence regions and regional city centers. Altogether more than 80% of the development funds are only available in the convergence region.

There is no connection between spatial (or land-use) planning and sectoral based policies (Oszter 2017). The impact of investments in the transportation infrastructure in Budapest and the effect of the corridors on specific areas are not evaluated or monitored. Neither do the brownfield areas from which railway functions are slowly pulling out have consistent development plans or strategies at the level of urban planning. The weakness of the capital city municipality versus the district municipalities and the state is an additional reason why no coherent implementation of the respective development plans is possible. As a result, market actors and local stakeholders on the one hand, and the Hungarian state on the other hand, are the ones defining the transformations of Budapest.

Railway infrastructure and related logistics and brownfield areas are well spread over the city to shape its spatial development in many ways. Therefore, railway and logistics development must have synergies with urban development. But is this city ready to benefit from the transformation of the railway network? This case study will highlight the development possibilities tied to the main transport networks of Budapest regarding the economy and logistics on the one hand, and the resulting urban development opportunities on the other.

2 Transport and logistics

2.1 Position of Budapest in the National Framework

Different sectoral stakeholders and ministries are responsible for the regulation and development of the transport and logistics sector. Primarily the Ministry of National Development (MND) and the Ministry of National Economy (MNE) share the responsibility, as the physical infrastructure is managed by the MND but business 'infrastructure' (e.g. logistics parks), industrial policies and entrepreneurial development is coordinated by the MNE. The lack of efficiency in collaboration between the two ministries decreases the impact, as the gains from synergies between individual measures and development tools are not maximized.

The most important policy documents defining governmental objectives in transportation and logistics are: The National Transport Strategy (NTS), prepared by the MND and the Coordination Center for Transport Development (CCTD),[2] adopted by the

2 http://www.kormany.hu/download/b/84/10000/Nemzeti%20K%C3%B6zleked%C3%A9si%20Infrastrukt%C3%BAra-fejleszt%C3%A9si%20Strat%C3%A9gia.pdf (May 24, 2019; The center was amended, its role and duties taken by the Ministry of ND at the end of 2016).

government in 2014; and (2) the Mid-Term Logistics Strategy (MTLS),[3] prepared by the MNE and Public Benefit Non-Profit Ltd for the Development of Industry (IFKA) and the Logistics Consultation Forum (LEF), approved by the national government in 2013. Both strategies are linked to and developed according to the National Development and Spatial Development Concept of Hungary[4] and in accordance with the National Spatial Plan ('Master Plan').[5]

The NTS is a long-term strategy which focuses on infrastructure (capacities of motorways, railways, waterways), the economic and environmental sustainability of the network, the modernization of public transport and the development of low-cost intermodal hubs (P+R, B+R). The main objective is "exploiting Hungary's role as a transport hub by considering societal demands". In particular, the NTS is the basis for focusing on transit corridors and on upgrading suburban transport networks (whereas the metropolitan area of Budapest is far the largest network in scale and usage).

The main objective of the MTLS is to increase the contribution of logistics to the GDP from 6% (2013) to 10–12%, with a specific focus on developing supply chains and industrial production. MTLS highlights the topic of employment, investment in fixed capital and corporate competitiveness, and aims to develop business competence and infrastructure, corporate networks, R&D and innovation. The MTLS framework rather emphasizes the role of stakeholders (1PL-5PL) and processes to make Hungary "the region's logistics service provider centre".

Operational programs for the period 2014–2020 are structured by the label 'Széchenyi 2020' to use EU funding. As more than 90% of investments in the infrastructure and businesses come from EU grants, the availability and objectives of the OPs are decisive.

The Integrated Transport OP[6] primarily uses the Cohesion Fund, so it is available in Budapest and Pest County. The ITOP specifies e.g. the aim of building almost 240 km of new motorway, upgrading 280 km of railway line,[7] improving travel times on railways, and providing more attractive public transport in cities by upgrading or building over 132 km of metro, tram and local train lines. The program's priorities are to: (1) Improve international road accessibility; (2) Improve international railway accessibility; (3) Develop sustainable urban and suburban transport; (4) Improve access to the TEN-T road network.

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3 http://2010-2014.kormany.hu/download/7/d5/e0000/IFKA_logstrat_130521.pdf https://ifka.hu/uploads/content/doc/projects/logistic-sector-strategy-en.pdf (May 24, 2019).

4 OFTK, 2012: http://www.terport.hu/webfm_send/4616 (May 24, 2019).

5 OTrT: http://www.terport.hu/orszagos-szint/orszagos-teruletrendezesi-terv-otrt-2003-evi-xxvi-torveny (May 24, 2019).

6 http://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/ital/2014hu16m1op003 (May 24, 2019).

7 The total length of the Hungarian railway system is 7,712 km, of which 1,224 km (15.9%) is double-track, whilst the electrified railway network has a total length of 3,033 km (39.3%). Source: HIPA Logistics & Transportation Industry in Hungary (2017).

While businesses in the convergence regions of Hungary have access to the Economic Development and Innovation Program (GINOP), which allocates the majority of funding for business development, 39.4% of the total OP framework, entrepreneurs in Budapest and Pest County can apply only for subsidies from the Competitive Central Hungary Operational Program (VEKOP) which has a much smaller (€ 462.6 million) fund, only 3.55% of the total.[8] Because of further restrictions, logistics service providers in the Budapest metro area can only access specific funds for innovation.

The Irinyi Plan (approved in 2016) has reframed the concept of industrial development, the challenge of digital transformation, and the perspectives in industry 4.0.[9] Existing development tools have been modified to support the proliferation of new technologies and business models based on big data, AI, IoT and automation by focusing on capacity building, IT development and knowledge-transfer via so-called 'Model Factories', including automated storage and retrieval systems and pilots in supply chains. The Budapest metro area is once again excluded as a location for implementation.

R&D, innovation – knowledge generation – and experience in digital technologies are the main strengths of Budapest as a hotspot. It would be a major step forward to realize the potential in synergies and support the more frequent use of digital technologies and knowledge. The National Research Development and Innovation Office[10] has elaborated several programs to support the region's RDI performance (know-how creation), addressing no specific sectoral target. So, it is open to question whether the region's mobility start-ups, technology providers and their customers (i.e. transportation and logistics) are affected by these interventions, or how RDI is supporting local infrastructural development. From the logistics' perspective, collaboration, technological readiness, low spending on training and education, uneven use of maturing technologies and solutions (e-freight, RFID, ERP) clearly hamper the digital transformation.[11]

2.2 Logistics in the Budapest metropolitan area

A closer look at the property market of Budapest reveals that there is a significant mismatch between the distribution of brownfields and new investments (city vs. suburb), owner occupied vs. speculative stock (Budapest and the rest of the country vs the surrounding metro area), intermodal nodes/container terminals vs. centers of road transport (Budapest vs surrounding metro area).

8 http://ec.europa.eu/regional_policy/en/atlas/programmes/2014-2020/hungary/2014hu16m2op002_ (May 24, 2019).

9 http://www.gteportal.eu/download.php?sub=event&eid=260 (May 24, 2019).

10 http://www.nkfih.gov.hu/; National Research, Development and Innovation Fund (NKFIA) (May 24, 2019).

11 1st Revision of the MTLS, Logistics Consultation Forum (LEF) 2017.

This is the result of the robust investment patterns of the last 2 decades. Real-estate development took off in the late 1990s and accelerated after EU enlargement. More than 60% of the properties of the M0 'logistics area' were built between 2005 and 2010, after that the crisis delayed most of the ongoing and new developments. Since 2016, the market has clearly flourished again, and vacancy rates have decreased to a historical minimum of 4% from the peak of the years of crisis when they were above 20% in the Budapest surroundings.[12] In the meantime, developments have slightly changed as the new industrial/logistics developments have spread to the west, along the M1 motorway and to the east (at Liszt Ferenc International Airport). This growth is fuelled by traditional market leaders (e.g. Prologis Inc.), smaller and larger investors, and new entrants (e.g. CT Park) too, including the National Industrial Park Management and Development Company (INPARK), the new state-owned real estate development company.

The largest intermodal terminals are located inside Budapest (Csepel Freeport/MCC, METRANS and BLIK), but the industrial property market is flourishing along the M1/M0/M5 corridors. The surrounding metro area alone, without Budapest, achieved a 40% share of the total Hungarian industrial property markets, with an overall stock of 2.5 million m^2. The size of the market inside Budapest is a third of this.[13] Such a level of concentration is remarkable in light of the systematic efforts of the governmental agencies to promote the relocation of entrepreneurs and FDI investments from Budapest to the countryside. A specific development scheme was utilized early in the late 1990s for the so-called National Logistics Service Centers (NLSC), implementing adequate certification and support, approved in 1998, for terminals and the country-wide network of centers (Bokor 2007).

The overall picture of logistics in Budapest shows a diffuse and fragmented landscape. The real estate market was frozen between 2008 and 2016; 2017 was the first year in the past decade when new projects were announced.[14] The number of operating transport and storage companies in Budapest metro decreased from 11,614 (2011) to 8,691 (2015) – in Hungary from 29,700 (2011) to 23,565 (2015) – but the number of employees increased from 123 to 136 thousand in the metropolitan area.[15] And finally, four of the eight Hungarian companies in logistics & transportation listed on INC EUROPE 5000 are located in the metropolitan area; in the meanwhile 15% of all listed companies from here are involved in logistics.[16]

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12 In total, € 1672 million was invested in the Hungarian commercial property market in 2016, which represents the second highest volume since records began. The investment activity rose 207% compared to 2015, while it produced a 270% higher volume than the average of the 2007–2015 period. 2016 was a record year in terms of transaction volume with €258 million invested in the Hungarian industrial property market. Source: Hungarian Investment Promotion Agency 2017 http://www.investhipa.hu/images/hipa_kiadvany_intro_realestate_web_20170822.pdf (May 24, 2019).

13 https://www.vg.hu/vallalatok/nagyot-ugrott-az-ipari-ingatlanok-piaca-555998/ (May 24, 2019).

14 For example, the project at Csepel by METRANS: http://www.metrans.hu.

15 KSH Hungarian Central Statistical Office http://statinfo.ksh.hu/Statinfo/haViewer.jsp (May 24, 2019).

16 https://www.inc.com/inc5000eu (May 24, 2019).

Cluster-based comparative evaluations justify these controversial observations. Concerning the Budapest metropolitan region, the European cluster reports show a real, although modest specialization in logistics between 2006 and 2014. Taking into account the relative size of the local market, the region performed above the CEE counterparts (except Lower-Austria). By 2016 however, the region's transportation and storage sector, or logistics (depending on how we aggregate the sector) had clearly lost its comparative advantage, as neither in 'specialization' nor in 'focus' did Budapest achieve above-average performance compared to its competing regions.[17] Compared with e.g. the Romanian West Region or western Slovakia, Budapest Metropolitan Region has only a relative advantage in terms of absolute size. Market reports and case studies also highlight this relatively weak performance.[18]

The World Bank's LPI study may contradict this relatively weaker performance (Tab. 1). Although the LPI rank decreased significantly in 2010, overall performance is more stable than other CEE countries during the fall-back of the 2007–2008 crisis.

	2007	2010	2012	2014	2016
LPI score	3.15	2.99	3.17	3.46	3.43
LPI rank	35	52	40	33	31

Tab. 1: LPI of Hungary 2007–2016 / Source: https://lpi.worldbank.org/

The yearly growth rate in service export is also above average, and the sudden recovery of the real estate market in the segment of logistics is becoming a real success story. In specific market segments, such as in the case of road operators, the market share of Hungarian entrepreneurs (50–60% of them located in the Budapest metro) on the EU market has grown to 4.5% from 2.9% between 2004 and 2016, which is also promising.

To understand the differences in the main performance indicators, the absolute size of the Hungarian logistics market must be taken into account as it represents only 0.5% of the European logistics market (Kovács/Kot 2016), and the logistics contribution to the GDP is still just over 6%, while in other European countries it reaches up to 10–13%. There is no real, widespread convergence. E.g. the total volume of road transport decreased in the period of 2004–2015 with a negative rate of 6.8% (Bertasius/Brans/Koff 2017).

17 European Cluster Panorama 2014 and 2016 https://ec.europa.eu/growth/industry/policy/clusters/observatory_en (May 24, 2019).

18 See Prologis Research on how the European locations perform in logistics.

The rail freight market is different in the sense that it was greatly impacted by the liberalization of rail freight services in 2006, and the privatization of the incumbent MÁV Cargo, acquired by Austria's OBB in 2008 (renamed to Rail Cargo Hungaria, RCH in 2010). The market share of domestic and foreign competitors is constantly increasing; RCH has around a 65% market share. As the rail freight consists of 19.9% of the total hauling market (road freight: 76.4, waterway: 3.6%), this is a fair level of concentration. One of the three major container terminals in Budapest – BILK – is a subsidiary of RCH.

The share of rail freight decreased after EU enlargement. Rail lost over 100 thousand tons between 2006 and 2008, even before the crisis (Székely 2011). Decreases in Ro-La transport exacerbated the ongoing reduction. Later, the modest recovery (except for a backlash in 2012) was a result of the emerging non-accompanied transit, stabilizing the share of rail freight once again around 20% (Świtała/Kolsa 2015).

In brief, Hungarian logistics has successfully recovered from the crisis, based on service export, freight transit and real estate development. Sector performance is determined by road freight. Budapest as a hotspot has lost market-share and position, and logistics is not as much a driver of growth as it could be and was before the crisis. Rail freight was very sensitive to the crisis, and now the shortage in capacities (rolling stock, traction assets and railway lines) limits growth in business. The *relative* performance of the metropolitan area is modest, as logistics has developed more throughout the CEE region.

As Hungarian development policy focuses on developing convergence regions in an extensive way, further analysis should be taken to evaluate how these preferences impact upon Budapest, as logistics investment is increasingly motivated by proximity to main consumer centers, available size of labor forces and access to the main European transit networks.

2.3 Future trends: diversification of trade and transit routes?

Diversification is one of the main drivers of transformation in logistics; regarding markets, trading routes and traded goods. Customization and its consequences – decreasing batch-size – is transforming the value chains and especially the logistics, as the size of the Low Cost High Density (LCHD) product category is growing constantly.

Logistics service providers have a long track record of improving service quality for the requirements of the lean manufacturing supply chains. This was also the engine of the economic transformation of Hungary and of the metropolitan area in particular, providing SCM services for OEM and TIER1/TIER2 facilities throughout the country, with an increasing share of 3PLP, 4PLP businesses. However, the service providers are experiencing new challenges today regarding digital transformation. The gap is widening once again between customer expectations and perceptions, between the level of technology and knowledge creation and adoption and the business models of the 'old and new economy'.

Rail freight is no exception. Web-based tracking and tracing, integrated supply chains, door-to-door delivery, reliability of services (arriving at the agreed time), reduced inventories and more efficient utilization of assets were mentioned by leading service providers as major challenges. Increasing demand for integration between modes – lean, agile and hybrid supply chains – capable of providing services for customized product portfolios (Kovács/Kot 2016); or utilizing the existing network by using longer trains, larger loading gauges, new solutions for horizontal transhipment, better planning – there are many incremental and even radical proposals emphasizing the major challenges with rail freight (Zunder/Islam 2017).

Traditional terminals of the main railway and waterway network have been failing (e.g. Záhony, the gateway to the eastern markets). Hungary has become one of the countries in the CEE where the market share of rail freight is the lowest, with around or less than 20% (Islam/Ricci/Nelldal 2016). This is significantly lower than e.g. in Poland. The CEE region has showed remarkable differences in other segments of logistics too, depending on the starting position of the countries in transition or policies followed in the transition, and influenced by the war in the former Yugoslavia too (Chikán 1996).

These trends represent a major challenge for the logistics of the Budapest metro as neither the level of technology nor the ecosystem support rapid adaption to the new environment. Scarcity of human resources and competences; the lack of rolling stock, wagons, traction assets – a wide set of human and fixed capital has been identified as contributing to the bottleneck that impedes the development of the market.

To understand diversification in a geographical sense, we should once again look back to the 1990s and the priorities regarding infrastructure development, which were simple: connecting Hungary with the western markets and supporting supply chains i.e. moving intermediary goods via the road network. City logistics was the other emerging segment that changed the form of logistics by developing the network of distribution centers, warehouses, wholesale and retail facilities. So the backbone of the new economy was built along the M1 highway (Pan-European corridor IV) between Budapest and Vienna, and Budaörs, the western gate of Budapest, became the major commercial center. By the end of the decade Germany was the main trade partner of Hungary.

Diversification in trade and FDI became a top priority in Hungarian policy after the 2010 elections when the new government announced the new policy of 'Opening to the East' in order to upscale trade with Russia and Asia, especially with the Chinese economy. At the same time, reflecting also the 'Economic Silk Road' and the 'One Belt' initiatives, the opportunities to build new (or renewed) railway connections, connections with sea ports and intermodal container terminals were elaborated to catch-up with the booming offshore trade, and with initiatives formulated by the People's Republic of China. The roles and opportunities in regional ports (Koper, Piraeus) and transit corridors were completely revised, with much more focus on strategic partnerships and stakeholders.

90% of the handling capacities of the Hungarian intermodal container terminals is located in Budapest, and because 65% of the containers are transported on the railway and just 35% by road, the terminals at Budapest (BILK, METRANS, MCC) are in a good position to seize opportunities in offshore trade transporting via railway and seaports, including the new, planned Budapest-Belgrade railway line dedicated for freight. The OEM Corridor traditionally connects these terminals to the main European network, also the VII via the Freeport of Csepel. The planned development of the METRANS center to a multimodal center (building a second Danube port at Csepel Island) may also improve the position of the Budapest metropolitan area. There is a network of terminals throughout the country to handle container traffic, but only Zalaegerszeg, the planned new intermodal node of the new XI (Amber) corridor has a real chance to gain significant market share outside the capital city.

Remarkably, in 2017 the Hungarian government proposed they act as a co-financing partner in developing the Slovenian railway line to Koper, realizing the fact that around two thirds of Hungarian offshore trade is transferred via the port of Koper (Far East, Arab world/Mediterranean, India and Australia), and only around 25% use Hamburg/Bremerhaven (USA, Canada, Mexico, South America, Africa). The initiative is considered to be positive for Budapest, although the Amber corridor will offer alternative routes for railway freight, both for IV corridor and for the RFC 5 (Austria).[19]

2.4 Liszt Ferenc International Airport – 'up-and-coming'

Planned investments in the railway lines, terminals and sea-port connections did nothing to alter the main priority of developing the national motorway network to reach the national border in every main direction. The majority of goods and passengers travel on roads and TEN-T corridors. The road traffic is highest at the M0, in the intersection of corridors, and the prospective traffic may reach a critical level by 2030.[20] The bulk of the logistics service providers are located along the M0, because the future of the hotspot lies on road. Or could the future of the Budapest hotspot perhaps depend on a third, emerging segment: air transport?

The Liszt Ferenc International Airport achieved double-digit growth rate both in passengers (13 million in 2017, a historical record) and in air cargo. Compared to Frankfurt, the size of Budapest air transport is significantly smaller. The air cargo, for instance, was about 6–7% of the turnover of Frankfurt in 2017 (130,000 tons). But growth is exceptional with a 15% growth rate per year on average, twice the European

19 Railway Pro 2016 03 29: The new rail freight corridor may be launched in 2018; also in http://www.kormany.hu/en/ministry-of-national-development/news/hungary-poland-slovakia-and-slovenia-initiate-a-new-eu-rail-freight-corridor (May 24, 2019).

20 http://www.kti.hu/index.php/kutatas/kiemelt-hazai-projektek/orszagos-celforgalmi-adatfelvetel-2016-2017 (May 24, 2019).

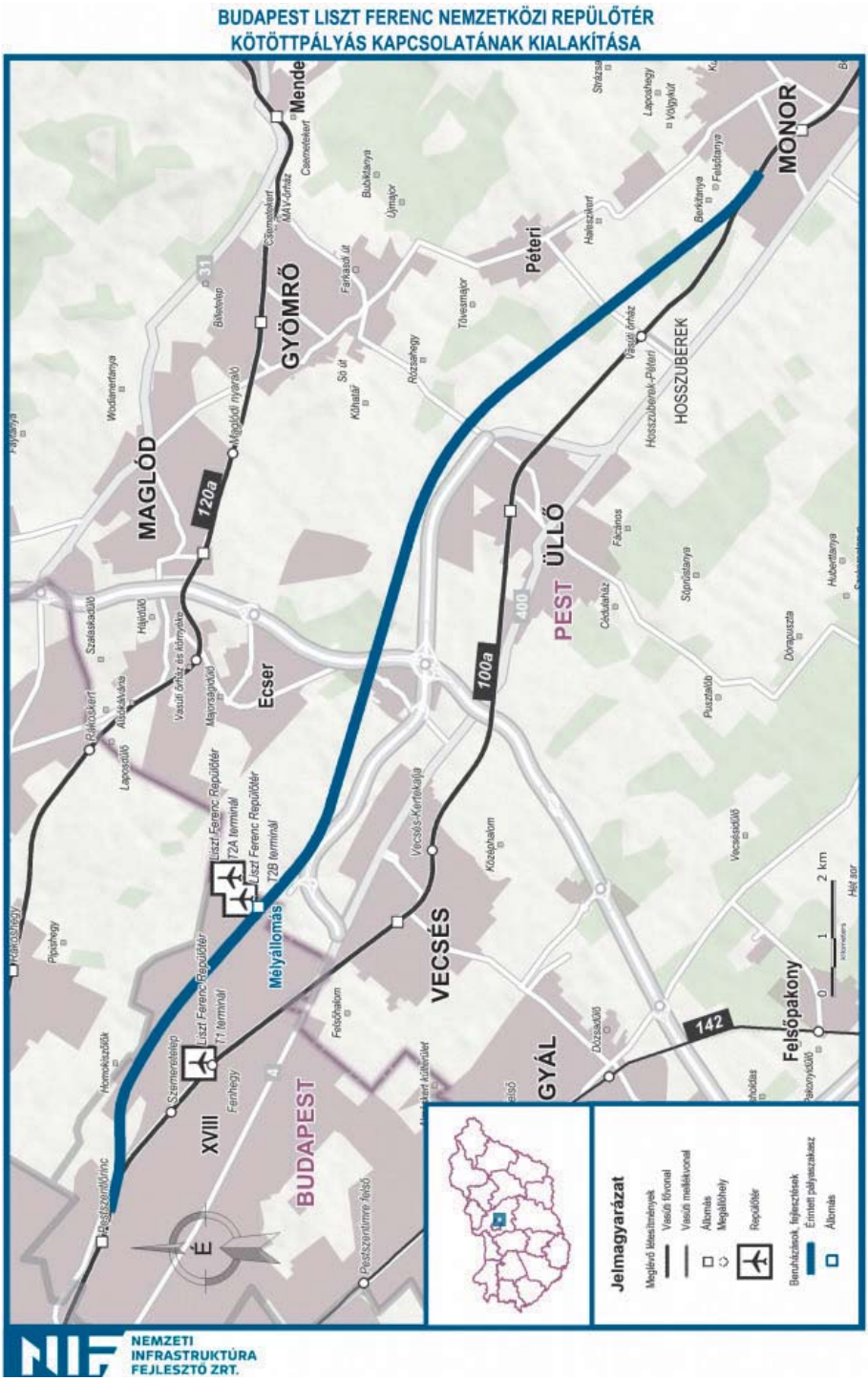

Fig. 3: Railway connection plan of the Liszt Ferenc international Airport Budapest / Source: NIF Zrt; https://nif.hu/projektek/2016/02/a-budapest-liszt-ferenc-nemzetkozi-repuloter-kototpalyas-kapcsolatanak-kialakitasanak-elokeszitese/

average in air cargo.[21] In 2 years the annual turnover may reach 150,000 tons; this may be a good basis for being a CEE 'hub & spoke' node by utilizing opportunities in new flight connections and by offering an alternative solution for regional consolidation to the existing western European freight terminals (Frankfurt, Amsterdam).

Besides increasing air transport, the ongoing transformation of manufacturing supply chains, mass customization, e-commerce and the emergence of the offshore markets (China) – in all a wide set of factors and trends are helping to achieve the aspired position. In the framework of 'BUD:2020' new logistics facilities were built at Terminal 1 for major parcel services, finished at the end of 2017, and the next phase at Terminal 2 – The Cargo City – is under construction with a capacity to handle up to 200,000 tons per year.[22] The central government is able to support this vision by building a new motorway section (M4 to eastern Hungary and Romania), by the reconstruction of the 'Fast Road', the main road connection to the downtown, and a 22-km-long bypass for intercity rails to connect the airport into the national railway network.

There are some uncertainties about how the planned investments will affect the neighboring districts and suburban settlements, the 'downtown-airport corridor', and urbanization in general fuelled by the 'Aerotropolis' (Kasarda 2018) ecosystem (Poungias 2009). From the perspective of Budapest as a hotspot, the locally existing synergies, the scale and concentration of interlinking activities, the presence of digital transformation and emerging business platforms connected to aviation, logistics and specific manufacturing services have great importance. The ecosystem of the airport region consisted of 190 companies, 45,000 employees and 5.6% of the national gross added value in 2016 (Századvég Gazdaságkutató Zrt 2017). The area may also be the center for urban development (Airport City/Aerotropolis) and applications in mobility technologies in the near future – a desired broad base for hotspots.

3 The railway infrastructure in the Budapest Metropolitan Region

3.1 Connecting or bypassing

One must be aware of the fact that the main drivers of the Hungarian and especially of Budapest's transition in logistics have been (1) flexibility in road freight; (2) emerging demand for regional distribution and city logistics; (3) logistics services needed for manufacturing supply chains. All these drivers are based on agile and lean operation, where railways were not and indeed still are not competitive. Railway freight is well below its potential. Just in container traffic, the output was 255,000 TEU in Hungary in 2015,[23] below one third of the traffic in Austria (755,000 TEU in 2014) or half that in the Czech Republic (410,000 TEU in 2015).

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21 https://www.internationalairportreview.com/news/38412/budapest-airport-cargo-2017/ (May 24, 2019).

22 General overview for investors in Hungary's Real Estate market – Hungarian Investment Promotion Agency 2017 http://www.investhipa.hu/images/hipa_kiadvany_intro_realestate_web_20170822.pdf (May 24, 2019).

23 Communication by Firbás György from ZVF Zrt.

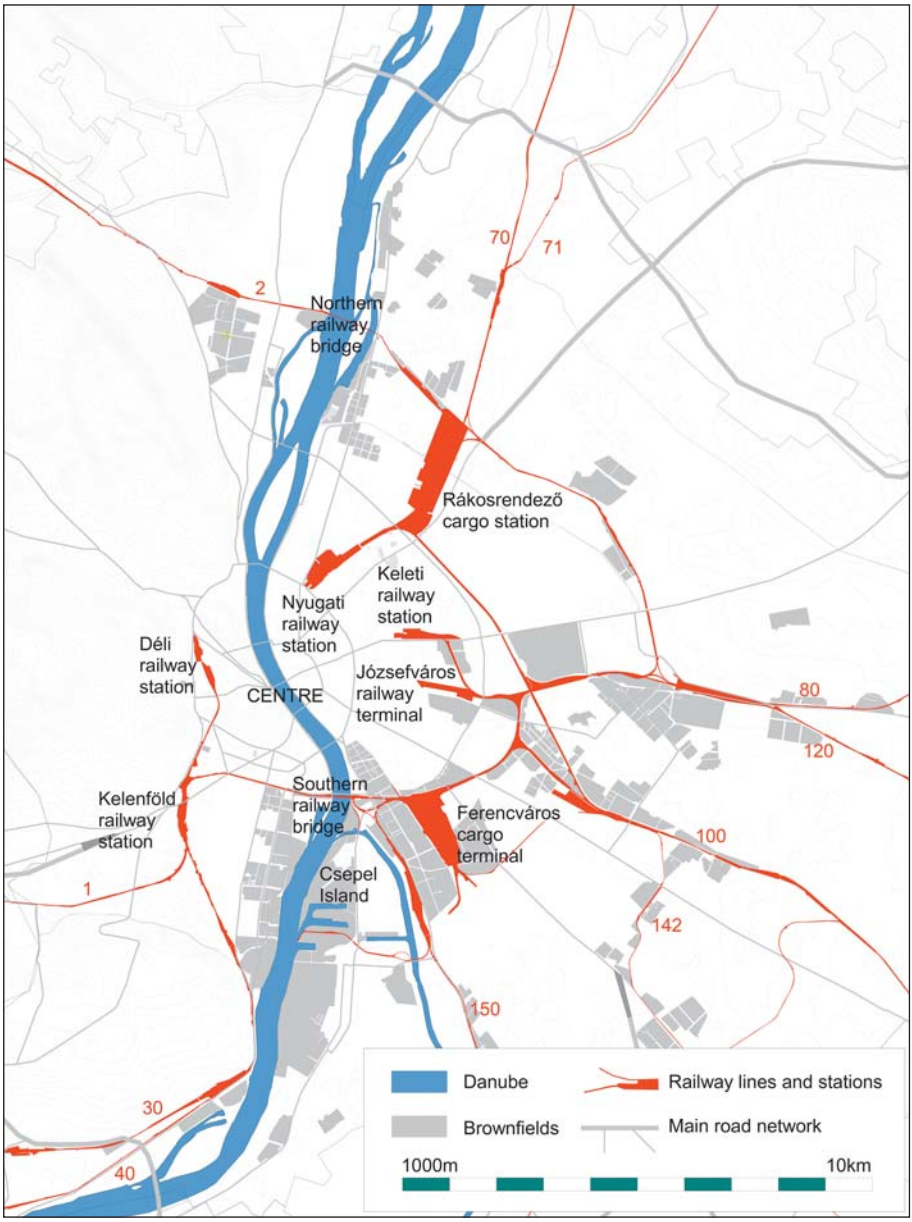

Fig. 4: Railway areas and brownfield areas in Budapest / Source: Author

The second peculiarity of the railway system of Budapest is that freight capacities compete with passenger capacities within the network, at the southern railway bridge, which is the main bottleneck, as this one pair of tracks must handle all east-west and south-west transit (freight and passenger) together with commuter transport, and this competition will increase with the planned S-Bahn-like services. The vision of the

'V0' is that a bypass could ease this conflict once and forever (Markovits-Somogyi/Karmazin/Bokor 2012), but it would also 'bypass' Budapest regarding the most important OEM Corridor.

The main priorities of the period 2014–2020 is to improve the commuter and intercity usage of the railway network in Budapest. Improving the service level of commuter (and intercity) services is important for the Budapest metro, because 60% of the commuting users of the railway network in Hungary use it in this area.[24] Reconstruction of the respective lines and stations may improve the conditions for freight traffic too. Ongoing investments from ITOP into the transport management systems (GSM-R, ETCS) also improve the capacity. Still, the question remains as to the extent to which the bottleneck has been solved or the conflict between the different usages simply prolonged.

A bygone project: V0 bypass corridor

Bypassing Budapest via a southern railway was always a popular idea in the past century (Takács 2012). The Treaty of Trianon (1920) defined the new borders of Hungary and cut off all the transversal railway lines connecting the regional urban centers of the Carpathian basin. The network was always Budapest-centered, but since that time crossing the Danube from Budapest to the southern border by rail was possible only at Baja, without direct links to the major transport corridors.

The first concept of 'V0' was elaborated during the 1930s, and the first 13km was built in 1940 (No.151a), including a new bridge at Dunaföldvár. Because of World War II, an even more devastating war, the original, ambitious plan was never realized, so the section was not appropriately connected to the main network. Also, the bridge could not meet the changing requirements of the post-war period, so a new plan was created in 1975 to solve this problem, but implementation was then delayed. During the 1990s, Hungary focused on managing the huge yearly deficits and national debt, and even the existing railway network had to compete for resources with the new motorway development programs. Finally, the bridge at Dunaföldvár and the line of 151a were closed in 2000/2001 due to inappropriate physical and technical features and a lack of connections.

In 2011, after seven years of EU membership, a revised proposal was made about V0 by the Association of the Hungarian Logistics Service Centers.[25] A feasibility and technical design study was prepared in 2012. The feasibility study proved that the bottleneck exists all along the railway sections at Budapest, including those where no significant improvement is possible, like at commuter stations where usage will be even more intensive (see line 100) in the future. In 2013, the National Spatial Plan (NSP) was modified to include the approved scenario of 'the new route of Szárliget–Vértesboglár–Vértesacsa–Baracska (south)–Ercsi (south)–the Danube–Kiskunlacháza–Bugyi–Dabas–Pusztavacs–Ceglédbercel', following the Pan-European corridor IV, with connections (intermodal terminals) to the Corridors V, XI and VII (Danube waterway) outside Budapest.

24 KSH Hungarian Central Statistical Office, 2016.

25 http://iho.hu/hir/hataridore-elkeszultek-121219 (May 24, 2019).

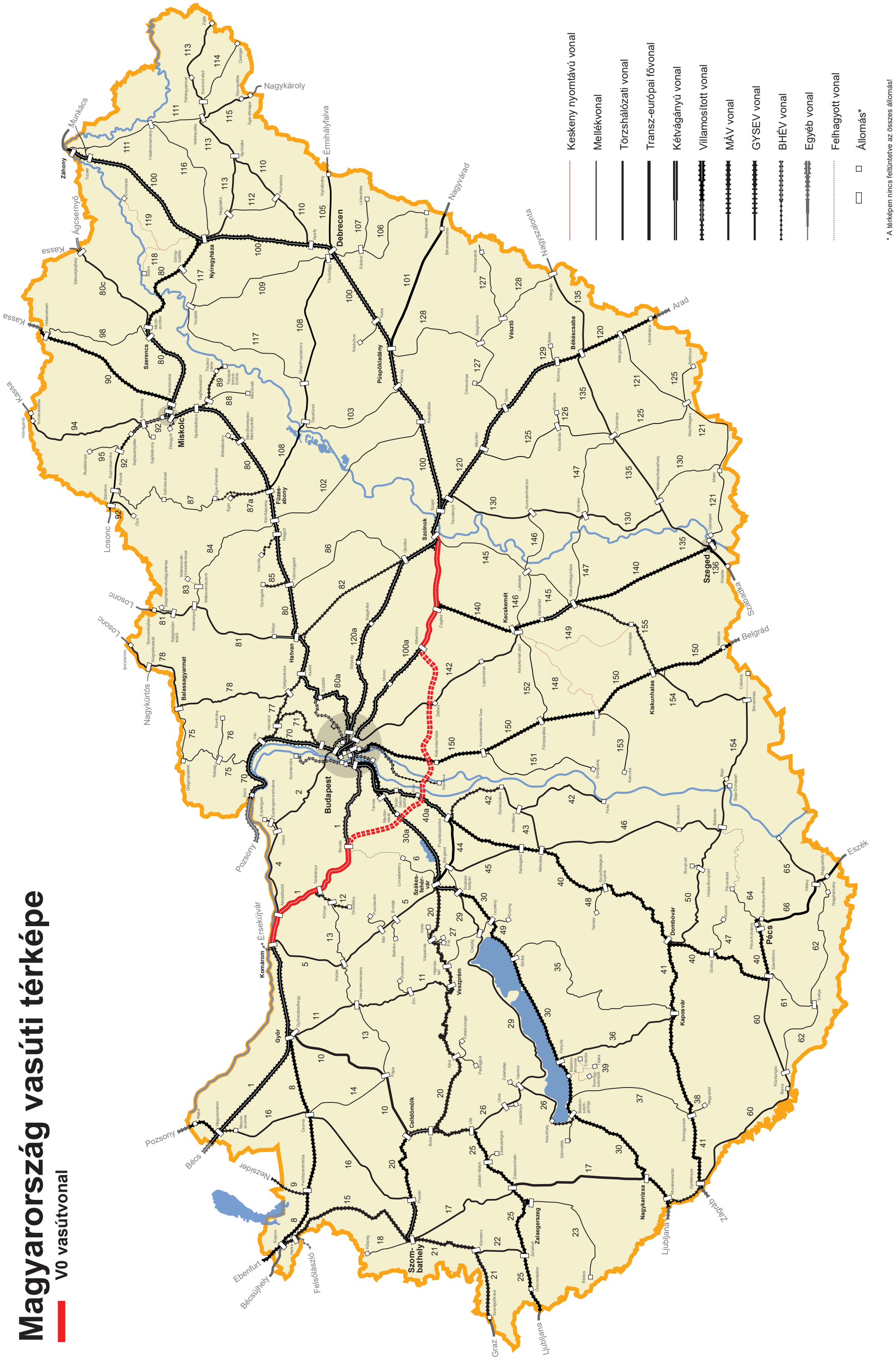

Fig. 5: The proposal for the V0 railway line in the national network / Source: https://hu.wikipedia.org/wiki/V0_vasútvonal; map by Joliet Jake

No decision has yet been made, as the estimated budget of 1.3 billion euros is as large as e.g. the total budget of the IKOP 2nd priority, aiming to finance the reconstruction and improvement of all the TEN-T railway (and waterway) lines of Hungary during the 2014–2020 period with more than 26% of the overall IKOP budget. There is a broad consensus between the stakeholders that the scale of the project is simply too large, and the proposed developments in the existing network (capacity building, level of services, ICT, scheduling, etc.) may improve efficiency sufficiently.

The plan conceptualizes a great vision of bypassing densely populated areas, improving logistics services, creating jobs in lesser developed areas, and last but not least increasing the capacity of the corridors.[26] According to this, the V0 is more than infrastructural development. It is a spatial concept too, highlighting the need for integration between the two, and targeting the development of Komárom, Székesfehérvár and Szolnok, two regional urban centers along the new line. This is an important aspect and a progressive idea, but the main question is still about the physical capacity which underlines the concept and the sustainability of the current structure. What if 30% of road freight over 300km shifts to other modes such as rail by 2030, and more than 50% by 2050 – in line with the EC Transport White Paper (2011)? How will the existing network ensure the necessary capacities to handle three to four times the cargo volume of today? (Islam/Ricci/Nelldal 2016).

Unfortunately, the 'V0' still has no sound business model. The main argument against implementation is what if the scenario of 'liner trains' and combining passenger and freight transport is valid, rather than today's 'hub & spoke' model which is seen as the future of railway transportation. Perhaps the future of transportation depends on integration and the shared use of the same network?

3.2 Contemporary railway development in the Budapest metropolitan area

The current patterns of railway usage are quite sophisticated, while the overall system is still the same as it was when developed in the 19th century (Garay 2014). Layers of usage are diverse (commuter and intercity trains vs transport), and transit is just one component of them. There are questions concerning the validity of the concept of separating transit and other freight and passenger traffic, or promoting transit without added value (local service, manufacturing), which is definitely a controversial topic from Budapest's perspective.

The growing openness of the Hungarian market gradually transformed transportation in terms of mode, destination and geolocation during the 1990s. The growth in transportation and logistics has been fuelled by exports and imports. However, the share of real transit within international freight traffic was almost marginal (5% of total traffic) till EU enlargement, and transit only began to develop thereafter as it went above 20% in the next 5 years; even the crisis failed to shatter this trend. By 2009 the share of transit in rail freight (measured in performance / ton-kilometer) reached

26 Presentation of the MLSZKSZ at Vecsés, at the Forum held by the Local Government of Pest County, 2014.

31%, and 34% by 2016.[27] An evaluation is considering how a real transformation can change the railway network at Budapest, introduce the necessary improvements for transit, and tackle the mismatch between passenger usage and freight transport, either in a radical way (V0) or incrementally, by upgrading and expanding existing lines.

Developments between Kelenföld and Ferencváros

The government realized the untenable situation of the bottleneck in the railway infrastructure between Kelenföld and Ferencváros and worked out a series of projects. Two of these are considered to offer a medium-term solution.

Fig. 6: Southern railway bridge / Source: https://hu.wikipedia.org/wiki/Összekötő_vasúti_híd; image by Joliet Jake

The most important is the extension of the south rail bridge crossing the Danube, and of the connecting rail transport system between Kelenföld and Ferencváros. This practically means the building of a new bridge (next to the existing) and a new (3rd) railway line (with two new rail stations: Danubius and Népliget). The notice of open procedure for public procurement for designing the bridge was published in 2015; the procurement for designing the connected networks started in 2017.[28] The ongoing development of the intermodal center of Kelenföld (P+R and B+R services, commercial developments), and the proposed intermodal nodes and stations may be a basis for developing the 'S-Bahn' railway network (the 'circle line'). So the bypass line to the airport could be an integrated part of this network just like the majority of other projects under construction, like the Kelenföld–Százhalombatta, Rákospalota–Esztergom, Rákos–Hatvan railway track reconstructions (all of them TEN-T project, proposed for CEF funding) affecting main commuter usage.

27 KSH Hungarian Central Statistical Office, 2016.

28 The other is a set of country level developments, like improving efficiency by developing ETCS2 signaling control and a rail traffic management system, diagnostic and monitoring systems, GSM-R, IT and software, modernization of rail tracks and sourcing of new electrical multiple units (EMU). These together will also improve the network capacities (IKOP ÉFK 2015, 2016, 2017).

There are further related investments: the reconstruction of Line 150 'Kelebian' (incl. the relocation of the track) will be part of the Belgrade-Budapest (Pan-European corridor 10) project. The estimated 2.42-billion-euro investment project of the new Belgrade line will have an efficient connection to the main container terminals at Pest (BLIK) and also to the Csepel-Island intermodal centers (Csepel Free Port/MCC, METRANS) after the reconstruction of the Gubacsi bridge and the related 2.3-km truck line. New intermodal services of METRANS, and also the MCC, BILK terminals may achieve competitive advantage, as less delay and more reliable freight traffic can be managed thanks to improvement and reconstruction. Using the connections to the main sea ports as a basis for evaluation, the competitive advantage of these terminals is clear, especially in handling offshore traffic. Further developments of the smaller regional terminals of Békéscsaba, Záhony, Paks,[29] Miskolc and Kiskunhalas probably will not alter this position.

3.3 Passenger train developments in the railway network

Train still has a considerable modal split in Hungary. The country had the second largest share of public transport from the modal split in the EU in 2012, 34.2% (Juhász/Mátrai/Kerényi 2014). The same second position was valid for passenger train usage, with 13.8% of the modal split share (EMTA 2012). Intercity railway usage and commuting usage were the most successful segments. In recent years the modernization of the Kelenföld–Székesfehérvár line 30, and Nyugati-station-Esztergom line 2, together with the new numbering and new motor-trains of commuters' lines, brought new users to the railway system. The usage of commuter rails increased by 20% from 2010 to 2017 and reached the 60 million passengers per year,[30] which is manageable but also increases the existing physical congestion of the Kelenföld–Ferencváros section.

However, passenger transport on the railways is characterized by further contradictions in Budapest. As opposed to the commuter lines coming from the agglomeration to the city, the usage of trains inside the city is almost immeasurable. HÉV (commuter rail, rapid transit) lines, formerly part of the urban public transport system was handed to the national railway company for concession, even though it is now planned that the southern HÉV line of H6 'Ráckeve' és and the H7 'Csepel' should be integrated into the city tram network.[31] Budapest has four lines of suburban railway and a considerable tram network, which have high percentages from the modal split, but inside the city's boundaries the integrated railway system still does not serve the public transport system. The reasons for this are multiple, basically the position of the lines inside the city and the position of the stations show almost no coherence with the areas where people live or work.

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29 532/2017 (VIII. 14.) Governmental order on the foundation of a National Intermodal Container Terminal Network.

30 https://www.mavcsoport.hu/mav/dinamikusan-no-utasforgalom-budapesti-elovarosi-vonalakon (May 24, 2019).

31 http://hvg.hu/itthon/20170314_Indul_a_nagy_HEVfejlesztes_Rackevetol_az_asztalfiokig (May 24, 2019).

S-Bahn Budapest

This situation should be improved with an ambitious S-Bahn concept currently under implementation. The concept named 'Railway permeability study of Budapest' was approved in the 1081/2017 (II.13) government decree, and right now is limited to the development of a strategy from CEF funds. The main core of the program would be the connection of lines 2 and 150 across the city using the existing tracks but building new stations to create viable connections with the public transport system of Budapest. The S-Bahn concept would create 15 new stops on mainly existing railway lines, the corresponding study is under delivery at the cost of 1.9 million euros, partly using CEF funds.[32] This concept would not directly affect the bottleneck of the southern bridge or the development of the Orient/East-Med Corridor, but improved passenger usage of the city would further increase overall demand.

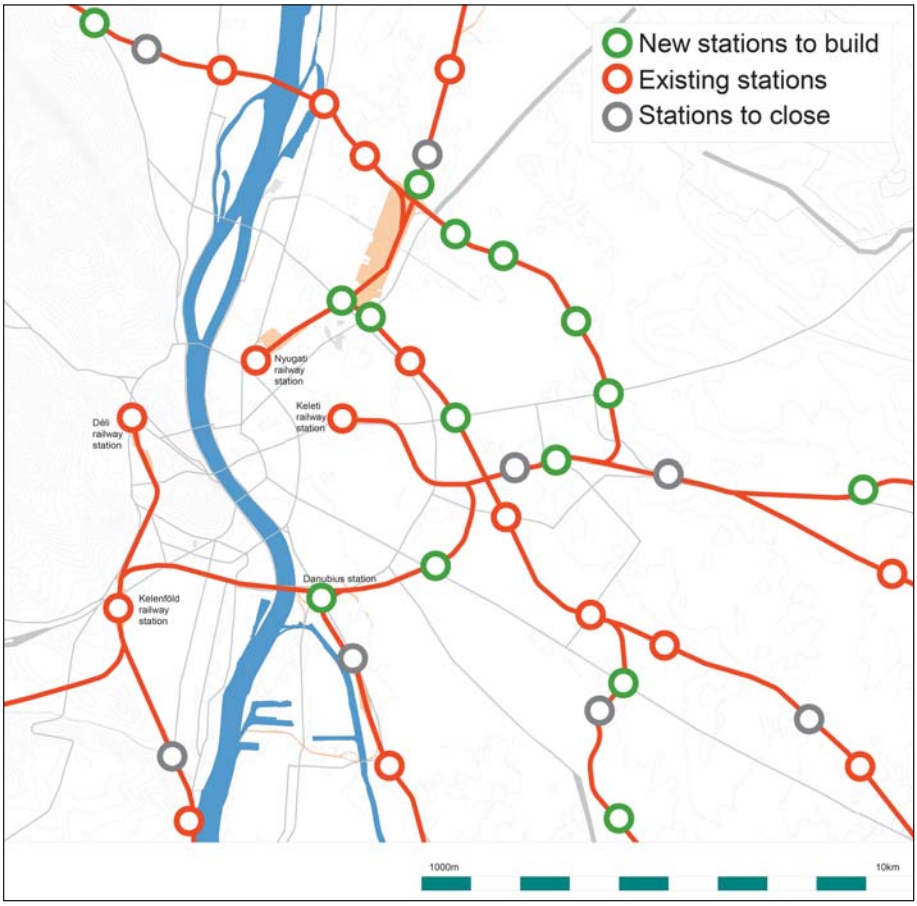

Fig. 7: S-Bahn concept to reform the passenger rail system in Budapest / Source: author

32 http://iho.hu/hir/ujabb-s-bahn-program-vagy-a-regi-ujragombolasa-170217 (May 24, 2019).

The S-Bahn system in Budapest could only be completed if the lines would finally close into a full circle. Just as in the case of the M0 highway connection, the railway system of Budapest has two bridge connections across the Danube, but these two lines have no connection on the western side. This is partly because of the extreme topography of the western (Buda) side in the north, so the only solution for both the motorway and the trains is to develop the system in tunnels.

The plan of the Déli–Nyugati tunnel bypass under the Danube

There is one plan that could affect the overall accessibility and permeability of Budapest, with a considerable effect on the cargo transport capacity shortages too, and this is the 100-year-old dream of a tunnel under the Danube connecting Déli railway station in the west with Nyugati railway station in the northeast. A plan to connect terminal stations underground has existed since 1934, when the elimination of the present Keleti station was projected, and extensive underground connections were planned under the city with a three-track connection between Kelenföld and Nyugati stations, traced in three tunnels.

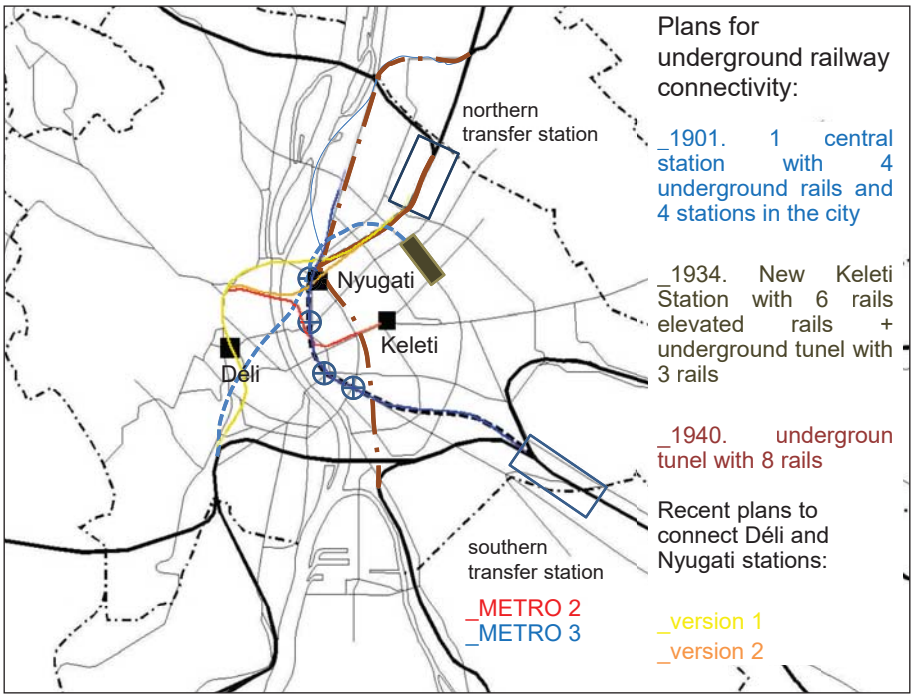

Fig. 8: Plans for the underground connections of inner city stations / Source: Kálmán 2012

There is a vision (more than a concrete plan) of an underground tunnel connecting Déli and Nyugati passenger railway stations under the Danube (Kálmán 2012). Both stations are terminal stations, but their lines could easily be connected with a 3–4km tunnel. Such a plan is still kept in reserve with some regulatory lines allowing the future

implementation in the dense urban fabric, and with the reservation of an exact section of the area of Nyugati station where the tunnel would start. This tunnel would have considerable benefits. It would diminish passenger traffic between Kelenföld and Ferencváros, allowing more fluid cargo transport and more logistics developments in the south. It could boost international passenger traffic of the stations Déli and Nyugati, both with excellent downtown connections. Also, both stations have some brownfield areas ready for urban development. The implementation of such a project with the two stations being just stops, but with 20-wagon-long platforms to accommodate international traffic would also resolve the problem of trains losing 20–30 minutes between central Budapest and Vienna due to the extreme detour they must make to reach Keleti (Eastern) station. Still, such development would only have complementary benefits for a OEM Corridor, as passenger trains would still have to either avoid the central stations or circulate round the city from Nyugati station on a circular line, which is as yet incomplete.

4 Urban development possibilities tied to railway development

4.1 Development strategies of Budapest

Budapest chose a liberal administrative system after the centralized era of communism, which means that decision-making structures are rather decentralized. 23 districts form the capital city, and most of the incomes and policy-making procedures go to these, while the municipality of the capital city has only a coordinative role. The Municipality of Budapest is basically responsible for overall urban policies, whereas the district municipalities are responsible for the specific ones (Keresztély/Scott 2012). Therefore, Budapest has the right to make the strategic plans of the city, but districts could successfully block central ideas by altering their land-use plans and have the power to issue or refuse building permits (Tosics 2006). Hungary also suffered from the planning deficit of many post-socialist countries (Nedović-Budić 2001), and the two-tier governance system together with this decline in planning traditions resulted in weak strategic and urban planning procedures. To make the situation more complicated, Pest County is another independent administrative unit, which includes all of the agglomeration of Budapest. Even if they are in the same convergence region, Budapest and Pest county have very different socio-economic issues, and their spatial strategies are not integrated at all. The relationship between Pest County Municipality and the individual municipalities of the agglomeration towns are somehow similar to the relationship of Budapest to its 23 districts.

Budapest, Pest County and the municipalities of the various districts and agglomeration towns have their own strategic and zoning/planning documents.

The General Assembly of Pest County issued the Spatial Development Concept of Pest County document in 2012 and the Spatial Development Program 2014–2020 in 2014.[33] In these documents the area of the Liszt Ferenc International Airport, the logistics

33 http://www.pestmegye.hu/images/2014/Teruletfejlesztesi_dokumentumok/Program_megyei/Pest_Megyei_Területfejlesztesi_Program_2014-2020.pdf (May 24, 2019).

zone south of the capital on the Csepel Island and on both sides of the Danube, and an innovation pole area along the transport axis from the capital towards Vienna are marked as the main development zones tied to the infrastructures discussed in this paper.

In Budapest the most relevant documents of development were the first Budapest Urban Rehabilitation Concept (1997), then the Urban Development Strategy (2003) and the Integrated Urban Development Strategy (2009). Since 2014 Budapest has a new Budapest 2030 Long-term Urban Development Concept, and since 2015 a new Integrated Urban Development Strategy.[34] In the integrated strategy there are three areas for concrete action plans related to railway infrastructures: the area of Kelenföld, Budapest-South including the Ferencváros railway terminal, and the area of the airport. In the long-term strategy the brownfields of Kelenföld and of Ferencváros are both highlighted, but more emphasis is on the areas adjacent to the Danube. The lines of railway 40 and 50 going south from Buda lie along brownfields marked for long-term development, and there is also a focus on the railway areas near Keleti and Nyugati stations.

Budapest also started Thematic Development Programs (TDP),[35] the result of a new planning procedure between the capital city and its districts, involving different stakeholders in the process. The aim of the program is to have a coordinated plan to effectively use the EU funds of the 2014–2020 period all across Budapest. The four accentuated themes are based on the 2030 long-term concept, and these are the following: development of the Danube riverside, development of brownfield areas, social urban regeneration, promotion of economic development and job creation. Among the projects of the brownfield thematic pole there are significant railway areas designated for redevelopment: the northern Rákosrendező cargo station, the utilization of South Railway Station and surroundings, the Westend Grund and different unused areas at Nyugati station, areas at Józsefváros Railway Station, areas in Csepel, and the areas around the Liszt Ferenc International Airport.

The Thematic Development Programs defined two main thematic areas where most of the new urban development in Budapest will take place in the next periods: the Danube riverside and the brownfield areas. While the development of the Danube riverside areas is in convergence with the development of the passenger river transport capacities and with the new cross-river connections, the brownfield areas are more related to transformations in the railway network, even though many brownfields to be developed are more connected to the former industrial sites along the Danube. While in recent years a development strategy to use the Danube as a main spatial corridor for development started to take shape in Budapest, the different strategic documents dealing with brownfield areas of development and logistics centers still do not draw out a coherent trajectory for development. Railway areas remain targeted by strategies and development projects only as enclaves inside the city.

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34 http://budapest.hu/Lapok/Városfejlesztési-dokumentumok.aspx (May 24, 2019).

35 http://budapest.hu/Documents/Városépítési%20Főosztály/Thematic_ENG_summary.pdf (May 24, 2019).

Strategic thinking in urban development came somehow unexpectedly from the area of public transport management. Since 2010 a new organization took over the management of the transport infrastructures of the city, the Center for Budapest Transport (BKK). BKK introduced a new model of urban management, as it became the planning and controlling agency of all projects and operations related to public and urban transport, therefore a strategic vision could be applied to these fields, also ensuring the implementation of the goals with monitoring. Until 2014 this municipal agency carried out extensive development projects aiming to create a more user-friendly and smart public transport system. BKK became the initiator of many transport-related urban development projects in this period, and it drew up the 'Transport Development Strategy of Budapest 2014–2030', the Balázs Mór Plan (BMT). The plan, developed with the involvement of 200 stakeholders, has a wider field of action than merely public transport, and it also focuses on the interconnectedness and joint development of the whole Budapest Metropolitan Region.

4.2 Development possibilities along railways

In the past decades the transformation of brownfield areas in Budapest was rather slow; the many isolated projects of revitalization, and the complete transformation of some central areas showed that brownfields along railways were less favored for development than former dock areas around the Danube or inner city industrial enclaves (Kiss 2007).

The area that has the largest urban development potential along the corridor is Ferencváros. While the transitional zone north of the railway line and of the station of Ferencváros developed steadily before and after the crisis, south of this station lies the largest brownfield development zone around the center of the city. It is not planned that the *Ferencvárosi Rendező Pályaudvar*, the main rail cargo station, should become a container cargo terminal, instead it is marked for functional change and urban development, just like the *Ferencvárosi Kikötő*, the former industrial area by the Danube, nowadays completely cleared for development except for the heritage industrial halls of considerable architectural value. Also, the areas between these two brownfields host industrial sites with large development possibilities, while the northern part of Csepel Island continues this southern development belt, too, a large area for visible urban development projects in the last decades.

The urban development of Kelenföld is already more robust. This is one of the most developing areas today, and its role as an intermodal center would further increase with the OEM Corridor. Commercial functions are expected to grow anyway, as this is one of the best-connected brownfield areas in Budapest since the opening of metro line 4. A big question is whether passenger trains connecting cities via the corridor would go to the center of the city just as they do now, losing more than an hour at the terminus of Keleti Pályaudvar, or would they just touch the city at Kelenföld, and follow to the south after crossing the Danube near Ferencváros. In this case Kelenföld would further develop into an international railway station and intermodal center, and the brownfields left here for development would quickly attract office and commercial developments. Some architectural competitions foresaw such developments but, as

mentioned above, the track capacities of Kelenföld are somewhat narrow to host the future international passenger station of Budapest, while at the same time letting through all cargo traffic passing from the east across Budapest.

5 Conclusions

Urban development around Kelenföld, Déli and Nyugati stations, as well as in Ferencváros and Csepel Island could be boosted by a new international rail corridor, but only if priorities could be set up regarding the urban development of Budapest and the rail system. Unfortunately, no consistent strategy exists in such a direction, the abovementioned areas are not subjects of extensive urban planning procedures within a strategy, and the rail system is being developed without a long-term vision on how to overcome the bottlenecks and outdated system elements in Budapest.

One of the most important observations regarding the sustainability of Hungarian transport policy and its implementation in the Budapest metropolitan region as a hotspot, is recognition of the connection between spatial development, land-use planning, master plans and sectoral transport policy, along with the coordination of transport and logistics strategies. In the meantime, even the planning of the metropolitan integrated transport network remains a major challenge for the relevant stakeholders.

Led by retail and wholesale, framed by a well-established real estate market, and fuelled by the emerging demand for supply chain management and shared service centers – Budapest offers one of the most competitive locations for logistics in the CEE region.[36] In order to upgrade this potential, the urban structure, the tangible transportation and logistics infrastructure and the intangibles, like synergies, economies of scale, and skills and competences still need to be improved in order to create a solid basis of sustainable economic development, and to compete with other great European cities.

Digital transformation definitely continues to maintain pressure on the various parties involved in logistics and transportation. Road freight and warehousing are in the forefront of the use of IoT and AI based technologies and solutions (autonomous and connected mobility, automated storage systems, remote control and telematics, using wearables etc.). The way in which rail freight services can implement new technologies beyond GSM-R, ETCS-2 in their operations and business model will impact Budapest as a hotspot, as ensuring reliability or remote tracking may only be the beginning. If, for instance, the industry would find appropriate technologies and business models to gain from the parallel presence of passenger and freight traffic (integrating services), or the providers would invent door-to-door services, integrated supply chains or other solutions for upgraded service and business quality, the gap between expectations and perceptions may be reduced to generate modal split, and Budapest may more extensively use its unique advantages in RDI and technology as a European hub of mobility.

36 HIPA (2017) Logistics & Transportation Industry in Hungary, https://hipa.hu/downloadmanager/download/nohtml/1/id/8 (May 24, 2019).

The capital is the main bottleneck and development hole in the rail system today, its system sets back the development of the whole country's infrastructure and economic centrality. No plans exist like the ones that helped Vienna to re-arrange its rail network, opening valuable opportunities for well-planned urban development. Budapest also lacks a cross-sectorial approach and strategies in the development of its logistics infrastructures. The development of the Liszt Ferenc International Airport is promising in all aspects, but other spatial units of development lack these synergies. A more coherent vision is needed to make Budapest a real European hotspot for cargo, with transport parallel to successful urban development. Large infrastructural projects like the Orient/East-Med Corridor could open the discourse for the strategic updating of the railway infrastructure and the spatial logic of the development areas.

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