RAILWAY AND THE TRANSFORMATION OF THE EMPLOYMENT STRUCTURE

The regional effects of a 19th century light railway

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Abstract

This paper explores the transformative impact of railways on employment structures in Hungary from 1880 to 1920. The study highlights the shift from traditional, agriculture-based employment to industrial and service sectors, primarily driven by the introduction of railways. The analysis indicates a general trend of modernization across settlements with railway connections, while those without showed a reinforcement of traditional structures.

On a regional level, the advent of railways spurred significant changes. Settlements along the main line and those near the light railway outperformed those without railway connections, indicating the railway's role in driving modernization. However, the influence of the railway appears to have diminished over time. The paper concludes that while the local impact of the railway was transformative, its absence often resulted in a delay in modernization. This local transformation paved the way for the region's integration into national and eventually, European processes.

Keywords: *Regional Development, Spatial Analysis, Infrastructure Impact, Transportation Networks, Rural Development, Regional Integration.*

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VASÚT ÉS A FOGLALKOZTATÁSI SZERKEZET ÁTALAKULÁSA

Összefoglalás

A tanulmány a vasút foglalkoztatási struktúrára gyakorolt átalakító hatását vizsgálja egy régiós szinten Magyarországon 1880-tól 1920-ig. A tanulmány kiemeli a hagyományos, mezőgazdaságon alapuló foglalkoztatásból az ipari és szolgáltatási szektorok felé történő elmozdulást, amelyet elsősorban a vasút bevezetése vezérelt. Az elemzés általános modernizációs trendet mutat a vasúti összeköttetésekkel rendelkező településeken, míg azoknál, amelyek nélkülöznek ilyen összeköttetést, a hagyományos struktúrák megerősödését mutatja.

Regionális szinten a vasút megjelenése jelentős változásokat hozott. A fővonal menti települések, valamint a helyi érdekű vasút közelében lévők felülmúlták azokat, amelyek nem rendelkeztek vasúti kapcsolattal, ami a vasút modernizáló szerepét mutatja. Ugyanakkor a vasút hatása az idő múlásával csökkenni látszik. A tanulmány arra a következtetésre jut, hogy a vasút helyi hatása átalakító volt, annak hiánya gyakran a modernizáció késlekedését eredményezte. Ez a helyi átalakulás megteremtette a régió integrálódásának lehetőségét a nemzeti, majd később az európai folyamatokba.

Kulcsszavak: *Regionális fejlesztés, térbeli elemzés, infrastruktúra hatása, közlekedési hálózatok, vidékfejlesztés, regionális integráció.*

JEL: *N13*

Historical overview

A crucial topic in the study of railways and local populations is the restructuring of employment structures. This shift not only altered the local economy but also significantly changed the composition of the local population with the influx of new demographics (Robbins 1962; Simmons 2009, Casson 2009, Newman 2015). Most notably, there was an emergence of a group of transportation workers.

The institutional transformations during England's Glorious Revolution of 1688 paved the way for the Industrial Revolution. This involved not just the abolition of monopolies, but also the creation of an economically conducive environment for industry and trade. The transportation revolution that began in the early 18th century further catalysed the development of the textile industry and the use of steam power. (Acemoglu – Robinson, 2013)

In Hungary, the transportation revolution began following the 19th-century revolutions for freedom, primarily because of infrastructural investments from foreign capital. It fully unfolded and became one of the most definitive economic sectors after the Austro-Hungarian Compromise of 1867 (Katus 1983). This progression aligns with the theory proposed by Acemoglu and Robinson, which states that political freedom leads to economic prosperity.

In his overview, Béla Czére (1947) distinguishes the railway population, which consisted of citizens involved in trade in earlier periods. Interestingly, while social history discusses traders for centuries, it does not differentiate between their financial transactions (buying and selling) and transportation activities. This distinction perhaps begins with the rise in water trade volume in some instances, and then during the 19th century, we clearly differentiate between transporters and traders. At this point, it becomes impossible to group the grocer and the train driver together.

The modernizing effect of the railway required a receptive attitude from the local population. As Frisnyák articulated, in the 19th century, railways could only modernize settlements where other conditions were met, such as sufficient labour and capital (2013).

Methodology

Space and time

The research, detailed further in the Sources and Methodology chapter, is primarily based on census data. Censuses were taken every ten years, aligning the temporal period of the research with the decades. I chose the starting and ending points based on two pivotal regional events.

The research begins with the completion of the ACSEV (Arad Csanádi Egyesített Vasutak, Arad & Csanad United Railways) Szőreg-Arad railway line in 1883. It allows the examination of the railway line's local impact, with the preceding 1880 census providing a pre-construction baseline. This approach enables attributing any deviations in time series analyses more definitively to the railway's influence.

The end point is marked by the Peace Dictate of Trianon, 1920, concluding the First World War. This event resulted in the annexation of a third of the region. The border change had a significant impact, overshadowing all previous phenomena. It made distinguishing the railway's effects from the border change impacts impossible in the new region.

When designing the region for my study, I considered three aspects. Primarily, I sought an experimental area for my dissertation research hypothesis, with the ability to conduct a control group

investigation. My research explores the social impacts of railways. As such, the ACSEV's Arad–Szőreg–Szeged line and the Mezőhegyes–Újszentanna line formed the core of the investigation area. In 1914, there were twenty-two stations on the line. The first examined settlement on the Arad–Szőreg–Szeged line is Pécska[1], situated at the 21st kilometer, and the last is Szőreg, at the 114th kilometer. This railway line connects to the pre-existing Szeged–Temesvár MÁV (Magyar Államvasutak, Hungarian State Railway) line. While the line links Arad to Szeged, these two settlements were excluded from the study due to their significant differences from the typically smaller, more rural settlements in the region[2]. The examined part of the Mezőhegyes–Újszentanna railway line starts from the beginning, with the last evaluated settlement being Sikló, located at the 65th kilometre. Although the line extends for an additional 34 kilometres, this part was outside the study's scope, which leads to the rationale behind the second aspect.

The formation of the region considered the applicability of statistical data at both settlement and district levels, ensuring the experiment would be credible and operational under all circumstances. Consequently, according to the 1910 administrative division, the region comprises 11 districts spanning four counties.[3]

The formation of the settlement list was informed by the administrative boundaries of the districts in 1910. However, the settlements can also be grouped by their proximity to the railway, not just district. This is particularly beneficial in the established region, as shown in Figure 1.

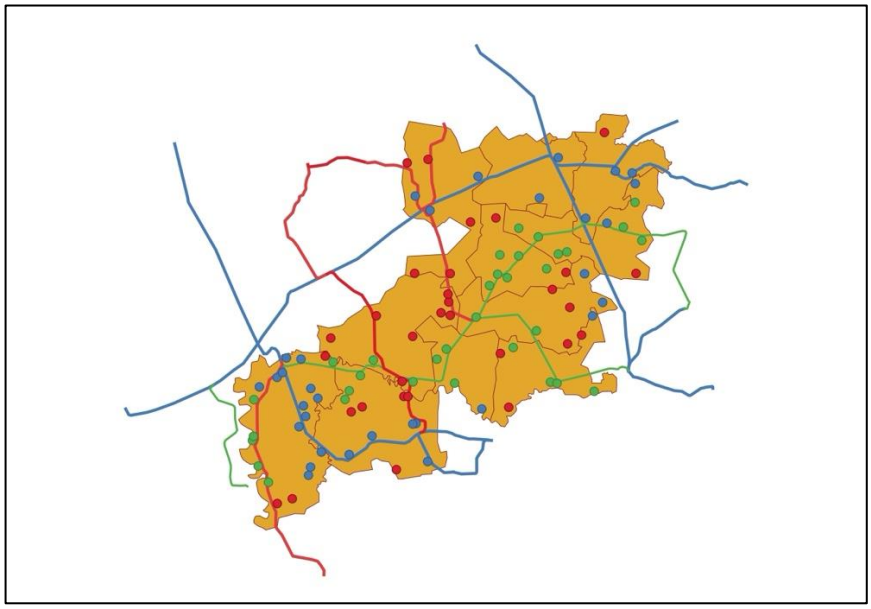

Figure 1: Schematic diagram of the Arad-Csanádi Region

Source: Maps and data tables of GISta Hungarorum (OTKA K 111766) edited by Ákos Kőrös, 2020.

Figure 1 shows the yellow area representing eleven districts. Despite two indentations, it is mostly a contiguous area. These indentations are unrelated to the railway line under investigation.

[1] From 1911, Ópécska.

[2] Examining these settlements, along with others of similar size and function, is both possible and valuable when compared on a national level.

[3] From Arad County, the Elek and Magyarpécska districts, from Békés County, the Békés, Gyula – with the city of Gyula – and Orosháza districts, from Csanád County, the Battonya, Central, – with the city of Makó – Mezőkovácsháza and Nagylak districts, from Torontál County, the Nagyszentmiklós and Törökkanizsa districts are included in the region. As a result, it is possible to work with data at the district level in the region, it does not cause a problem if the settlement level is not accessible.

The thick, colored lines indicate the chronological order of the railway lines' construction. The blue line represents those built by 1880, the green line for those built by 1890, and the red line for lines constructed between 1890 and 1920. The map does not include economic railway lines as they were not part of the examination.

When color-coding settlements, the distance from railway stops played a significant role. It was established as early as the 20th century (Hieronymi 1902) that railways could have the most substantial impact within a 12-kilometer radius, a finding confirmed by Frisnyák (2016). I utilized a database from the GIStory Hungarorum (OTKA K 111766) project for this purpose[4]. This database contains the distances of settlements from the nearest railway stop between 1870 and 1910, broken down by decade. The geoinformatical program's function was used to calculate the straight-line distances between two points based on the available data in the database[5]. The resulting impact zone represents the area of modernization. The distances are calculated from the nearest stop, not the railway line itself.

I categorized the settlements into three groups based on their proximity to the railway's 12 km radius: those that entered before 1880, those between 1880-1890, and those that entered later or not at all.

The blue-marked settlements, termed „*Early Bird*", are those within a 12-kilometer radius of a railway station by 1880. The green-marked settlements, dubbed „*Innovative*" entered the impact zone by 1890. This group includes settlements near ACSEV and a few located south of Szeged along the left bank of the Tisza. Despite the Szőreg-Karlova railway line near them only being built in 1897, they are included in this group due to the Horgos-Zenta line on the Tisza's right bank, accessible via Törökkanizsa. The red-marked settlements, termed „*Leftover*" had not joined the impact zone by 1890. Although most joined the network by 1910, due to the construction of the Alföld Economic Railway, they serve as a control group for the research focused on ACSEV and the modernization that began in the late 19th century. The three groups are nearly equal in number, with 32 *Early Bird* settlements, 33 *Innovative* ones, and 31 *Leftover* ones in the region[6].

In general, it can be said that the region is suitable for comparison between 1880-1920, however, due to lack of data, some settlements fall out of the census data. Medgyesegyháza became a municipality in 1893, before that it belonged to Medgyesbodzás (KSH 1902), so we only have data from the 1900 census. After the Treaty of Trianon in 1920, the following settlements came under Romanian authority: Gyulavarsánd, Nagypél, Ottlaka, Sikló and Szentmárton from Eleki district of Arad county; Kispereg, Magyarpécska, Nagyiratos, Nagyvarjas, Németpereg, Óbodrog, Ópécska and Szemlak from Magyarpécskai district of the same county; Kisiratos and Tornya from Battonya district of Csanád county; Sajtény from Nagylak district of the same county; Bolgártelep, Keglevichháza, Nagycsanád, Nagyősz, Nagyszentmiklós, Németszentmiklós, Nyerő, Óbesenyő, Őscsanád, Porgány, Pusztakeresztúr and Valkány from Nagyszentmiklósi district of Torontál county; Óbéb from Törökkanizsa district of the same county. At the same time, Csóka, Egyházaskér, Feketető, Hódegyháza, Józseffalva, Kanizsamonostor, Magyarmajdány, Ókeresztúr, Oroszlámos, Rábé, Sza-

[4] Henceforth, GIStory Hungarorum.

[5] The Traffic and Distance Indicator, edited by Róbert Lányi and Jenő Szatmári (1902), provides the distance between the center of a settlement and the railway station. The distance is measured on the available road network with meter accuracy. This source does not provide straight-line distances, but rather practical usable distances. However, this summary was prepared only for one year, and there is no digital version available. For further information on travel distances, refer to Czére 1991.

[6] I presume that the advent of the railway modernized the associated settlements. The name of these settlement groups stems from this, but it doesn't necessarily imply that they have become developed, are developing, or are regressing.

nád, Tiszaszentmiklós and Törökkanizsa from Törökkanizsa district of Torontál county came under Serbian authority. These listed settlements no longer appear in the 1920 census, so they are lacking data, their role in comparison is weaker.

The name of certain settlements changed during the period under review, so these various names had to be matched to each other. I relied on the data from the 1900 census and the Hungarian Place Name Identifier Dictionary (Lelkes 2011) for this.

Sources

The occupational data is based on four censuses. In each case, I used the number of job seekers, these sources are available broken down by occupational group. The 1880 occupational structure is not available at the settlement level in the published and digitally findable volume, but the tables can be researched in the Óbuda research room of the Hungarian National Archives among the archival sources of the KSH (Központi Statisztikai Hivatal, Hungarian Central Statistical Office) (MNL 1880a, MNL 1880b). For 1890, there is some kind of source only at the district level, so I left this year out of the study[7]. D are available for the years 1900, 1910, and 1920 (KSH 1904., KSH 1913., KSH 1925.) can be studied digitally.

Regarding the data from 1880, it is noteworthy that those dealing with transportation were not separated, and the data of five settlements are missing[8]. Thus, the number of elements decreases to 91 in this case. In addition, the source provides the total number of employed people differently than the censuses of later decades. The difference stems from where family members are accounted for: in the 1880s, only earners were included in the calculations, while in later years the entire population. For comparison, I projected the 1880 numbers onto the total population in accordance with the ratios. The 1920 census does not include the annexed territories, so the data of these settlements are missing.

Censuses used various methodologies to create sectorial classifications. Each method included a detailed classification system to guide enumerators on categorizing individuals. These methodologies were documented at the start of the census volumes. To simplify the data, I grouped the categories from the source into five major classes: primary, secondary, tertiary, other, and outside the investigation. The grouping was done as follows, with the year of the source provided in parentheses:

Primordial Production (1880, 1900, 1910, 1920), *Day Laborers* (1880, 1900, 1910, 1920), and *Agriculture and Gardening* (1900, 1910) were categorized under the primary sector. However, the *Day Laborers* group is not straightforward, as it includes not only agricultural workers but also those in industrial, commercial, and other roles earning daily wages. Hence, this category cannot be neatly classified into one of the three groups, yet it is too large to dismiss from the analysis. Given that the principal activity of the area under study is agricultural, it is likely that the majority of the day laborers are from the agrarian sector.

The secondary sector was represented by two groups: *Industry, etc.* (1880, 1900, 1910, and 1920) and *Mining and Metallurgy* (1900, 1910, and 1920). As expected, only one person belonged to the "Mining and Metallurgy" group[9].

[7] The districts cannot be clearly matched to the triple classification serving as the basis for the examination.

[8] Gádoros (Békés county, Orosházi district, *Leftover*), Gyula (Békés county, Gyulai district, *Early Bird*), Medgyesegyháza (Arad county, Eleki district, *Innovative*), Makó (Csanád county, *Innovative*) and Végegyháza (Csanád county, Mezőkovácsházai district, *Innovative*).

[9] In 1900, one person was recorded in Szemlak (Arad County, Magyarpécska District, *Leftover*), in 1910 seven people were recorded in Gyula (Békés County, Gyula District, *Early Bird*), one person was recorded in Ambrózfalva (Csanád

I classified the *Intellectual income* (1880), the *Household maids* (1880, 1900, 1910, 1920), the *Trade and credit* (1900, 1910, 1920), the *Military* (1880) and *Defense* (1900, 1910, 1920), the *Transportation* (1900, 1910, 1920) and the *Public service and free occupations* (1900, 1910, 1920) groups into the tertiary sector. The transportation division within the tertiary sector piques our interest, as it is typically viewed as part of the service sector. Yet, by reflecting on current trends, we could suggest that a factory worker's reliance on machinery isn't significantly different from a modern rail driver, which opens the discussion of categorizing railways as an industry. Railways present a distinctive type of industrial output wherein railway employees contribute as a productive workforce and passengers serve as consumers. In this setting, production and consumption happen simultaneously; the product is essentially movement. (Schivelbusch 2008.)

The categories such as *Living on a pension* (1880), *Other occupations* (1880), *Unknown occupations* (1880), *Other and unknown occupations* (1900, 1910, 1920), and *Retirees, capitalists* (1920) are grouped under the other category. Although this category is factored into the calculations, its proportions are not separately displayed due to its less significant role. The groups *Household* (1880), *Unemployed* (1880), and *Detained* (1880) were not included in the study[10].

Results

National trends

I have analysed the economic structure based on the classical division. Here, the primary sector mainly involves agriculture-related activities, the secondary sector pertains to industry, and the tertiary sector encompasses a range of services.

Nationally, there's a noticeable decrease in the primary sector, as shown in Table 1. Simultaneously, the secondary sector's proportion has nearly doubled over forty years. The „*other*" category also saw its share double during this period. However, the most significant growth was in the tertiary sector, which contributed to the propagation and expansion of civic values and lifestyles through its service value-add.

Table 1: The proportion of people employed in different sectors in Hungary from 1880 to 1920.

Decade	*Primary*	*Secondary*	*Tertiary*	*Other*
1880	78,2%	11,7%	7,9%	2,2%
1890	74,4%	13,1%	9,7%	2,8%
1900	70,1%	15,2%	11,8%	2,9%
1910	64,6%	18,1%	13,8%	3,6%
1920	57,0%	20,5%	18,0%	4,5%

Source: Based on KSH 1882, KSH 1904, KSH 1913, KSH 1923, KSH 1925 the author's calculation and editing

County, Central District, *Leftover*), and in 1920 one person in Orosháza (Békés County, Orosháza District, *Early Bird*), two in Tótkomlós (Békés County, Orosháza District, *Leftover*), and one person in Békéscsaba (Békés County, *Early Bird*) were also recorded.

[10] The dependents were classified into the first two groups in 1880.

Table 2 clearly illustrates the changes between decades in percentage terms, with the final row indicating the difference between the start and end times. This data highlights the increasing shrinkage in the primary sector. The growth of the secondary sector is more moderate, becoming noticeable towards the end of the 19th century, with its pace slowing in the early 20th century. Interestingly, the services sector shows potential for growth in several phases. This could be due to varying levels of participation in civil lifestyle across different population groups over time. While initially, only the wealthier classes could afford certain services, the less wealthy social classes could afford the same level of comfort two decades later. This cycle continued subsequently.

Table 2: Change in the proportion of employed people by sector in percentage in Hungary between 1880 and 1920

Decade	*Primary*	*Secondary*	*Tertiary*	*Other*
1880–1890	-4,9%	12,5%	21,5%	29,1%
1890–1900	-5,8%	16,1%	22,3%	1,4%
1900–1910	-7,9%	18,7%	16,6%	24,0%
1910–1920	-11,8%	13,7%	30,5%	25,8%
1880–1920	-27,1%	76,3%	126,3%	104,2%

Source: Based on KSH 1882, KSH 1904, KSH 1913, KSH 1923, KSH 1925 the author's calculation and editing

Structural Realignment

Comparing our findings with national results[11] gives us a broader perspective on how our region fits into the national context. However, this approach may obscure the disparities within the region. To address this, I have included a component in our study where we compare results at the municipal level, rather than with national data. This method allows us to trace the unique development path of our region.

I have plotted the sectoral changes of each settlement on a line graph. Based on the trend of the line, I have defined five categories within the primary sector as follows:

1. Group: The primary sector's proportion has consistently diminished over time.
2. Group: The primary sector's proportion fluctuated, ending at a lower point than where it began.
3. Group: The data is scattered, trending towards a horizontal direction.
4. Group: The proportion of the primary sector fluctuated but ended up in a larger proportion than it started.
5. Group: The primary sector's proportion has distinctly and consistently increased.

Just like the primary sector, I grouped the other sectors and gave each sector unique group names. You can see these groups, their number of elements, and their distributions in Table 3. When looking at the primary sector, a decline represents modernization, while growth is evident in the secondary and tertiary sectors. From a methodological standpoint, I want to clarify that settlements

[11] We will delve deeper into this topic in an upcoming study, as it's beyond the scope of the current one.

without data for 1880 and 1920 are not omitted from the study. If they were, the number of elements would be significantly less. Instead, I compared the shape of the line from the start time to the end time. By 1900 and 1910, we had data for every settlement.

3. Table: Group allocation for success analysis

Sector	*Group Name*	*Number of Elements*	*Ratio*[12]
Primary	Modernizing	13 pcs	13,5%
Primary	Rather modernizing	33 pcs	34,4%
Primary	Fluctuating	34 pcs	35,4%
Primary	Rather traditional	11 pcs	11,5%
Primary	Traditional	5 pcs	5,2%
Secondary	Industrializing	9 pcs	9,4%
Secondary	Rather industrializing	17 pcs	17,7%
Secondary	Fluctuating	37 pcs	38,5%
Secondary	Rather decreasing	28 pcs	29,2%
Secondary	Decreasing	5 pcs	5,2%
Tertiary	Civilizing	34 pcs	35,4%
Tertiary	Rather Civilizing	38 pcs	39,6%
Tertiary	Fluctuating	16 pcs	16,7%
Tertiary	Rather traditional	8 pcs	8,3%
Tertiary	Traditional	0 pcs	0%

In the primary sector, the *Innovative* group holds a significant presence with 39,4% in the *Rather modernizing* category, and 24,2% in the *Modernizing* category. Notably, most of the *Modernizing* group's settlements, about 61,5%, originate from the *Innovative* group. The *Innovative* group also dominates the *Rather modernizing* category, making up 39,4% of it. However, in the *Rather traditional* category, the *Leftover* group leads with 54,5%. Similarly, in the *Traditional* category, the *Leftover* and the *Early Bird* group share the top spot, each comprising 40,0%. From a primary sector perspective, the introduction of the railway appears to have reduced the sector's size, whereas its absence seems to have reinforced traditional structures.

Looking at the secondary sector, the majority (36,4%) from the *Innovative* category transitioned to the *Fluctuating group*. Next, 27,3% of them moved to the *Rather Decreasing* group. Conversely, more than half (55,6%) of the *Industrializing* group originated from the *Innovative* group. In the *Rather Industrializing* group, the *Early Bird,* and *Innovative* groups each constitute 35,3%, while in the *Rather Decreasing* group, the greatest portion (39,3%) comes from the *Decreasing* group. In the *Decreasing* group, the *Leftover* group holds a simple majority (60,0%). The secondary sector mirrors the primary sector in these trends, although the temporal effect is lessened, and the transitions happen at a slower pace.

[12] Here, the ratio represents the proportion within the specified sector.

For the tertiary sector, the most significant proportion from the *Innovative* group (45,5%) moved into the *Rather Civilizing* group, with 30,3% entering the *Civilizing* group. Interestingly, the *Leftover* group showed a similar pattern (38,7% and 32,3% respectively). For the *Early Bird* group, the order was reversed with most falling into the *Civilizing* group (43,8%). The *Early Bird* group made up the highest proportion of the *Civilizing* group (41,2%), but half of the *Rather Traditional* group came from the *Innovative* group. It is noteworthy that none transitioned into the *Traditional* group.

For the primary and secondary sectors, it is evident that settlements having a railway outperformed those without one. However, when we delve into the local level, we find a contrasting narrative. The railway ushered in a wave of modernization and industrialization, spreading a civilizing influence, irrespective of railway connections.

Success

I've assigned points to the categories: Modernizing, Industrializing, Civilizing group: 2 points; Rather upwards: 1 point; Fluctuating: 0 points; Rather downwards: -1 point; Traditional, Decreasing: -2 points. I then averaged the results of the subgroups. As a result, the *Innovative* settlement group came out on top with 1,788 points. The *Early Bird* group is next with 1,406 points, followed by the *Leftover* group with 0,935 points. If we interpret higher values as greater success and use the *Innovative* group's score as a baseline (100%), it shows that the *Leftover* group achieved only half as much success (-47,7%) compared to the *Innovative* group. The *Early Bird* subgroup reached 78,8% of the *Innovative*, indicating that the influence of the railway diminished over time.

However, viewing the railway as an innovative factor and the *status quo* (*Leftover* group of settlements) as standard (reversed success), we find that the settlements along the main line (*Early Bird*) achieve success at a rate 1,5 times higher (50,3%) than the *Leftover* ones. Furthermore, the Innovative settlements near the light railway outperform by nearly double compared to those *left over* from the railway.

Conclusions

For the primary sector, the introduction of railways led to a reduction in agriculture, while the lack of railways reinforced traditional structures. In the secondary sector, the railway played a clear role in promoting industrialization, albeit at a slightly slower pace than in the primary sector. The tertiary sector followed a similar trend to the industrial sector, but with a more pronounced spatial impact. Even in areas where railways were not present, there were signs of urbanization.

The local impact of the railway was transformative, driving success and modernization. Conversely, areas excluded from the railway often experienced a delay in modernization. This might seem contradictory but makes sense when you consider that while a local railway line greatly influenced and shaped the lifestyle of the surrounding region, it didn't necessarily cause a shift of national importance. However, these local transformations did pave the way for the region's integration into national and eventually, European processes.

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