

POST OFFICE AND THE SUSTAINABILITY OF TRIANGLE HISTORICAL AREA IN SEMARANG FROM THE TRADITIONAL ERA TO THE COLONIAL ERA

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Abstract. Development of information and communication technology changed mail delivery services in various parts of the world in the twenty centuries. In Java, the increase in postal services as Dutch East Indies government infrastructure) grew along with the construction of the *Postweg* line (postal road) in 1809–1811. The road networks pass through Jakarta – Semarang, Surabaya, and another small-town facility and now the postal networks became a heritage. The networks of post building in Semarang are unique compared to other big cities in Java. The Dutch East Indies government anticipated the geography of Semarang when they developed the expansion of the town to the south and utilized it by postal services. The government has issued a cultural heritage regulation for buildings and areas, but has not touched the conservation network of heritage. Based on that problem, this paper aimed to reveal Semarang city pattern used post office and infrastructure as a tool for analysing city morphology and suggested to conserve the heritage network. The method used was urban design with the historical approach, the post office location, settlements, road networks, and geographic conditions. The research findings showed that the postal infrastructure formed the sustainability of Semarang city from local-Dutch Indies rule in triangle form. The city's geographical factor also influenced the city's layout. The local and colonial city character in this triangle area is still preserved, although some minor changes in the area *postweg* road. The sustainability city layout from the era of local government – the Dutch East Indies in Semarang by making the city centre of the local government (in the top of the triangle) as the centre of urban design should be input on the heritage regulation as areas conservation.

Keywords: post office, Dutch Indies City, historical method, triangle city formation, Semarang.

Introduction

Postal service organizations around worldwide are struggling to cope with the challenges posed by the digital revolution and advances in information communication technology. Post offices around the globe have long provided critical public services (Kiumarsi et al., 2015). In Indonesia, the VOC (*Vereenigde Oost Indische Compagnie*) government built the first post office in Batavia in 1746. Four years later, they made a second post office in the city of Semarang. Meanwhile, the Dutch East Indies government established a post office in Surabaya in the former regent's office in 1800 (Rukayah et al., 2020b). The Dutch East Indies government built a *post weg* line in 1809–1811 to shorten postal deliveries' travel time, etc. The postal highway is built for approximately 1.000 kilometres on the island of Java, which stretches from *Anyer*

to *Panarukan* and passes through the three major cities mentioned above. Daendels (Governor of the Dutch East Indies 1808–1811) issued a regulation that postal officers would pass along the road being built between Batavia, Semarang and Surabaya. They set up a resting place complete with horses' stations, stagecoaches, and other postal equipment (Toer, 2005). Postal lines have transformed cities into modern and become the hub of cities in Java (Pratiwo, 2002; Rukayah et al., 2019). The big cities of Jakarta, Surabaya, and Semarang, developing into a big cities complete with modern facilities (Priyantoko, 2010). The development of Jakarta, Surabaya, and Semarang's cities began as traditional city centres with local government centres, leaving only the city of Semarang, which still has traditional towns. VOC founded the Fort town next to the traditional city centre. The map of the Dutch East Indies 1800s, showing the pattern of Jakarta, Surabaya, and

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Semarang. As the number three big city, the Semarang city pattern shows the uniqueness that forms a triangle of urban development (see Figure 1). Semarang in the 14th century started as a small village on the beach and grew when the regent of *Pandan Arang* established a city centre with the same urban pattern character as the city centre in Java. The city centre consists of a square, mosque, and government centre as well as multi-ethnic settlements (Rukayah et al., 2021). The morphology of a city is influenced by aspects of history that shapes and influences city development. The time function becomes very important in the process of understanding city morphology. The government has issued a cultural heritage law for buildings and areas (Indonesian government, 2010). This law has not touched the conservation aspect to interconnecting large areas. The uniqueness of the city layout that connects the city's morphology from the local government era to the era of the Dutch East Indies government is essential as a new reference for the conservation of historic areas. The government in Singapore has made a trail of landmark areas by creating a heritage trail (Guan, 2011; Yeoh & Kong, 2012). Based on that problem, this paper aimed to reveal that Semarang city pattern used post office and infrastructure to analyse city morphology and suggested conserving that unique city area

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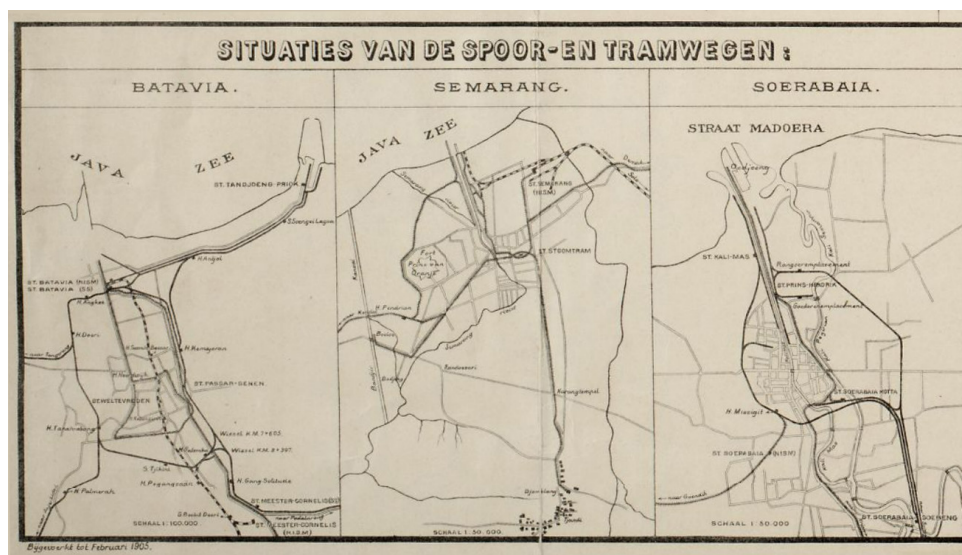


Figure 1. The Dutch Indies city formation in 18 centuries, show the triangle of Semarang city formation (source: Leiden University Libraries, 1905)

made a trail of historic places by creating a heritage trail (Guan, 2011; Yeoh & Kong, 2012). Based on that problem, this paper aimed to reveal that Semarang city pattern used post office and infrastructure to analyse city morphology and suggested conserving that unique city area.

In the previous paper, research on the morphology of the Semarang city discussed the classic era (15–17 centuries), the era before the arrival of Dutch colonialism (17–18 centuries) (Rukayah et al., 2016). Some experts classify the character of cities in Java before the arrival of the Dutch colonial as traditional cities (Damayanti, 2005; Rukayah, 2010). That paper revealed the Semarang morphology in the conventional era using a 1695 map with historical sources from the 1970s to the back. This research finds that the construction of postal roads, post office buildings, hotels, and markets uses the square/traditional open space on the north side (Rukayah et al., 2016).

Some experts have used several characteristics of cities and villages to reveal the area's morphology, such as landscape (Dobson, 2011). This paper has also used the elements of the traditional city landscape in Java to reveal the city centre of local government in Semarang. According to some researchers, traditional cities in Java are characterized by a square, government centre, mosque, and several multi-ethnic housing estates surrounding them. (Rukayah et al., 2021). This study leaves research questions about the traditional city's development after the colonial arrival. Colonial work in the city of Semarang shows the integration between the local and colonial government centres. The two are separated by a canal but connected by a bridge. This city concept is different from the urban design in Surabaya and Jakarta, where the Dutch city design omitted the location of the local government centre (Rukayah et al., 2012, 2016). The development of a modern city occurred to expand the town of the fortress to the west. The postal line connects the fortress and *Bulu* area, and the line occupies the north side of the square.

The city developed to the south (southwest), with the planned housing of *Candi* and *Mlaten* (on the south east side). The government equips that area with postal infrastructures such as roads, trams, stations, post offices. The urban morphology development could be traced through approaches to transportation networks in addition to the history of cartography (Boeing, 2018, 2019). Thus, the postal facility with transportation network can be a tool to check urban morphology because it has a post office building, the utility network, and the settlements it serves. Urban morphology, in general, is formed to make a physical evaluation of the conditions of buildings/open spaces together in an area and the changes/transformations in the urban tissues (Agirbas & Ardaman, 2015). The urban morphology of the industrial environment, indeed the study of its history, might suggest that such aesthetic sensibilities are alien to the genius loci (Canniffe, 2015).

Some of the opinions above use landscape, a transportation network and change/transformation to determine the morphology of the city. The results of their urban morphology findings are used to make a physical evaluation.

This paper uncovered the change and transformation of the city in the era traditional-colonial era in Semarang to show how modernity in the Dutch Indies era to the traditional city concept. Refer to the statement that historic urban spaces are emplacements that present a particular special interest due to their cultural value, urban and architectural patterns (Niehaus et al., 2021), so this paper will have significant value to uncover urban pattern in historic city.

Post offices and postal lines served as transportation networks between traditional cities in Java. Post office placement right near the traditional city square/*alun-alun*. This area was often referred to as the city zero points (Yuwono & Rukayah, 2018). The Dutch East Indies built the first post office Indonesia in the 17th century. The establishment of a post office near the centre of local government or *alun-alun* turned the traditional character to modern. The cosmic concept of the traditional city centre in Java changed with several colonial government facilities nearby (Priyantoko, 2010). Since the colonial era, changes in the city shape from conventional to modern have been widely discussed by historians, urban planning, and architects (Christalina, 2010; Colombijn, 2012; Handinoto, 2010; Wahid et al., 2009; Wihardyanto & Ikaputra, 2019). Several research results on traditional and colonial cities' morphology have been conducted (Hendro, 2014; Wahid et al., 2009; Marzuki, 2018). However, analysis of urban development at the same time about pre-colonial and colonial cities has never been carried out. There is the discussion about Colonial and Traditional Urban Space in Java: a Morphological Study of Ten Cities (Sunaryo et al., 2013), but focused on urban open space as an element of the cities.

Therefore, it is a new method to uncover the city transformation using the post office as an analysis tool. The distribution of post office locations and their facilities and infrastructure shows a network that connects the old and new city centres. The existence of Semarang from the classic era to the colonial period raised a question about how the promotion of the historic zone as a conservation area and how to input it into Indonesia's heritage conservation law. Indonesia's heritage conservation law (Indonesian government, 2010), have not discussed the aspect of interlinks of heritage area. The city heritage from pre-colonial to colonial-era interconnected with the networks, settlements, post offices, postal transportation networks, and postal transportation facilities. According to (Antariksa, 2011; Hendro, 2014), conservation efforts for the cultural heritage objects individually and in areas. There is an opportunity for the cultural heritage objects individually to be linked together.

Semarang City is essential to study because of the geographical condition and historical development as an international port from time to time. Some sailors have stopped in this city because it has a unique geographical shape. It was once the port of the *Mataram* kingdom, where Admiral Zheng (a famous explorer from China who wandered between 1405–1433) landed and became a trading centre for the VOC. In the 14th century, this area

was still in hills with a group of islands. Sedimentation united the islands into mainland Semarang in the 14th century. Now the people of Semarang know the upper Semarang zone (hilly area) and lower Semarang (coastal area). The 17th–18th-century colonial map shows the hilly area, swamp area, and lower areas of Semarang. This geographical uniqueness causes the change and transformation of the city from other cities in Java (Jakarta and Surabaya) in the era of modern city development by the Dutch Indies. The town began in the 6th century AD, was a coastal area called *Pragota* (now called *Bergota*), and was the port of the Old *Mataram* kingdom (Maziyah, 2012; Rahayu, 2017). The reappearance of old port Semarang is known from Admiral Cheng Ho's news, an envoy of the Emperor of China. After a sedimentation process that united the group of islands to form a landmass occurred, the city became the centre of VOC power on the North coast of Java. The geographical condition of the town of Semarang as a new land as a result of the sedimentation process forms a sustainable city design with anticipation of these geographic conditions. As a prominent port, Semarang was the first city to have the first railway stations and lines built in Indonesia (Handinoto, 1999), traversed by the *postweg* line. It became the second city to have a post office in Indonesia after Jakarta City (Rukayah et al., 2020a). The transformation and morphology of Semarang from the classic era to the colonial period in distinctive geology and geography produce a unique pattern of urban development.

1. Materials and methods

To identification the Semarang historical development, we used the historical methods (Kuntowijoyo, 1994) through the contemporary historical sources approach. The benefit of doing historical research is knowing the events that have happened to get an accurate explanation. To research the city history during the Dutch East Indies rule, the period and historical sources refer to the 17th–19th century. Historical resource area old maps, photos, pictures old book, obtained from the Dutch library. The Dutch government recorded Semarang old maps (1795, 1741, 1787, 18th-century maps) and old images focusing on the central location of the local government and colonial areas. The Dutch East Indies recorded the condition of their colony area when they arrived after the VOC in the 17th century. Researchers use old image sources and maps to solve the problem of limited historical data on the development of cities in the past. The historical approach by reading maps and pictures is essential in historical research because images provide more stories than narratives (Pole, 2004).

Based on the old maps and photos, the researchers redrew them using the Auto CAD program using the same scale. From a series of development maps of the city of Semarang, the researcher analysed the traditional city centre and urban development in the Dutch Indies era. The three locations of post offices network, tram networks, tram sta-

tions, and housing developments for the community show a grouping of areas. The researcher also uses hand-drawn sketches to explain the linkage between the traditional city centre and urban growth. Semarang Dutch Indies map on tram lines in the 18th century was beneficial in the analysis process because it shows the geographical conditions. The researchers obtained from that maps the information on the construction of postal infrastructure, avoiding areas with location conditions that were not accessible by transportation.

The 18th-century colonial map shows the division of the upper and lower areas of Semarang. This map also showed the railway line in Semarang City, which stopped at the last station (*Jomblang* tram station) near hills. These maps became a tool for analysing the development of Semarang that adapt to the geographical morphology of Semarang City. The *Postweg* road passes through near the local government centre, Semarang as the first railway line in Indonesia, and the second Semarang Post office's after Batavia became the analysis reference.

The researchers also conducted the old literature study, such as archives, manuscripts. We also collected data by observing road network buildings, the environment, or other city elements, to determine the pattern of urban expansion. The researchers also interviewed community leaders and postal service activists who know and understand its history. Historical sources about the condition of the city of Semarang are compared with field data. By conducting a field survey, the researcher found that the area still has local character (in the traditional city centre) and colonial character (in the post way and Candi Village). Some villa buildings and office buildings on the postal route have been turned into modern shops. The traditional city centre still has an *alun-alun* and mosque, which characterises a city in Java. The new Candi housing leaves colonial buildings and the concept as a garden city with several gardens still there.

2. Data and analysis

2.1. The Semarang's city pattern from local to Dutch Indies rule

The Semarang maps on 18 centuries show the development of Semarang city from the classic era to the colonial era. Based on its history, the coastline of Semarang city in the 8th century was far away in the middle of the city today or on the *Bergota* hills (Bemmelen, 1948). The coastline around Semarang was in the Candi Hills (south of Semarang now). This opinion was also strengthened by the writings of the Arab-Persian merchant Abu Zaid in about 916 AD. Abu Zaid mentioned that *Bergota* was a port of the *Mataram* Hindu Kingdom in the inland. In addition, through Chinese chronicles, especially regarding the arrival of Admiral Cheng Ho and his fleet in the 14th century, it showed that Semarang city was already known as a hub for regional and international trade activities. The traders carried out the process of bartering spices for

rice and exchanging spices or rice for goods from India and China brought by foreign traders (Maziyah, 2012). That old information means that Semarang city was a port near a hilly area surrounded by islands. The port Semarang played an essential role as a trade centre in the XV–XVI centuries. This city area also served to ship from other small port cities in the vicinity (Yuliati, 2014) (see Figure 2). Semarang was one of the major shipyards in southeast Asia. Therefore, it could be understood why the Dutch VOC chose it as its colony to oversee the inland of Central Java, such as Cirebon and Surabaya.

Ki Ageng Pandan Arang was the first regent of Semarang, who the Sultan of Demak Bintara appointed. During Ki Ageng Pangandaran, the settlement moved from Bergota to the area near the Malay settlements that existed for 15 centuries. *Bergota* area was used as a natural port surrounded by hills as an entry point for the city. The port's position shifted to its current position (*Bubakan* area) due to sea silting and the accumulation of mud (Bemmelen, 1948). According to an old map in 1695 and 1741, the new area became the city centre closed to *Malay* Village. The *Malay* village had a port, so the sailor from another place transit and stayed there. The traces of architecture

as a port with various ethnic settlements still exist today, although the location is no longer on the beach. The ongoing sedimentation process causes this area to no longer be on the coast anymore. *Ki Ageng Pandanaran* made a traditional city centre by considering a strategic location close to a busy port. The composition of the city centre was the Regent's house, also functioning as the centre of government called *Dalem*. *Dalem* was located not far from the grand mosque (*Javaasch Tempel*) and *Kauman* (Muslim settlement) with Arabic nuance (Suprapti et al., 2017). In the 17 centuries, VOC built colonial fort areas around Semarang's local government (Rukayah & Abdullah, 2021) (see Figure 3). On the East side, there was a road from the port to the south. This road had existed since the Islamic Mataram era, now called MT Haryono. *Mataram* Street continued to the *Bangkong* and *Jomblang* areas. In the following discussion, this road became the post road that passed through *Bangkong*, *Jomblang*, *Jatingaleh*, *Dr Wahidin Street*, *Banyumanik* to the Surakarta or Yogyakarta.

The second Semarang development occurred when Dutch Indies ruled in Java and built the *Postweg* line, connecting west to east Java. In Semarang, the *Postweg* Line (called *Bodjong* Street) stretch from the west entered via

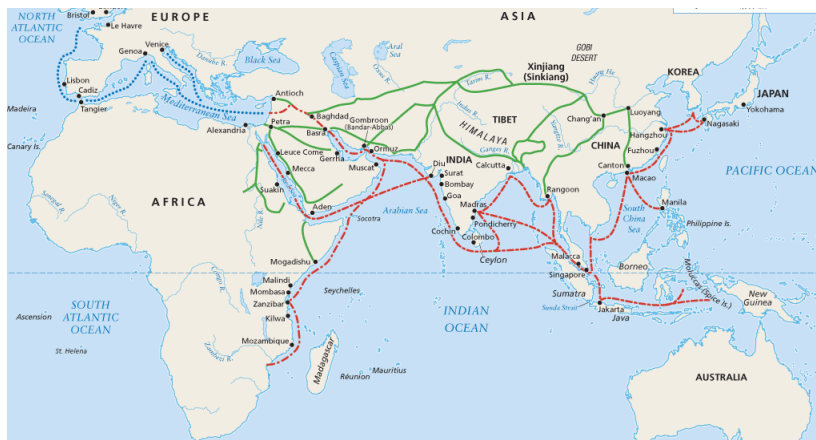


Figure 2. Indonesia and the trade routes of sea and land spices in the Greco-Roman era



Figure 3. Traditional city pattern with city center local government in old map (source: Atlas of Mutual Heritage, 1719)

Bulu area and then continued to the traditional city centre, continued to fortress area as *Heerenstraat*, *Karangbidara*, and then go to the east towards Demak (Brommer et al., 1995; Nurhajarini et al., 2019). The *postweg* line also goes to the south of Surakarta and Yogyakarta via the existing local road, *Mataram Street* (Hartatik, 2016) (see Figure 4). The analysis results show that the development of the fortress city towards *Bulu* is due to the availability of good transportation.

The government builds urban infrastructure (postal lines, post offices, the first train station, hotels, markets), company offices and the emergence of settlements because of the role of Semarang as a trading city and the increasing population. The Dutch East Indies government developed the town using the Dutch Indies Architect, Thomas Karsten. Karsten developed the concept of functional spatial arrangement, typology of roads and buildings, public spaces, including green open spaces (*The book entitled Verslag Vanden Toetstand der Gementee Semarang over 1917*). Based on this concept, the main roads are *Bodjong street*, *Mataram street*, *Oei Tiongham street* (*Diponegoro Street*). They also designed several green open spaces at the road meeting junction (at the end of the triangle), such as the square, *Wilhelmina Plein park* (in the *Bulu* area), *Diponegoro park* (in the Temple area). The typology of commercial buildings is located in the *Bodjong* street area, elite residential buildings in the temple area and public housing in the *Sompok* and *Mlaten* areas. There are also shared facilities other than the post office at the road meeting, such as a tram station and a traditional market.



Figure 4. Semarang in 1787, the colonial fort city, the center of traditional government, and the *Bulu* area connecting by the *postweg* road. The harbour and the inland connecting by *Mataram* road (source: Atlas of Mutual Heritage, 1787)

2.2. Placement of post office, transportation routes, and urban expansion

The development of the city to the south and east is at the same time increasing housing facilities. The *Mlaten* people's house project in *Sompok Village* (now *Bugangan Village*, east Semarang) is a mass settlement. The development of this area was the answer to the problem of the lack of liveable housing, the growth of organic urban villages, sanitation, hygiene, and aesthetic issues, which were urban phenomena faced by the Semarang city government in the early 20th century. Based on the development of the map from the pre-colonial to the colonial era, we conclude that the Dutch East Indies government did some finishing work on the design of the modern city of Semarang.

The government built a post office in 1750 before carrying out the construction of the *Postweg* (1809–1811). The post office and its facilities are the initial part of the Grand Design for the modern city of Semarang. As a trading city for the VOC, they equipped the city with transportation networks. This policy was accompanied by the strengthening of the post office as a government agency assigned to serve communications, money exchanges, and the transportation of goods. Therefore, the placement of a post office in a strategic area near the traditional city centre (Rukayah et al., 2020a). The second placement is on *Bangkong Street* (*Mataram* road), facilitating the *Mlaten*, *Sompok*, *Jomblang*, etc. The arrangement of Dr Wahidin's post office enabled new settlements in the *Candi* Area. From the development of the three post office locations, a morphological map of the city of Semarang appears. Morphology considered the technology when transportation could not solve swampy areas' problems in the middle of towns and the hilly regions. Agree with (Zahnd, 1999) that a city always experiences development from time to time involving political, social, cultural, technological, economic, and physical aspects.

The physical part of urban morphology is the arrangement or formation of city conditions that are objects and systems. We can study it structurally, functionally, and visually (Schirmer & Axhausen, 2016). Therefore, three elements of the development of urban morphology can be seen from the city, land use, road patterns, and post-building infrastructure. Following the opinion (Boeing, 2019), we can trace towns' morphology through approaches to transportation networks and historical cartography, geography, and visual representations of urban forms.

Morphology during the European influence can be seen through physical artefacts of Dutch colonial buildings and city parks scattered in the urban area of Semarang. The distribution of the heritage area is still the centre of the city in the pre-colonial period, which consists of elements of the square, market, centre of government, and a large mosque (Rukayah et al., 2012) as the centre of urban activities. The placement of the central post office in *Johar* indicates that the centre of the transportation network is heading to this area. The traditional city centre remains a cultural centre by maintaining the character of the city centre consisting of a square, mosque, and local

government centre. Culture is an inseparable part of the built environment and nature (Muminović et al., 2020). Its traditional city centre experiences physical-cultural sustainability and regeneration in modern city design. According to (Radosavljević et al., 2019), inheritance is a generative value for planning and design.

After developing the great post road, which connected the mainland of Java in 1810, several traditional cities developed into modern towns with hotels, *gementee* (mayors) offices, and post offices (Priyantoko, 2010). *Kantor Pos Besar Semarang* (Semarang Post Office-1750) was built after constructing a post office in Jakarta City (1746) (Rukayah et al., 2019). The railway transportation system made aimed to complement the post office. The first network connected Semarang to *Kedungjati*, completed in 1871. Then, the network construction continued until the 1920s. This development was recorded as the most complete and densest railroad network in Asia (Sunaryo et al., 2012). The Dutch built a tram network and road lines to connect the downtown area and the southern part of Semarang city development (*Candi, Sompok, Mlaten*) (Rukayah & Supriadi, 2017).

A city or area morphological approach uses a network and core to determine a city area's shape and characteristics (Radosavljević et al., 2019; Santander et al., 2018). The

traditional city centre was the core for urban development with post transportation as a network. Thomas Karsten (Dutch architect) designed Semarang city planning to modern. He planned the development of the town to the south. In the city's growth, he still makes the traditional city centre a city core. The city core with classic nuance completed in a modern way by placing the post office, the railroad network, and the post highway pass through the city centre (Handinoto, 2010). These facts are sufficient to show the importance of Post Offices and Railway Stations as elements that influence the spatial structure of the Javanese city. There was a significant expansion due to the opening of new areas, plus the flow of goods, services, and people getting smoother so that development will be even more equitable and the need for settlements are greater.

The Semarang city has transportation routes to the south from the city centre and the port city. The transportation link with towns in the inland, such as Ungaran, Salatiga, Boyolali, Kartasura, and Solo (Nurhajarini et al., 2019). It also transportation from the traditional city centre to the Candi as the Semarang development. The city morphology formed a triangle to avoid the swampy and hilly areas in the south (see Figure 5). The south post way to rural areas helped encourage the migration of Europeans to the inland to develop their businesses (Handinoto, 1999).

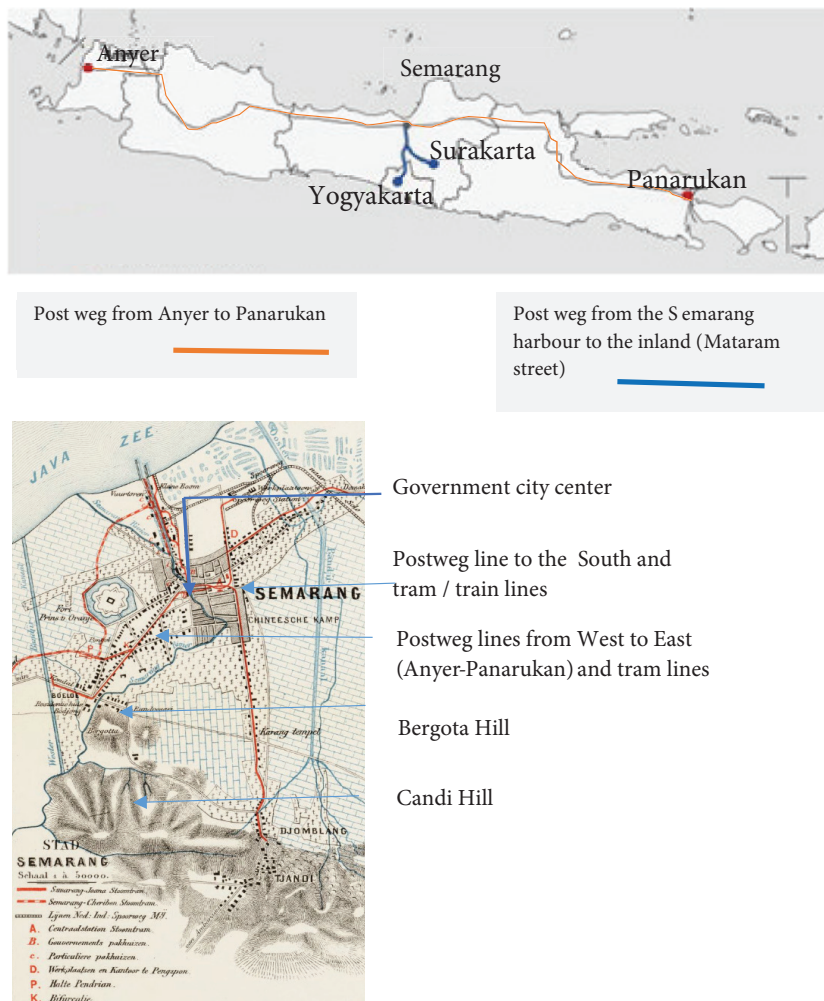
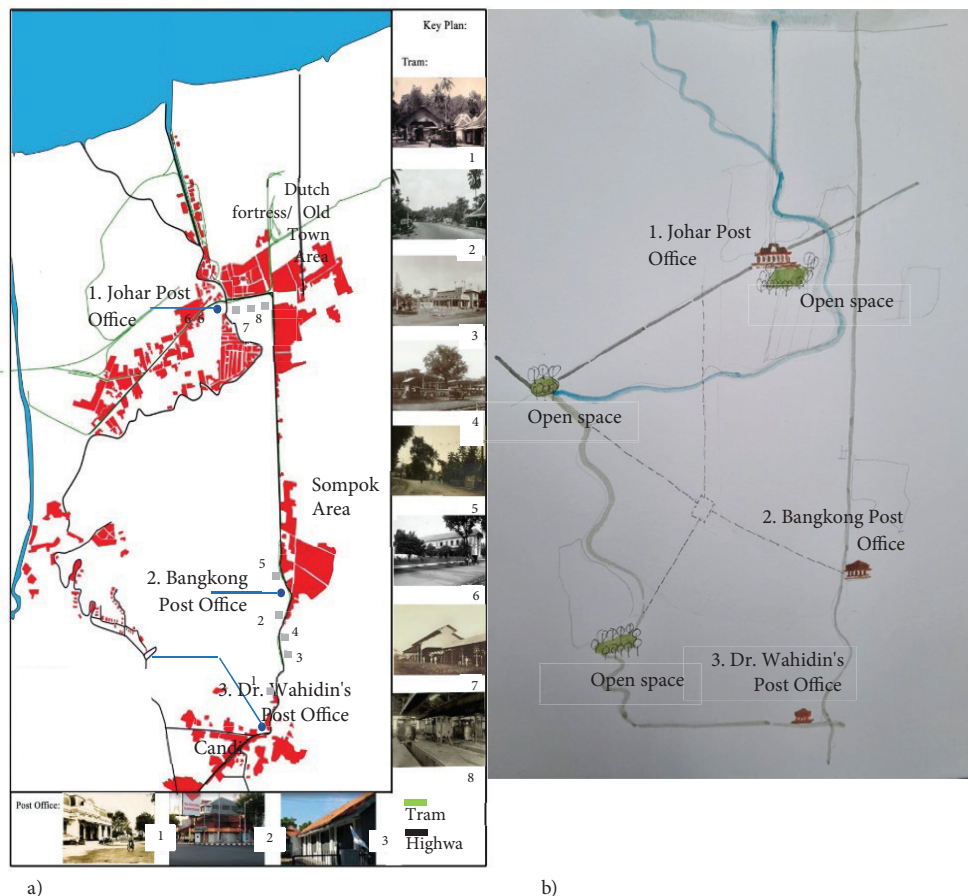


Figure 5. The 18th century Dutch colonial map of railways, show the topography of Semarang (source: Leiden University Libraries, 1907)

Over time this migration led to colonial settlements inland Semarang (Wihardyanto & Ikaputra, 2019). To connect the city centre with the inland of Semarang, several railway station buildings built around 1900 were as follows: *Kemijen Station*, *Jurnatan Station*, *Pendrikan Station*, *Jomblang Station*, *Tawang Station*, and *Poncol Station* (Ratnawati et al., 2015). These stations facilitated the city development towards the south, north, and east (*Candi area*, *Sompok area*, and *Mlaten area* as mentioned above).

The existence of railway lines was often a consideration in planning for urban development or colonial settlements (Sumalyo, 1993). At this time, steam trains, trams, and other vehicles appeared (Saidi, 2010). The tram was land transportation to inland areas operated by Semarang-Joana Stoomtram *Maatschappij* (SJS). Trams were discontinued in 1940 for reasons of savings. Some old photos

and maps showed that the railway transportation line in Semarang stopped at the *Jomblang hill*. This evidence showed that the railroad tracks only through gentle slopes (see Figure 5). The Dutch also developed a road network towards the expansion area to the south. The road passes through such as the *Mlaten* and *Halmahera Housing settlement*. Apart from housing facilities, other facilities were also built, such as *Peterongan Market*, the school building, the *Bangkong monastery*, and the *Bangkong post office* (see Figure 6). The government directed city development to a hilly area in the south, called *Nieuw Tjandi* (*Candi*), to avoid the swampy areas (sedimentation) in the middle of the city. The post office branch building was established in the *Candi/Dr Wahidin Street*. This development was carried out to facilitate new residential areas and complement the existing road and transportation network.



- Information:
1. Djomblang Station
 2. Mataram street and Djomblang Station
 3. Luna Theater
 4. Peterongan Market
 5. Meeting of MT Haryono street and Kompol Maksu street
 6. SMA Sedes Sagientiae
 7. SMA Sultan Agung Gate
 8. Station Central Djoernatan
- a. Johar Post Office
 b. Bangkong Post Office
 c. Dr Wahidin Post Office

Figure 6. Auto CAD and hand drawn show the construction of three post office buildings, transportation routes, and tram stations: a) Post office infrastructure and the morphology of Semarang (source: Leiden University Libraries, 1900; Boekhandel "Trio" (Semarang), 1930; Hisgen,1927); b) The city planning of Semarang, a network and the core in traditional city centre

3. The district growth in Semarang

As the economic centre of the Dutch East Indies, the city of Semarang caused an increase in the population. It is not easy to know how fast the growth and population in Java between 1800–1900, especially 1800 and above. In the mid-17th century, the Dutch East Indies company in Java gave 10,000–20,000 houses to Dutch officials. The construction of these houses indicated that the population growth was very high in the three colonial port cities, namely Batavia, Semarang, and Surabaya (see Table 1). Cities in Indonesia, which until then showed a pattern of low-density settlement, also became increasingly densely populated.

Table 1. Population growth of Batavia, Semarang and Surabaya 1905–1930

	1905	1920	1930
Batavia	173000	253000	435000
Semarang	97000	158000	217000
Surabaya	150000	192000	341000

The number of Europeans reached 62,500 in 1900 and increased to about 190,000 in 1930 (Gooszen, 1999). Meanwhile, China's population was about 227,000 in 1900 and grew to about 582,000 in 1930. The indigenous population accounted for 28.5 million in 1900 and significantly increased 41 million in 1930. This data shows that Europeans and Chinese in the 1900s constitute a large community. The community area can also be seen on the 1900s maps that the Chinatown area and the fort area have expanded towards *Bulu* in west area and *Candi* in south area. In the big cities of Java, the European and Chinese presence was more prominent. The number of increases in the Chinese population in several cities was 14.8% in Batavia, 11.4% in Surabaya, and 12.6% in Semarang. Meanwhile, the total population of Europe was 6.9% in Batavia, 7.7% in Surabaya, and 5.8% in Semarang (Gooszen, 1999). Semarang's population was around 200,000. Most of these were in the Inland by 1920. The researchers analysed through a map in 1741–the 1900s. The map 1741 depicted the central area of local government, Chinatown, Malay village, fortress city, multi-ethnic villages. In series, the 18s–19s map shows the urban expansion to the south. The map includes the Candi area and areas along *Mataram Street (Mlaten, Bangkong, Peterongan, and Halmahera)*.

4. The old post office and urban expansion from traditional city to the colonial settlement

Along with the urban development, postal services improved to serve new residential areas, such as Sompok and *Candi Baru*. This fact was demonstrated by the existence of the *Bangkong* post office (officially called the *Karangturi* post office) and the *Candi* post office located on Dr Wahidin Street (now an official residence). These three post offices are evidence of the urban expansion of Semarang.

The post office centre's location was in a strategic place near *alun-alun* adjacent to the Johar market, the Governor's office of the Dutch East Indies and the Du Pavilion hotel (now Hotel Dibyapuri) (Arianto, 2013; Priyantoko, 2010). The Semarang people known it as Johar post office. The position of the post office occupied the main highway since it was an essential means of transportation. Using the urban design method and technique explained that the post office's position occupied the main road. The road was necessary transportation (Hendro, 2015). Once the importance of the road, every ruler had an interest in the road-way in their area. The location of the post office was the entrance of the Semarang Old City from the direction of the *Groote Postweg* and became the zero point of Semarang City (Rukayah et al., 2020b). With the Johar post office location right on the edge of the postal road and close to the centre of local government, its existence has become a marker of a Dutch East Indies city in Java.

The government facilitates population development and residential development along *Mataram street* with roads, trams, markets, tram stations and *Bangkong* post offices. The location of *Bangkong* post office is on the corner of *Mataram Street* to *Majapahit Street*. The existence of this post office showed that this area was starting to develop as a residential and trading area. This post office served the trading area (*Peterongan* market) and new settlements in *Sompok* and *Mlaten*. The book *Verslag Vanden Toetstand der Gementee Semarang over 1917* explained that the government chose Sompok and Mlaten previously rice fields as new residential areas. Karsten designed a residential area with the concept of a garden city, with a garden in the middle as a green space, so the housing in *Sompok, Mlaten, and Halmahera* was the pride of Semarang as middle to lower class settlement.

Karsten planned to develop an area in the hilly area called new *Candi*. In this *Candi* area, there was the residence of *Oei Thiam Tjong*, a prominent ethnic Chinese family (now turn into a restaurant), Elizabeth Hospital, gardens, graveyard, and other large buildings surrounding the area (Coté, 2014). The post office on Dr Wahidin Street showed that its existence was a regional facility. *Mataram Street*, connecting the city centre with the *Mataram street*, passed through the residential area of the Old *Candi*. In conclusion, there were two patterns of placement of the post office in the colonial city. First, it was in the city centre, functioning administratively and symbolically the splendour of the Dutch East Indies era. This phenomenon was demonstrated by the existence of the centre Semarang post office. Second, the post offices were in transportation routes and strategic residential areas, as shown at the *Bangkong* post office and the third is the post office in Dr Wahidin Street.

The area of the expansion of Semarang city could be seen in the population census in 1930. In that year, the Semarang area was divided into four districts, namely Semarang *Kidoel* (southern Semarang), Semarang *Koelon* (western Semarang), Semarang Tengah (center of

Semarang) and Semarang Wetan (eastern Semarang). The four districts had covered the development of the city of Semarang towards the south. There are four districts in Semarang and consist of kampungs or villages.

Semarang Kidoel consisted of 25 villages: *Djangli, Djatingaleh, Dja-blang, Gadjahmoengkoer, Gemak, Genoek, Karang Anjar Goenoeng, Karanganyar Goenoeng, Karang Koempoel, Karaugredjo, Lainperkidoel, Lamperlor, Lampertengah, Ngesrep, Pandean, Pegandon, Peterongan, Petompon, Sampangan, Sr. Koelon, Srondol Wetan, Tandang, Tegalsari, Tindjomojo* and *Wonodri*. Then, Semarang Koelon consisted of 13 villages: *Baroesari, Bergota, Gilisari, Karaugredjo, Pandjangan, Panggoeng, Pekoenden, Pendrikankidoel, Pendrikanlor, Poerwogondo, Salamanmlojo, Sekajoe* and *Soemoerbanger*. Central Semarang consisted of eight villages: *Bandar Hardjo, Gaba-han, Gandek पो-espo, Gareiuhan, Karang Kembang, Poerwodinatan, Soekolilo* and *Soemeneban*. Finally, Semarang Wetan consisted of

10 villages: *Boegang, Kebonagoeng, Paderessan, Padoeroenkidoel, Padoeroengantengah, Patebon, Pedalangan, Sendanggoewo, Tambaklorok* and *Widohardjo*. The 25 villages in southern Semarang showed the rapid development to the south (see Figure 7).

This fact developed new knowledge about the post office's role as a morphological element (see Figure 8), not only in the city centre as it had been known so far. This research showed the existence of a post office as an analysis tool for the formation of city morphology and the formation of new areas. The *Candi* area was a marker for the development of the modern Semarang city to the south (Suprapti, 1992). Since the beginning of the 20th century, the urban development trend towards the southern part of Semarang city has continued (Flieringa, 1930; Roosmalen, 2011). The drivers of urban growth are not independent. They have changed over time and vary in different geographic areas.

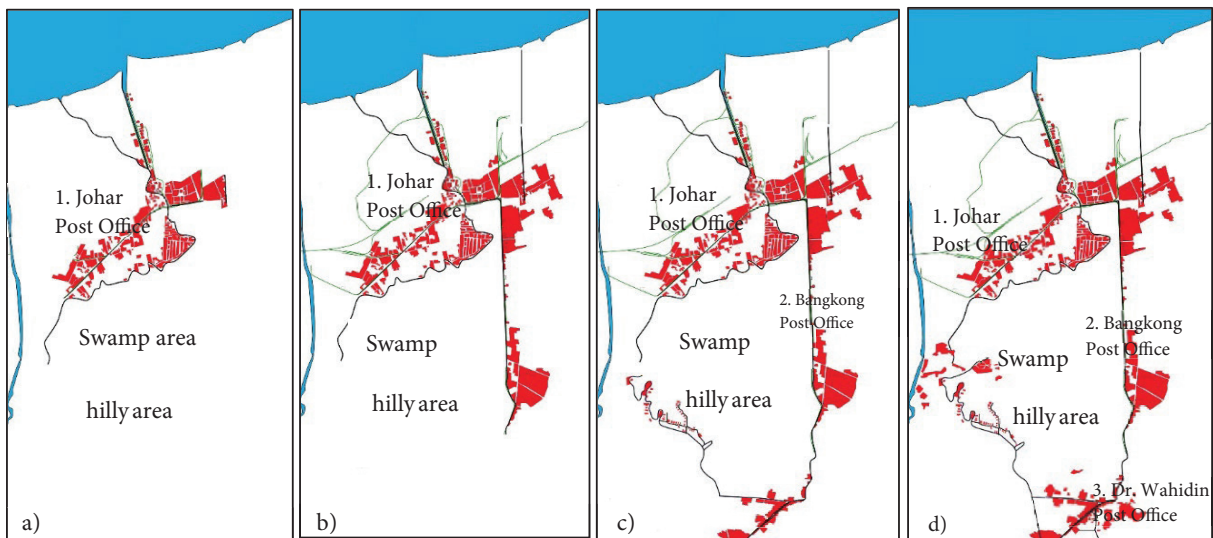


Figure 7. The area expansion of Semarang, avoid swamp and hilly area: a) Johar's post office position towards service area to fortress colonial city area, Pemuda Street, and Bulu area; b) Position of the Bangkong post office on the service area to the residential areas of Bangkong, Sompok, Mlaten, and Halmahera; c) Position of the post office on the service area to New Candi and Old Candi area; d) Position of three post offices and the triangle of morphology of Semarang City

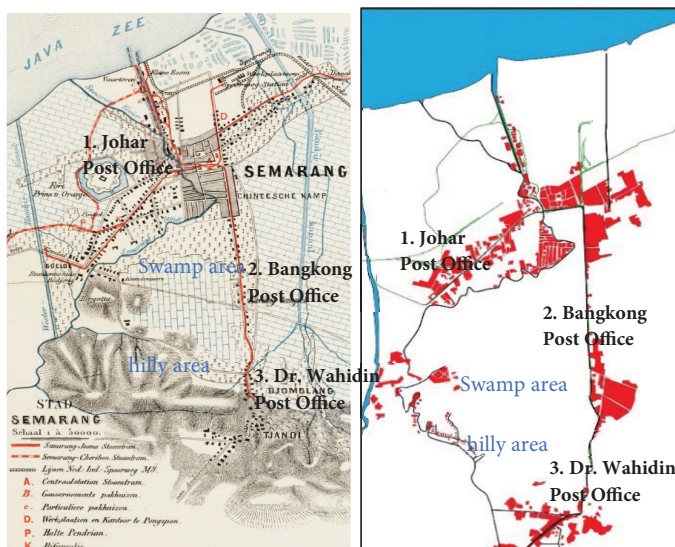


Figure 8. Comparing the Semarang map in the 18th-century Dutch colonial era (source: Leiden University Libraries, 1907) and the result of a triangular-shaped city morphology analysis. The vacant area used to be a swampy area and steep hills

Conclusions

Morphology is a structural linkage between regulatory types of connection, interrelation, position, dimensioning, functioning, etc., which governs the weaving of different types into organizational networks (Boeing, 2018). A case study of the post office in Semarang considered a city structural linkage in triangle formation. The formation facilitated and equipped Semarang city with transportation networks, connections, and interrelation between the city centre to the development area and still functioning the local city centre as the centre of the city development. The placement of the central post office in the provincial city centre becomes the centre for distributing postal services throughout the city. The organizational network of the post office became an indicator of the expansion of Semarang City. The post office and infrastructure use as morphological analysis. The government developed urban growth by making housing development, post road networks, the road and railway as city infrastructure. The traditional city centre consists of a square, mosque, government centre, and multi-ethnic settlements (Rukayah & Abdullah, 2021), which became the centre of the Semarang growth. The government turned the traditional city centre into modern nuance and equipped it with the post office, tram station, market, hotel.

The distribution and organizational network of post services in three locations formed a triangle pattern of urban growth in an old serial map with the triangle urban development design with an empty area in the middle. The Semarang old map in 1719 shows that in the middle of this triangle was a swamp area. The Dutch Indies Government avoided this swampy area and expanded it to the south in the *Candi* area and the south along *Mataram* Street. The development process, forming the spatial city pattern, studying the urban development from the beginning of the city's formation to the emergence of developmental areas resulting from the city expansion (Schirmer & Axhausen, 2016). In this paper, we study the urban development from the beginning of the city's formation to the emergence of the developmental show the novelty that the city's growth is also resulting from the problem of the geographical conditions.

The urban morphology development could be traced through approaches to transportation networks in addition to the history of cartography (Boeing, 2018). In 1695, urban growth centred on local government city centres (*alun-alun*, markets, the grand mosque, ethnic settlement) based on the old map. The Dutch East Indies government has complete Semarang cartographic records from 1719, 1795, 1741, 1787, to 18th-century maps. Although it has a complete map, the direction of development has not been fully explained. Using the post and its infrastructure traced the transportation networks. It became an analytical tool to reveal the city morphology, the reasons for the city's development, and its sustainability. The traditional downtown location has no topographical constraints. The town's story towards the south considers the construction

of a road network as a postal service infrastructure that requires a flat area.

The urban morphology that existed in the past sustain to connecting traditional areas to colonial areas. European influence could be seen through the physical artefacts of the Dutch Indies post office and their network system (Rukayah et al., 2020a). In conclusion, the post office role is a part of the morphology of the Dutch Indies city. The city's morphology showed a complete and compact road network, cohesive transportation which continues from the traditional city centre.

The sustainability concept is from the local governmental city centre (at the top of triangle city form) to urban development towards the south. The post office near the local governmental city centre (at the top of triangle city form) became the head office of the branch post office located in the urban expansion area (at the foot of the triangle urban development). The Semarang city formed a triangle shape due to the geographical factor of Semarang City, which consisted of hilly and lowland areas. The triangle's top was on the coast or lowlands, and the triangle's leg was at the foot of the hill. The middle of the triangle was an empty area that was swampy. The government avoided this area because technology and soil treatment were not as advanced as now. The technological advances, the marshy land has been soil compaction and turned into a business district centre.

This paper gives recommendations to city planners, architects, and the government to add to the list of conservation regulations about the sustainability of urban design as a conservation area of the Semarang historic site from the classic to the Dutch Indies era. Singapore's success in making a historical area trail to make it a heritage tourism area can be a best practice to make this city's triangular area a historic site. There are opportunities for further research to show the architectural character of the triangular historical zone. This additional research is to strengthen the design theory of colonial works from a triangle zone consisting of the colonial city centre area (fortress city area), elite housing (*Candi* area), and public housing (*Mlaten* area).

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