

# THE IMPACT OF THE JAVA MONARCHY INVOLVEMENT IN THE COLONIAL RAILWAY NETWORK ESTABLISHMENT ON CONTEMPORARY URBAN DEVELOPMENT

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## Abstract

**Introduction:** This paper discusses the role of the monarchy in Java in establishing railways in the colonial period. How did the rulers of the Principalities (Surakarta and Yogyakarta) become involved in and grant their land for the development of a new type of transportation infrastructure in the 19<sup>th</sup> century? **Purpose of the study:** We aimed to reveal the impact of the colonial-era railway network as an urban artifact and the monarchs' participation in railway building on the contemporary urban morphology of Java. **Methods:** The conceptual framing is based on Aldo Rossi's theory of the evolution of urban artifacts, which emphasizes the urban artifact as the main element of the city's morphological and cultural evolution. **Results:** Java's contemporary urban morphology demonstrates the power of the monarchy to shape its cityscapes and how some aspects of city layouts today are related to railway development in colonial times, which adds significance from the perspective of the engineering component.

**Keywords:** *Vorstenlanden*, history, infrastructure, heritage, architecture

## Introduction

Both physical and non-physical aspects of cities evolve over time. A city's architecture, which Rossi calls an urban artifact, is the most obvious observable manifestation of urban morphology (Rossi, 1982). Rossi sees it as two different things: a very large man-made object, growing over time, and an urban artifact characterized by its own history and form.

The interrelationship between urban growth and transportation cannot be severed. Such an inseparable association is the influence of railways established in the 19<sup>th</sup> century on present-day urban development. The impact of railways on cities has been and continues to be significant (Roth and Van Heesvelde, 2022). Their influence on Victorian cities can be traced through topography, the character of the city center, the condition of poor neighborhoods, the sewerage system, suburbs, the direction and character of growth, and the market price of land in the 19<sup>th</sup> century (Kellet, 2006). Examples can be seen in London, Manchester, Liverpool, Glasgow, and Birmingham. In their study of major cities of the world, Okamoto and Tadakoshi (2000) stated that urban railways encourage intensive development around stations and are highly important as a means of reducing the dependence on cars and protecting the urban environment. At the end of the 20<sup>th</sup> century, many countries made major investments to improve the quality and increase the size of their rail networks as an alternative to feeder flights, thereby linking the railways to international travel and trade (Bruinsma et al., 2008). According to Bruinsma et al. (2008), the development of railways offers new

opportunities to cities that are experiencing a period of decline. Based on the authors' discussions, it can be concluded that the city and the railways are interrelated and continue to interact even today.

The railway system was first developed in Europe and later introduced to Asia to support the exploitation of the colonies. No study to date has attempted to understand the involvement of the monarchy, especially in Java, Indonesia, in the construction of railways during the colonial period, although those rulers had little political power. The current discussion of the railways in Indonesia is largely limited to engineering aspects. Their historical value and impact on modern life are only partially considered, with the focus tending to be on the role of the Dutch colonial government. In contrast, the part played by the monarchs of the Principalities (*Vorstenlanden*) in the establishment of railways in Java has not received any attention. In any consideration of contemporary urban development, it is necessary to understand urban artifacts by examining the morphology and cultural evolution of the city.

## Methods

In this study, Rossi's view of urban artifacts is used to understand the role of the monarchy in the establishment of railways during the colonial period. The presence of railways in the Principalities in the last 150 years must have influenced their urban and cultural evolution. This study of the monarchs' involvement in the establishment of railways in Java will fill a gap, and the results should provide a guide to understand the urban artifacts of the

island. This study investigates the involvement of the monarchs of the Principalities in the establishment of railways during the colonial period and its impact on contemporary urban development.

The paper consists of two parts. The first part, which is the result, addresses the development of the railways during the colonial period in the Principalities. The political conditions as well as the management and exploitation of the area under the monarchs' rule were slightly different from those in the area directly under the administration of the Dutch colonial government. Nonetheless, all parties supported the efforts to bring railways to Java. The discussion in the second part of the paper considers the railways and urban morphologies of Surakarta and Yogyakarta. The impact of the monarchs' involvement more than a century ago in the construction of the railway network is evident in today's urban development. The relationship between the railway network and the city poses a challenge to the development of the city. The cityscape cannot avoid changes due to the presence of railway infrastructure, such as level crossings.

### Results

The local rulers of the Principalities, located in the heart of Java, also appeared to have a desire to develop a railway system in their territories. Their involvement in the construction of the railway network cannot be underestimated although the monarchs had little power and few opportunities to exert their authority in the 19<sup>th</sup> century to the same extent as they had been able to in previous centuries. The presence of a railway system, which was supported by local rulers, certainly affected the urban evolution of the island during the colonial period and still has an impact on today's urban morphology.

The railway network has undeniably had an impact on the city. The network of railway tracks and stations that have existed since the early 19<sup>th</sup> century has clearly been part of urban evolution. In the mid-19<sup>th</sup> century, European cities placed their main stations on the outskirts of the city. By the end of the 19<sup>th</sup> century, this trend changed, and stations were located as close as possible to the city center. In the early 20<sup>th</sup> century, the United Kingdom, France, Germany, Austria, and Sweden began to build stations in the city center (Bataviaasch Nieuwsblad, 1916), so that changes to the cityscape became inevitable.

The Dutch presence in Java began with the establishment of trading posts by the *Vereenigde Oostindische Compagnie* (VOC), which was replaced in 1800 by the colonial government, headquartered in Batavia, that politically controlled Java. A series of actions were taken by the Dutch colonial government in Batavia to control and exploit the island, including economic activities in the coastal area (Lombard, 2008). However, the monarchy in

Java still possessed land needed to construct a rail network.

### Monarchs of the Principalities and the Plantation System

In order to discuss the monarchs' involvement in the construction of the railways in Java, it is necessary to describe the conditions that existed on the island as the background to the emergence of the need for a rail network. The island of Java is part of the Pacific Ring of Fire and has a chain of volcanoes stretching from the east to the west that dominates the southern part of the island. The ash from volcanic eruptions provides abundant fertility in the interior, making the area ideal for rice cultivation. The rice fields of Java are among the most productive in the world (Lombard, 2008).

The population of Java is mostly rural and the island has a relatively small number of cities along the north coast (Van Zanden and Marks, 2012). Historically, Java largely consisted of rural areas, with cities arising on the northern coast and at the center of the Mataram Kingdom. Prior to 1800, the state structure that developed in Java was dominated by elite groups who had authority over land and labor, meaning that these groups controlled the productive land and most of the peasants were subjected to forced labor (Van Zanden and Marks, 2012).

The urban area in the interior of Java was at the center of the Mataram Kingdom called *Vorstenlanden*, which was dominated by the cities of Yogyakarta and Surakarta (Van Zanden and Marks, 2012). The *Vorstenlanden* region was made up of Yogyakarta, which was the domain of Sultan Hamengkubuwono and Prince Pakualam, and Surakarta, which encompassed the domains of Susuhunan/Sunan Pakubuwono and Prince Mangkunegoro. *Vorstenlanden*, which literally means Prince's Land and is generally translated as the Kingdom, is more correctly translated as the Principalities (Rouffaer, 1931). The term was introduced by Dirk van Hogendorp in the *Bericht*, or the Report on the Present State of Batavia's Assets in the Dutch East Indies, in 1800. Both geographically and culturally, this region is different from other areas in Java. In his work *Historical Atlas of Indonesia*, Cribb (2000) compared the territory of the Mataram Kingdom at the height of its power in the early 17<sup>th</sup> century, the expansion of Dutch control in Java, 1705–1768, and Java after the Treaty of Giyanti.

The strengthening of Dutch colonial power in Java in the early 19<sup>th</sup> century led to the diminishment of the powers of the local rulers. From 1830 onward, most areas of Java were subjected to a forced Cultivation System (*cultuurstelsel*) introduced by Governor-General Johannes van den Bosch in 1830, plantations and agricultural crop cultivation were developed more widely in the eastern and western regions of Java in the next 40 years (Bosma and

Raben, 2008). Under the Cultivation System, each village was obliged to surrender the yield of one-fifth of the land cultivated to the government, and each adult farmer had to spend one-fifth of his working time cultivating this land.

Meanwhile, land in the Principalities in Central Java was managed under land lease of the apanage (*tanah lungguh*) system existing in this area (Bosma and Raben, 2008). Under this system, the princes rented out land with *tanah lungguh* status to foreign entrepreneurs for the purpose of establishing plantations. Although the systems prevailing in the Principalities and Dutch-ruled areas were different, there was an abundance of plantations in both areas to produce commodities for sale in the European market (Figs. 1-2). This then demanded a means of transportation of plantation products from the interior of Java to the ports.

**Monarchs of the Principalities and the Colonial Railway Network**

The conditions underlying the need for mass and fast modes of transportation indicated that a rail network was the most appropriate choice to solve transport problems in Java. However, not all of the land was within the territory of the Dutch colonial government. Some of the land that

had to be traversed by the railway network was part of the territories of the rulers of Surakarta and Yogyakarta (Samarang-Joana Stoomtram-Maatschappij, Oost-Java Stoomtram-Maatschappij, Serajoedal Stoomtram Maatschappij, Semarang-Cheribon Stoomtram-Maatschappij, 1913). Since the monarchs also had interests that required transportation (Tweede Kamer der Staten-Generaal, 1863), it was understandable that they would grant permission to build the railway network on land in their territory. At the celebrations for the issuance of the concession to construct the Semarang–*Vorstenlanden* Line in 1862, Pakubuwono IX of Surakarta stated that the presence of the railway would increase the prosperity of his domain and his people (Samarangsch Advertentie-blad, 1862).

According to Rossi’s concept, the railways in the Principalities can be regarded as urban artifacts embodied in the city’s architecture. The planning of the Semarang–*Vorstenlanden* Line to transport tropical products from the Java hinterland to the port of Semarang was a fairly long process. After taking into account various considerations, the route chosen traversed the colonial government land (*gouvernement ground*) in the Semarang Residency and the territories of the rulers of Surakarta

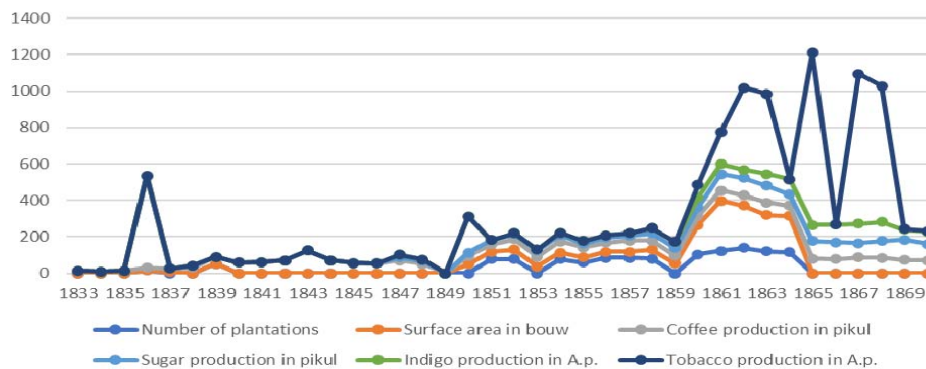


Fig. 1. Production on private plantation in Surakarta 1833-1870 (Houben, 1994)

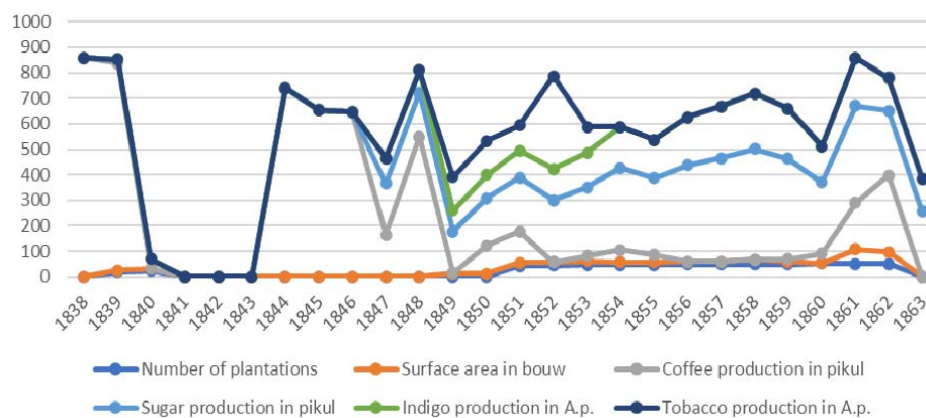


Fig. 2. Production on private plantation in Yogyakarta 1838–1863 (Houben, 1994)



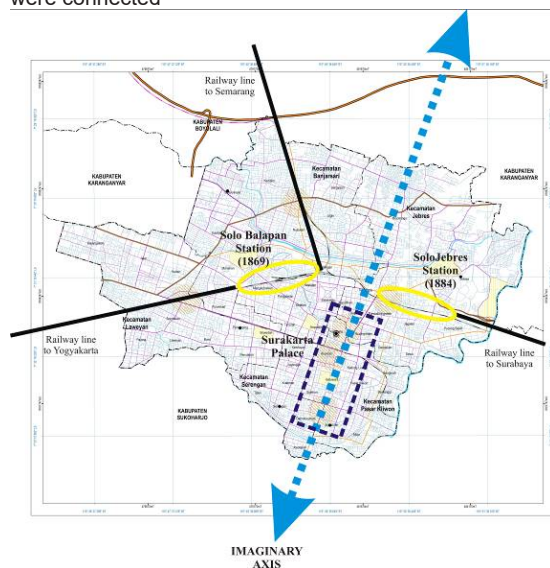
and Yogyakarta. Susuhunan Pakubuwono IX of Surakarta and Sultan Hamengkubuwono VI of Yogyakarta gave permission to route the railway through their territories (De Bordes, 1870). Thus, stations and railroads became a new part of the urban architecture of Surakarta and Yogyakarta.

In accordance with the Javanese cosmological concept, an imaginary axis passes through the traditional city structure of Surakarta and Yogyakarta. The north–south and east–west axes of the four cardinal points meet at the *kraton* (palace), with the north–south axis being the stronger one (Behrend, 1989; Purwani, 2014). At the time of its initial construction, the railway lines running through Surakarta and Yogyakarta did not intersect the imaginary north–south axis. However, the need for an integrated rail network meant that the railway line from Solo Jebres Station to Solo Balapan Station had to cut across the imaginary axis of Surakarta (Fig. 3). Likewise, the imaginary axis of the city of Yogyakarta was bisected by the railway line from Tugu Yogyakarta Station to Lempuyangan Station (Fig. 4). In other words, the presence of the railway is proof that Surakarta and Yogyakarta were growing. Although the imaginary axis was not initially intersected, it was eventually interrupted during the later stages of the development of the railway network. This shift is evidence of Rossi’s view that city architecture is a man-made object that grows over time.

On the other hand, Rossi sees an inseparable relationship between urban history and geographical conditions (Rossi, 1982). Parts of the city display their form, way of life, and traces of their memories, and become urban artifacts. The second section of the Semarang–*Vorstenlanden* Line, which was laid

in the territories of the Principalities, exemplifies this notion. The main station in this section is Solo Balapan Station. According to the report sent to the *Koninklijk Instituut van Ingenieurs* — KIVI (the Royal Dutch Institute for Engineers) in 1871 by J. P. de Bordes, the engineer of the first railway company in Java, which was the *Nederlandsch Indische Spoorweg Maatschappij* — NISM (Netherlands Indies Railway Company), Solo Balapan Station was located between the Pepe River and the road to Malang Jiwan because of the need for cost savings and efforts to avoid floods. The original plan was for the station to be located in the eastern part of the Solo city on the banks of the Solo River (Lang, 1869; Smulders & Co., 1868). However, the area was regularly flooded; the station and the rail line would have had to be raised, adding to the costs of the venture. The second alternative was on the west side of the city, which would have meant shifting several princely houses and relocating royal families, inevitably imposing high compensation costs. Another risk of building a railway and a station in this section was that some parts of the property belonging to Kasunanan Surakarta Palace would have been destroyed or moved to make way for the railway infrastructure (De Bordes, 1870). The problem of finding a suitable location for the station was resolved by the intervention of Mangkunegoro IV, the ruler of Mangkunegaran, who allowed the NISM to establish a station at the site of his cavalry barracks to the north of the Mangkunegaran Palace. It is difficult to find a map of Surakarta with the location of the cavalry barracks before it was replaced by the station. However, it can be traced from the name *Balapan*, which means “horse racing”

a) Before Solo Balapan Station and Solo Jebres Station were connected



b) After Solo Balapan Station and Solo Jebres Station were connected in 1899

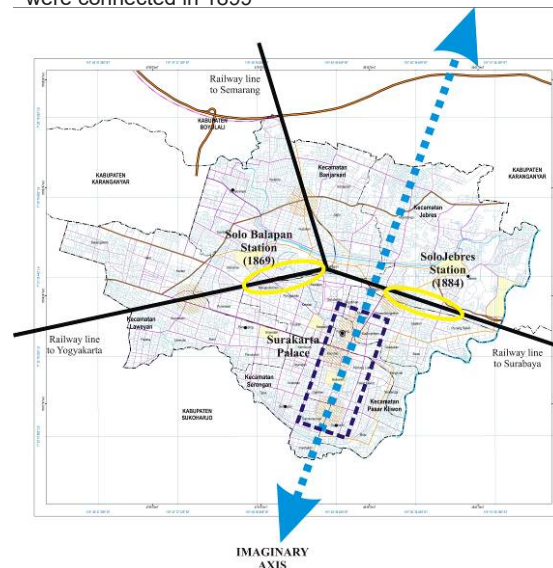
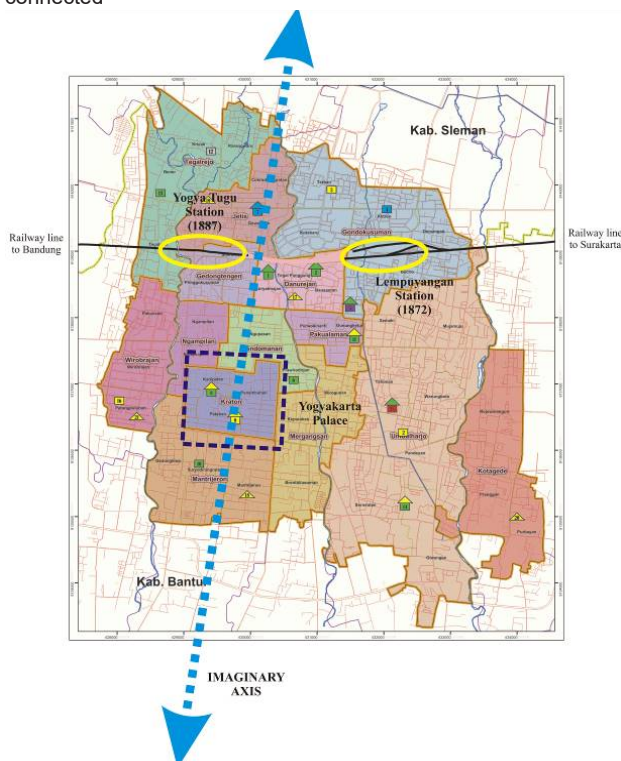


Fig. 3. Railway connection cutting across the imaginary axis of Surakarta (adapted from <https://intip.surakarta.go.id/album-peta>)

a) Before Lempuyangan Station and Yogya Tugu Station were connected



b) After Lempuyangan Station and Yogya Tugu Station were connected in 1894

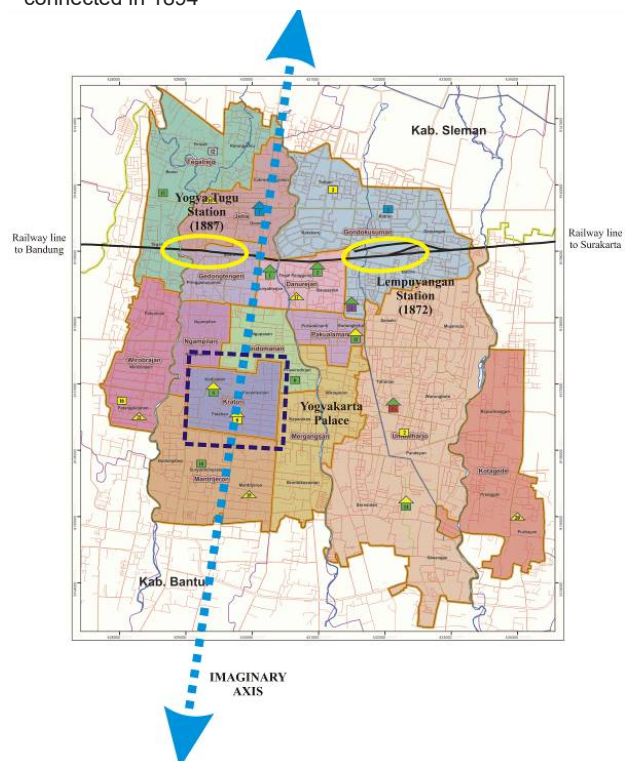


Fig. 4. Railway connection cutting across the imaginary axis of Yogyakarta (adapted from [https://bakung16.files.wordpress.com/2011/08/peta\\_penyebaran\\_pendidikan.jpg](https://bakung16.files.wordpress.com/2011/08/peta_penyebaran_pendidikan.jpg))

(*balap* = racing), and the *kestalan* area located southeast of Solo Balapan Station. The word *kestalan* is derived from the Dutch *stal* (pl. *stallen*), which means “stable for horses”, providing evidence that the area was part of the cavalry *stallen* (cavalry stables). Although it is somewhat far from the center of Surakarta, the NISM accepted the location because the main road in Surakarta was accessible from it. In addition, the company did not have to pay Mangkunegoro IV for the land (De Bordes, 1870). It is possible that Mangkunegoro IV gave his land for the station because he considered the future of his sugar factory in Malang Jiwan. The road to Malang Jiwan and the postal road to Ngawi were accessible from the location (De Bordes, 1870). Mangkunegoro IV appears to have considered the time and cost savings obtained for sugar transportation by the construction of the railway. It took 20 hours to transport sugar from Surakarta to the port of Semarang in horse-drawn carts (*cikar*), while the same journey would have taken only three hours by train (Wasino et al., 2019). The selection of the location and the name of the station (Solo Balapan) confirm Rossi’s view that a city’s history cannot be separated from its geography; the flood proneness of the banks of the Solo River encouraged the selection of flood-free land in the north of the city of Surakarta even though it was a little far from the city center. The name Balapan is a reminder that

the location was previously a horse racing venue belonging to Mangkunegoro IV.

Urban artifacts, as manifestations of the form and way of life of parts of cities, are also evident in the Sewu Galur–Yogyakarta light-train network. The development of the sugar industry in Sewu Galur, which was within the territory of the ruler of Pakualaman, encouraged the construction of a light-train network as a means of transporting industrial products to Yogyakarta and to the port (Murdiyastomo and Darini, 2020). The sugar industry would not exist in Sewu Galur if Pakualaman had not allowed his *tanah lungguh* land to be leased by European planters and used for the construction of waterways to irrigate sugarcane fields in the Sewu Galur Plantation (Murdiyastomo and Darini, 2020). The plantation and sugarcane industry changed the social life in the area around Sewu Galur Station and Brosot Station due to new economic activities, which led to the emergence of small towns (Murdiyastomo and Darini, 2020). Thus, the role of the ruler of Pakualaman in the construction of railways, especially the light train in Yogya, was intended to support the sugar industry. Sugarcane plantations and the sugar industry have specific characteristics so that the artifacts of the city they formed are also different from those that existed before.

**Discussion**

Javanese society had been a target of European colonization longer than other Southeast Asian

communities; consequently, the monarchical power in Java was reduced and local rulers were forced into an indirect form of rule (Kershaw, 2001). Currently, the railway network and several locations around the stations are facing problems that date back to the development of the railways more than a hundred years ago. The problems are varied and range from conflicts of land ownership and economic conflicts related to traffic flow to social conflicts due to the development of cities and the railway network. The monarchy's role in the construction of railways in the colonial period influenced the condition of urban morphology. The following discussion considers the impact of the monarchy's involvement in the construction of the railway network during the colonial period on the morphology of the cities.

### The Railway Network and the City

The railway network in Java has become an urban artifact. Its existence influences the transformation and cultural evolution of cities on the island. The railway network has become an important contributor to transportation of people and goods. Rail transportation in Java experienced a period of decline due to the increased adoption of motor vehicles. Some railway networks were decommissioned because they were no longer profitable or even considered loss-making. However, at the beginning of the 21<sup>st</sup> century, the Indonesian government took an interest in supporting the redevelopment of train transportation. The year 2009 was an important moment for Indonesian railways because they began to show service improvements (Djuraid, 2013). In Surakarta and Yogyakarta, the authorities have facilitated better integration of the railway network and stations with improved connections to airports and bus terminals. The idea of the railway station as a transit space, as well as a gateway to the city, was revived by equipping it with service facilities with adequate standards. It is hoped that the railway network will also support the central business district.

The morphology of the cities of Surakarta and Yogyakarta is influenced by the presence of the railways, which supported trade and industrialization and propelled Surakarta and Yogyakarta into becoming modern cities. Distance was no longer a problem in Surakarta and Yogyakarta after the basic infrastructure of roads and rail networks was established. Due to the presence of this infrastructure, the trajectory of development changed. Initially, the *kraton* (palace) was the focal point of development, but roads and railways encouraged the growth of the city outside the palace. The stations, like the ancient "urban gates", are sites of access to the city, as well as symbols of the identities of the places where they are situated (Somma, 2018). The Principalities rulers realized the importance of the railway network. By allowing a part of their territory to be developed as

the station they might have envisaged the possibility of the station becoming a new gateway to the Principalities.

As gateways to the city, stations provide the first experiences of the city to visitors and become identity-formers (Richards and MacKenzie, 1986; Schivelbusch, 1986). That means that railway stations become identity-forming places. For example, we can consider the transformation of Solo Balapan Station in 1927, with the addition of a building that functions as a reception hall, which was an effort to create an identity-forming place. The new building, which was designed with a square shape, was topped with a prism-shaped roof (Fig. 5). *Tajug* is the Javanese term for a prism-shaped roof. *Tajug* roofs were traditionally used in Javanese architecture for sacred places such as mosques and cemeteries (Rujivacharakul *et al.*, 2013) (Fig. 6). The adoption of a *tajug* roof for a public space seems to be an endeavor to form an identity. The *tajug* roof was deliberately chosen to emphasize the status of Solo Balapan Station as the main gateway to the Principalities. Moreover, the designer, architect Herman Thomas Karsten, from the architecture firm Karsten and Schouten, took into account the station's relationship with urban planning. Thus, relocating the village in front of the station and turning it into a park was an attempt to provide visitors with a vista of the *Sunansveste* (the seat of the Sunan/Susuhunan).

As a geographical entity, the railway station has two basic identities: as a node and as a place (Bertolini and Spit, 1998). According to Bertolini and Spit (1998), the railway station's identity as a node means that it is a gateway, and its identity as a place means that it is a specific area of the city with a concentration of infrastructure and a diverse collection of buildings and open spaces. The station's identity as a node is evident in the development of Solo Balapan Station. The railway network in Surakarta is still functioning as a means of transportation of goods and passengers. The



Fig. 5. *Tajug* roof emphasizing the status of Solo Balapan Station as the Principalities main gateway Photo by author, 2010



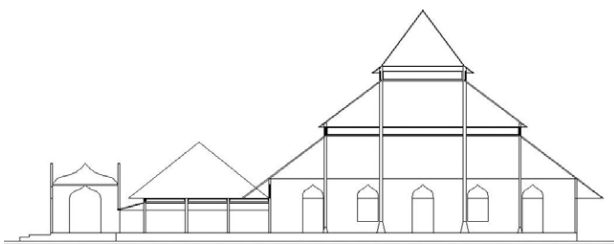


Fig. 6. *Tajug* roof on the Al Wustho Mosque Photo by author, 2006

Surakarta City Government has developed an integrated transportation system that connects Surakarta to other areas by making Solo Balapan Station the central station. Solo Balapan Station is also part of the integrated transportation development of Surakarta and Yogyakarta areas, linking it with the international airport and bus terminal. The double track, which was officially inaugurated in 2007, facilitates the connection of Solo Balapan Station to Adisutjipto International Airport in Yogyakarta. To help pedestrians, Solo Balapan Station was connected to Tirtonadi Terminal via a skybridge in 2019. The connection between Solo Balapan Station and Adisumarmo International Airport in Boyolali is supported by the Airport Rail Link inaugurated in 2020. Recently, PT. Kereta Api Indonesia (PT. KAI), the train operator in Indonesia, began improving the railway connections to Semarang. The project to regenerate the Solo–Semarang railway line started in 2022.

The power possessed by the city has consequences for the evolution of the city itself, and the management of different forces will lead to different changes (Rossi, 1982). The power in question can be economic or political. Economic power may manifest as expropriation and land ownership. Some of the obstacles to land acquisition for the construction of a passenger network, especially to cater to commuters, are a consequence of the involvement of the monarchy in the development of the railways in the mid-19<sup>th</sup> century. Today, the railway network

is an asset of PT. KAI, the sole train operator in the country. As described in previous sections, historically, the railways were not built solely on land belonging to the Dutch administration; some of the land was part of the Javanese rulers' territories. At the time of nationalization of the company in 1958, not much attention was paid to the ownership of the land used for the construction of the railway network. The nationalization process was based on implementation of Law No. 86 of 1958 concerning the nationalization of Dutch-owned companies. Article 1 of Law No. 86 of 1958 states that Dutch-owned companies located in the territory of the Republic of Indonesia, which will be specified by a government regulation, are subject to nationalization and declared to be the full and free property of the Republic of Indonesia (Wasino, 2016).

The power ascribed to land ownership can force the evolution of cities (Rossi, 1982), a problem that is often faced in the development of the railway network in Java. The problem of land ownership was articulated as early as in the second decade of the 20<sup>th</sup> century in a letter sent to the NISM by the Prince of Mangkunegaran. The Prince questioned the use of land that had been handed over to the NISM and the *Staatsspoorwegen* — SS (The State Railways) and stated that transfer of the rental of the property to a third party was a breach of contract. The letter was sent on October 7, 1928, by the *Patih* (vizier) of Mangkunegoro VII. The Resident of Surakarta, on behalf of NISM and SS, responded by letter dated November 21, 1928, stating that NISM had used the land in accordance with the terms of the concession (Sulistiyani, 2022). Mangkunegoro VII was a descendant of Mangkunegoro IV who donated his cavalry barracks to NISM to build a station in Surakarta at the beginning of railway construction in the city. The problem continued until 1931 when Mangkunegoro VII revoked the status of the land. This act underlines the fact that the rulers of the Principalities gave permission to the Dutch railway company only to use the land, not to transfer the right of use to a third party. This suggests that the land rights were not properly defined, a problem that remains to this day. The issue of ownership status of the land, which is an asset of PT. KAI, is one of the roots of the difficulties faced by the organization in developing the railway network. The nationalization of the company after independence transformed the land that was originally an asset of the monarch into an asset of PT. KAI. The problem became more complicated when the land was occupied by people and social conflicts arose with the community when PT. KAI took over the company's property.

Today, the existing railway line in Yogyakarta is the only main line connected to the Surabaya–Bandung and Surabaya–Jakarta railway network. The local railway network within the city of Yogyakarta and

its surroundings ceased to operate in 1970. The Yogyakarta–Sewu Galur line, built to support the sugar plantations and industry during the colonial period with the support of the rulers of Pakualaman, was decommissioned. Due to problems of land ownership, there are numerous barriers to activating or revitalizing this route. A part of the infrastructure of the Yogyakarta–Sewu Galur railway line is not an asset of PT. KAI, the line and station belong to the Yogyakarta City Government and the Bantul Regency Government (PT. Kereta Api (Persero), 2000).

### **Collective Memory**

Rossi sees collective memory as a communal connection to a place that helps to understand the urban structure and its architecture. The union between the past and the future lies in the idea that the city must be formed, which becomes a permanent aspect of the artifacts and monuments of the city (Rossi, 1982). To the Javanese, the arrival of the train was foretold. The railway network is the monument to the myth about the arrival of the iron serpent in Java, a prediction that came true. The transformations brought by the railways in Java marked a faster and farther movement. The railways, an easy mode of mass transportation because the station is located in or close to the inner city, became a collective memory. The station is the gateway to the city, and the collective memory of the railways is one of the drivers for improving services to attract passengers.

### **The Morphology of the Cityscape**

Some aspects of today's urban planning also relate to station planning of the past. The city, according to Rossi (1982), is a man-made object, a work of engineering and architecture. Currently, the conditions for crossing railway lines and highways is the city government's homework. According to the Regulation of the Minister of Transportation No. PM 36 of 2011 concerning the Intersection and/or Intersection between Railroad Tracks and Other Buildings Article 6 verse 1, trains receive traffic priority (Kementerian Perhubungan, 2011). This becomes a problem in urban development. Before Surakarta decided to build bridges at several level crossings in the city, Yogyakarta had already taken steps to solve the problem of congestion due to the intersection of railway and roadway lines. Three flyovers, Lempuyangan, Janti, and Jombor, were built to relieve congestion due to level crossings. However, not all level crossings can be engineered with flyovers. The crossing east of Tugu Yogyakarta Station cannot be negotiated by a bridge. Rotation of the flow of motor vehicles to the east to pass under the railroad tracks was the traffic engineering solution applied to this crossing point. In Surakarta, the level crossings in Palur, Manahan, Purwosari, i.e., the Joglo level crossings from the direction

of Semarang, are handled by flyovers, which are still under construction. The problem of the Ledok Sari crossing has not yet been resolved. Does the construction of flyovers in Ledok Sari-Surakarta and Yogyakarta Tugu Station have something to do with the imaginary axis of the city (Figs. 3-4)? Is it part of the cultural evolution of the cities? These questions suggest new avenues of research.

The current development of Solo Balapan Station is also an example of a man-made object. At the end of the 19<sup>th</sup> century, Solo Balapan Station became a hub for the railway network from three directions: Eastline from Surabaya, Westline from Bandung, and Semarang from the north. Initially the three lines met at Solo Balapan Station, but the rails were not connected. SS developed the Eastline and Westline network from the beginning and planned to build a main line connecting the east and west sides of the island of Java (Perquin, 1921). However, the plan had to be delayed several times because of the difference in gauge of the tracks at Solo Balapan Station. The SS railway line to Eastline and Westline were narrow gauge, but the NISM railway tracks in the Principalities were broad (standard) gauge. The plan that emerged in 1913 involved turning Solo Balapan Station into a common station for both NISM and SS. The new station building complex would be elevated toward Purwosari Station, so that pedestrians could pass under the bridge. The plans have never been implemented. For more than a hundred years, the problem of the dangerous level crossing near Solo Balapan Station has remained unsolved. In 2018 and 2021, the Surakarta City Government built a bridge at the intersection of the roadway and railway line in Manahan and Purwosari, which is to the west of Solo Balapan Station. The bridge built to accommodate motor vehicles brought a significant change to Surakarta's cityscape. Pedestrians and cyclists are accommodated by a tunnel. Mangkunegoro IV's intervention by donating his cavalry barracks 150 years ago to build a station influenced the urban morphology of the city of Surakarta. Meanwhile, in Yogyakarta, the government persists in its attempts to solve the congestion problem by planning the construction of two new flyovers, one on Jalan Kaliurang, around the Universitas Gadjah Mada campus, and one on Jalan Gejayan. However, there is also a discussion about overcoming the problem of crossing a plot with an underground tunnel (underpass). Surakarta has implemented the construction of an underpass at the Makam Haji crossing (Figs. 7-8).

### **Conclusion**

Several city artifacts in Surakarta and Yogyakarta still existing today are directly related to the construction of the railway network in Java, which was begun in the mid-19<sup>th</sup> century. At that time, the political power of the monarchs of the Principalities





Fig. 7. Manahan-Surakarta Level Crossing, 2020 (Kementerian PUPR, 2020)



Fig. 8. Purwosari Surakarta Level Crossing, 2021 (Kementerian PUPR, 2021)

was diminished under the control of Dutch colonial rule. However, it is undeniable that these rulers in Java played an active role in the construction of the railway network and became part of the spatial history of Java. The railway network, including its stations, in Surakarta and Yogyakarta is still largely functioning, although some parts are neglected or even forgotten. Understanding its presence and its stakeholders during its development will help in planning future developments in the city within the context of urban morphology.

The main factor driving the establishment of Java's railway network was the increase in plantation products. The land lease system in Surakarta and Yogyakarta and the Cultivation System in West Java and East Java led to the growth in plantation yields

and industrialization. The monarchs of Surakarta and Yogyakarta were aware of the changes taking place during their reign, and their openness to supporting and facilitating the arrival of the railways illustrates their drive to bring modernity to their territories. The monarchs were actively involved in establishing the railways and thus became agents of modernism.

The impact of the monarchs' involvement in the establishment of railways in Surakarta and Yogyakarta on today's urban development is quite diverse. Examples include the influence on transportation arrangements within the city, mobility between regions, settlements, and economic activities. All these aspects required traffic engineering which brought changes to the cityscape. Another challenging element is the impact of the railway network on land ownership, which is often followed by long-lasting social conflicts due to neglect of or unclear land rights. It is difficult to solve these problems without understanding the role of the monarchs because it was they who granted permission for the railways to cross their territories and formulated the relevant conditions for land use. With the establishment of the railways, changes in the cityscape are inevitable due to the infrastructure such as level crossings, as well as at a spiritual level. In Java, the architecture of the railway network, including its stations, intervenes in the imaginary axes of the cities of Surakarta and Yogyakarta, a crucial aspect of Javanese mysticism. The development of the railway network transforms the city, and the evolution of the city brings changes to the railway network. Built as part of the colonial infrastructure for exploitation of the colonies, the railways are a testament to the involvement of the Javanese monarchs in catalyzing modernity. The railway network in Java has become one of the most important elements that make up the urban artifact. Aspects of urban development today cannot be separated from the existence of the railways. This study emphasizes that the monarchs' involvement in ensuring the existence of the railways in Java had an impact on urban development.

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## ВЛИЯНИЕ УЧАСТИЯ ЯВАНСКОЙ МОНАРХИИ В ФОРМИРОВАНИИ СЕТИ ЖЕЛЕЗНЫХ ДОРОГ В КОЛОНИАЛЬНЫЙ ПЕРИОД НА СОВРЕМЕННОЕ ГОРОДСКОЕ РАЗВИТИЕ

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### Аннотация

**Введение:** В данной статье рассматривается роль монархии на Яве в устройстве железных дорог в колониальный период. Каким образом правители княжеств (Суракарты и Джокьякарты) оказались вовлечены в процесс и передали свои земли под формирование нового вида транспортной инфраструктуры в XIX веке? **Цель исследования** заключалась в том, чтобы дать оценку влиянию участия монархов в устройстве сети железных дорог в колониальный период, ставшей городским артефактом, на современную городскую морфологию Явы. **Методы:** Понятийный аппарат базируется на теории Альдо Росси о развитии городских артефактов, которая придает особое значение городскому артефакту как основному элементу морфологического и культурного развития города. **Результаты:** Современная городская морфология Явы указывает на влияние монархии на формирование городского ландшафта, а также на то, что некоторые аспекты городской планировки имеют отношение к развитию железных дорог в колониальный период, что придает определенную значимость с точки зрения инженерной составляющей.

**Ключевые слова:** *Форстенланден (княжеские земли)*, история, инфраструктура, наследие, архитектура.