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Impact Permeability Study Transition from Residential Function to Educational Function in *Dalem Mangkubumen, Yogyakarta*

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ABSTRACT

Dalem Mangkubumen, is a residential house specifically for nobles in the Yogyakarta Sultanate. *Dalem Mangkubumen* itself was built as the home of the crown prince Sri Sultan Hamengku Buwono VI. It cannot be denied that *Mangkubumen* has the largest land area and grandeur like *Karton Yogyakarta*. It was built in 1876 and still stands today. Since its founding until now, its function has changed, it was built as a residence and then changed to an educational function. This change in function has an impact on changes in building use and building additions to meet their needs. This qualitative research examines how permeable the spatial layout is when it functions as a residence and changes to an educational function. Using data that has been written down, both old maps and previous articles, as well as direct observations in the field, the latest map modifications and a list of spatial changes have been obtained. These data are used to see changes and assess permeability. The level of permeability and changes in permeability in the zones within *Mangkubumen* can be seen.

Keywords: function; *Dalem Mangkubumen*; permeability

ABSTRAK

Dalem Mangkubumen, merupakan rumah hunian dikhususkan untuk bangsawan di lingkungan kasultanan Yogyakarta. *Dalem Mangkubumen* sendiri dibangun sebagai rumah putra mahkota Sri Sultan Hamengku Buwono VI. Tidak dipungkiri *Dalem Mangkubumen*, memiliki luas lahan yang paling besar dan kemegahan seperti *Karton Yogyakarta*. Dibangun pada tahun 1876 dan masih berdiri hingga saat ini. Semenjak berdiri hingga saat ini mengalami perubahan fungsi, dibangun sebagai hunian kemudian beralih menjadi fungsi pendidikan. Perubahan fungsi tersebut, berdampak pada perubahan penggunaan bangunan dan penambahan bangunan guna memenuhi kebutuhan. Penelitian secara kualitatif ini, mengkaji seberapa permeabilitas tata ruang saat berfungsi sebagai hunian dan berubah menjadi fungsi pendidikan. Menggunakan data yang pernah dituliskan baik peta lama maupun artikel terdahulu serta amatan langsung dilapangan, didapatkan modifikasi peta terbaru dan daftar perubahan ruang. Data-data tersebut digunakan untuk melihat perubahannya dan mengkaji permeabilitasnya. Terlihat tingkatan permeabilitas maupun perubahan permeabilitas dalam zona-zona yang terdapat di *Dalem Mangkubumen*.

Kata kunci: fungsi; *Dalem Mangkubumen*; permeabilitas



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1. Introduction

Yogyakarta, which is close to the Royal City, was founded in 1755 with the Kraton as the center of government and the king's residence. The Kraton complex is surrounded by a fort known as *baluwarti*, while the area inside is called *Jeron Beteng* (inside beteng). The *Jeron Beteng* area is an area that is still developing today and is a cultural heritage area (Sektiadi, 2015). *Dalem Mangkubumen* as part of *Jeron Beteng* is a heritage building and is one of the *Dalem's* registered as a cultural heritage building in Yogyakarta in 2010 (Cahyandari et al., 2019). *Dalem* itself is a term for residential buildings intended for nobles (Adianti, 2019). The name after the word *dalem* is adjusted to the name of the nobleman who lives in the building. *Dalem Mangkubumen* was founded in 1874 based on the inscription on one of the buildings (Bangsal Sriwedari), *Dalem Mangkubumen* itself was built during the reign of Sultan Hamengku Buwono VI (Yuniastuti, et al, 2014). This palace is intended as a residence for the future Crown Prince of Sultan Hamengku Buwono VII, namely Prince Adipati Anom Hamengkunegoro. After Prince Adipati Anom became king, this *Dalem* was inhabited by his younger brother, Prince Mangkubumi, in 1918. When it was used by Prince Adipati, the palace was known as *Dalem Kadipaten*, but after being used by Prince Mangkubumi it became known as *Dalem Mangkubumen*. *Dalem Mangkubumen* underwent several changes in function, initially as a residence, and most recently functioned as an educational facility until now (Yuniastuti & Murti, 2019).

The topic of the prince's palace (*Dalem*) has been studied by several researchers. The distribution of *Dalem* in Yogyakarta and Surakarta Sultanates has been studied by (Ikaputra, 1995), and the results of the distribution focus on discussing the *Dalem* in Yogyakarta. (Ikaputra, 1995) conveyed about the typology of the ownership of the *Dalem* in the Yogyakarta Kraton area related to its architectural form. Specifically discussing the *Dalem Mangkubumen*, (Yuniastuti & Murti, 2019), said that the change in spatial planning was caused by the change in the function of the *Dalem* to the function of education. The research shows that several buildings in the *Dalem Mangkubumen* have changed their spatial functions or there have been additions to buildings. The history of the *Dalem Mangkubumen* has also been conveyed in a study conducted by (Yuniastuti et al., 2014). The research conveyed about the changes in the function of each building function in the *Dalem Mangkubumen* which was traced in the period of 1874-1949. Permeability in traditional buildings was once revealed by (Adianti et al., 2023) in Yogyakarta cardboard research in the HBIX and HB X eras.

Although research related to the *Dalem Mangkubumen* has been carried out by several researchers. However, it still observes changes in function both by identifying the addition of space and the transfer of space functions. Based on this, there needs to be further research that the researcher will conduct. This study is based on previous research to examine the permeability of the *Dalem Mangkubumen* which has changed its function from a residential function to an educational function. As a residential function at first, of course, there is a space that is not permeable, after changing the function to education will it affect the level of permeability. According to Rossini, F, et al (2018), permeability is generally the ability of a material to allow fluid to pass through without changing its original structure. *Dalem Mangkubumen* has a distinctive spatial pattern structure. As a result of changes in the function of the interior, new spaces emerged. Additions and changes to space due to changes in function will be studied in this research. Another expression of this study is how permeable *Dalem Mangkubumen* is in responding to changes in function.

Dalem Mangkubumen as a traditional building that has been designated as a cultural heritage building, of course needs to maintain its identity as a building that has important value. Its current existence is still functioning even though it is no longer the residence of the king's relatives, of course there are still operations that are still carried out today. This regulation appears in the use of space and the addition of space that occurs in the *Dalem Mangkubumen* which currently functions as an educational

function. The core space of the Javanese traditional house, namely *Dalem Ageng*, when changing its function to an educational function, will certainly function as a space that has important value for an educational institution.

2. Literature Review

Dalem Mangkubumen was originally built as a residence for the Crown Prince. Therefore, the area, size architectural style, and completeness of Mangkubumen are similar to the Yogyakarta Palace (Yuniastuti, et al, 2014). *Dalem* is the most complete typology of traditional Javanese houses. Physically, the palace is limited by a 2-3m high fortress with a land area ranging from 2,000 – 10,000 m² (Siti Widayatsari, 2002). The entrance access called *gledekan* has varying lengths measured from the main road to the *regol* (gate) of the palace. The main hall structure of the palace is divided into 3 (three), namely *pendapa-dalem-gandok*. The changes in function experienced by the *Dalem Mangkubumen* also influence changes in spatial planning. This change in function occurred during the reign of Sultan Hamengkubuwono IX, who officially allowed the Yogyakarta Palace to use the performance area for higher education institutions as a lecture hall (Roem, 2011). The king's policy also influenced the actions of the nobles, allowing parts of the palace to be used for social purposes.

Dalem Mangkubumen currently functions as a place of education and settlement. This settlement emerged from the dalem's first function as a noble residence which of course required servants (*abdi dalem*) to serve the house owner daily. As long as servants serve the palace owner and his family, they are allowed to live in the palace fortress. Some of the descendants of these servants still live in the *dalem Mangkubumen*, apart from the descendants of the Mangkubumen palace owners. This change in function affects the spatial layout of Mangkubumen from its original function as a residence to its current educational function. It cannot be denied that the current function is changing the function of the original building as well as adding space both within the original building and adding new buildings, to fulfil the current function of the *Dalem Mangkubumen*.

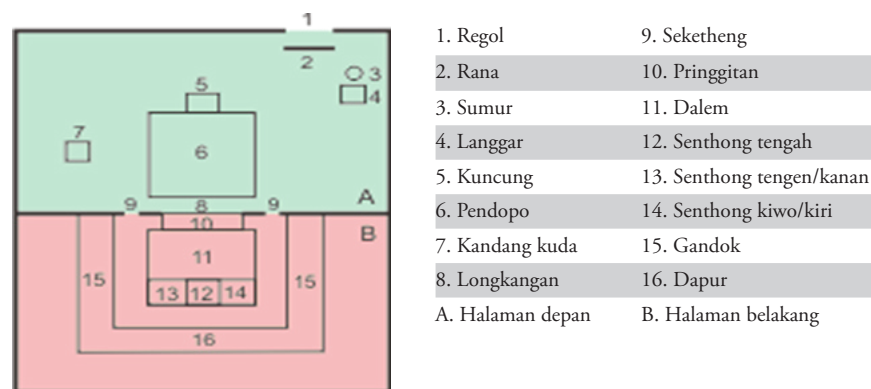


Figure 1: Layout *Dalem Mangkubumen* (Source: Wibowo, 1998)

The ability to get from one place to another easily is the concept of permeability introduced by (Lynch, 1959) in Urrohmah (2023). Good connectivity of circulation can increase permeability, due to easy access and movement in a settlement Lynch (1948) in Urrohmah (2023). Permeability can also improve social and economic relations in the area. People who live in this area can easily recognize the environment and can feel the spatial hierarchy (Silavi et al., 2017).

The authority of the area and building owners influences differences in permeable levels. Differences in permeability levels are influenced by the territory of an area (Adianti et al., 2023). If the owner limits an area to a low level, then that area is considered more permeable. According to Altman (1975) in McCartney & Rosenvasser (2022) Boundaries or territories have a hierarchy. The hierarchy according to Altman (1975) in

McCartney & Rosenvasser (2022) consists of 3 levels, while according to (Zubaidi, 2019) it was developed into 4 levels. The four territorial levels are Primary territory, Secondary Territory, Public territory, and Free territory. Through research revealed by McCartney & Rosenvasser (2022), territorial levels are explained. Areas that are classified as primary regulatory territories are still controlled by a few groups whose regulations can still be felt by other people apart from high ownership. Feelings of threat can arise in the primary territory area if there is a violation of territorial boundaries. Areas that are classified as secondary territory are areas that are periodically controlled and can be entered by other people. Areas in the public territory category are areas where other people can see and use but cannot be controlled because there are rules that are still obeyed with low ownership. Meanwhile, free territories are areas that are not owned by permanent residents or users and whose ownership is low.

3. Methods

Yogyakarta is one of the provinces in Indonesia. Currently, Yogyakarta still has the relics of the traditional Javanese kingdom, which is centered in the Kraton. The palace as the king's residence has the outermost boundary of the Kraton called *Baluwarti*. In the *Baluwarti* fort, in addition to standing the Kraton, there are also houses where the king's sons and servants are called *abdi dalem*. The king's prince is called *Dalem*, scattered both inside the *Baluwarti* fort and outside the fort. *Dalem* Mangkubumen is located in the *Jeron Beteng* area which is located west of Kraton Yogyakarta. Located approximately 300 m from Kraton, it is part of the Kadipaten sub-district of Yogyakarta, DIY.

Assessing the permeability of *Dalem* Mangkubumen, using qualitative methods. Qualitative is a search to understand certain phenomena. The results of this research are presented descriptively based on the interpretation of data collected by researchers (Fiantika et al., 2022). *Dalem* Mangkubumen from the beginning was built from a cluster of buildings that have different functions. Therefore, the unit of analysis needed is the change in function in each space in a certain period, the circulation pattern in a certain period and the addition of new buildings due to changes in the function of the dalem. Through the identification of functions, circulation and addition of buildings, it can be known which areas are fixed, areas are increasing or areas are changing. The identification is carried out by marking on a map made with periodic periods.

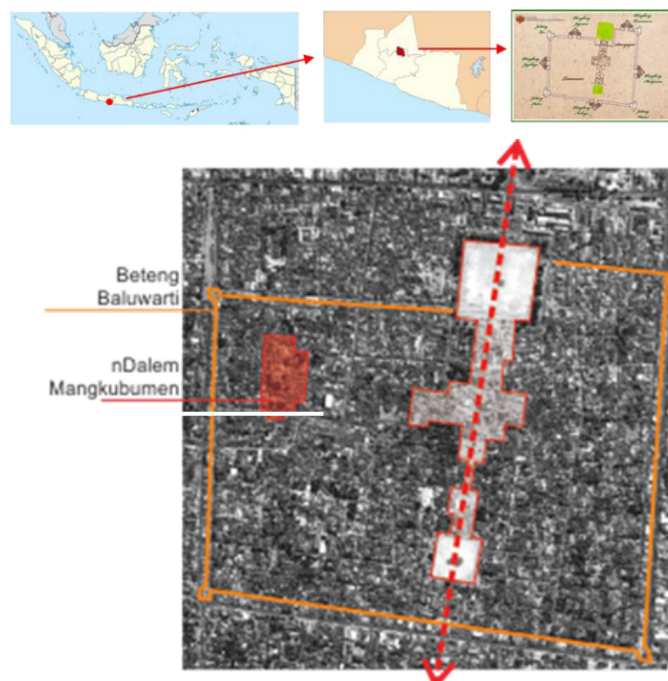


Figure 2: Location *Dalem* Mangkubumen

Data and information collection is carried out with several strategies. Primary data was obtained through interviews, observation and documentation. This research requires data related to past and current conditions, to see the development of the *dalem*. The interview was conducted in a semi-structured manner, due to the flexible nature of the interview, but it can be arranged and has the goal of understanding field phenomena (Hadi & Rusman, 2021). Through interviews, the author obtained information on the history of spatial change. The selected informants are the elders who live in the *dalem*, the people who live in the *dalem* and the managers of educational institutions who use the *dalem* today. Direct observation was made by the researcher to see the current condition of the *dalem*. Documentation through the investigation of written objects such as published articles, old maps and books that discuss the prince's palace, especially the *Dalem Mangkubumen*. Based on these data, we can find the historical process of *Dalem Mangkubumen*, both changing the function of the building and adding space to support new functions. The data is presented in the form of maps and narratives so that changes in spatial layout can be seen.

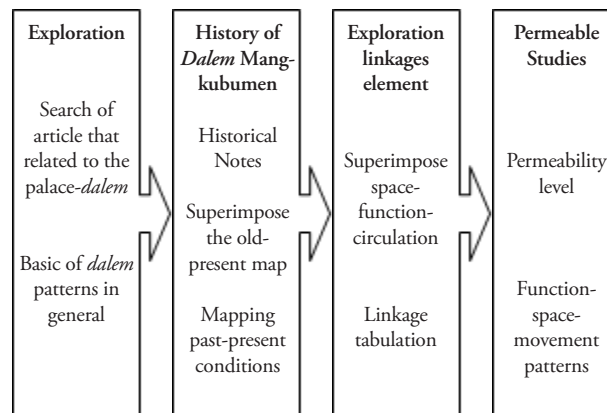


Figure 3: Collecting data dan analysis

The data that has been obtained is then poured into maps, based on a certain period. The period obtained is, at the beginning of the establishment of the *Dalem*, the period when the palace changed its function to the function of education and the current period. Existing maps are used to map the function of each space, the addition of buildings, and circulation paths in each period. Then the map is superimposed to find out the pattern of changes in spatial function, changes in circulation. Through the superimposed, it is possible to group areas or show space so that conclusions can be drawn regarding the level of permeability.

4. Results

4.1. History and Spatial Planning of *Dalem Mangkubumen*

The construction of *Dalem Mangkubumen* began in 1876 and was completed in 1877 (Widayatsari, 2002). This palace is the residence of the crown prince of Sultan Hamengkubuwono VI, whose name is KGPA Hamengkunegoro. After he was appointed king with the title Sri Sultan Hamengku Buwono VII, this palace became the residence of his younger brother, namely KGPH Mangkubumi (Yuniastuti et al., 2014) until 1918. After the death of KGPH Mangkubumi, it was occupied by his younger brother until 1928. Since 1928, the *Dalem Mangkubumen* has not inhabited, although regular maintenance is still carried out. From 1952 to 1982 it functioned as a lecture venue for several UGM faculties, which then continued from 1982 until now it was used by Widya Mataram University as a lecture venue.

The settlements that emerged within the *Dalem Mangkubumen* complex emerged, starting when the *Dalem Mangkubumen* fully functioned as a noble residence. The nobles who live in the palace have the power to manage the palace, and even regulate who is allowed to live in the palace complex. The courtiers who served the nobleman and his family daily were allowed to stay. So some of the settlements in the *Dalem Mangkubumen* are descendants of noble families or courtiers who once lived in the palace. The layout and

architecture of *Dalem Mangkubumen*, it looks the most majestic and resembles a palace. This cannot be denied because the *Delem Mangkubumen* is the residence of the future king or crown prince of the reigning king. The orientation of the palace is south-north, with 3 (three) main access doors to the palace, and there are still 2 (two) gates so that you can see two layers of security doors.

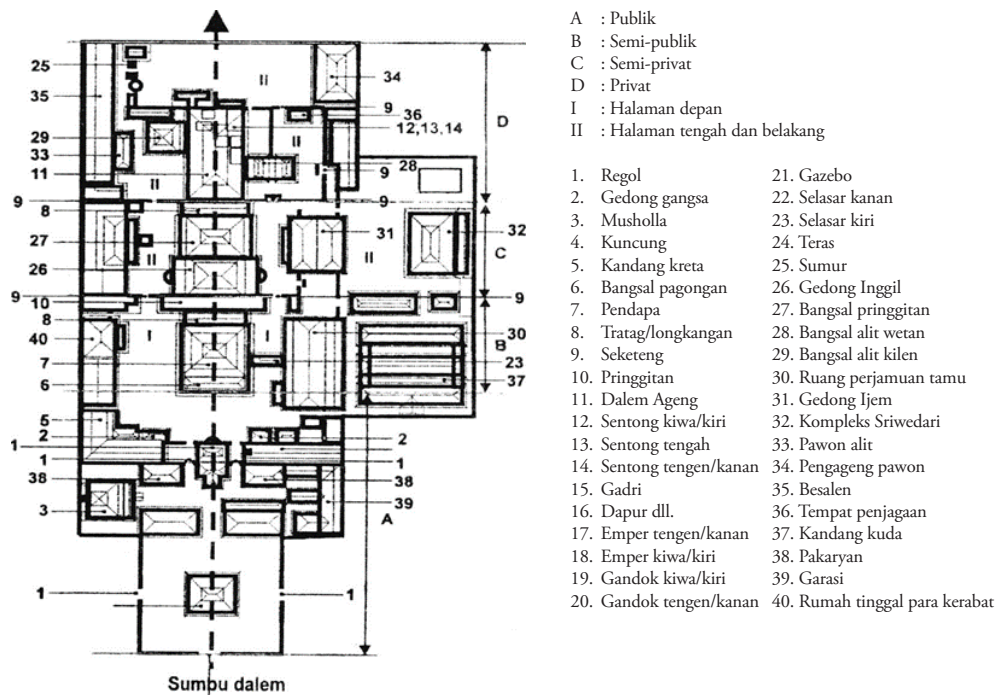


Figure 4: Layout *Dalem Mangkubumen* (Source: Widayatsari, 2002)

4.2. Changes in the Function of Mangkubumen

During the 3 periods experienced in Mangkubumen, adjustments occurred either by changing the function of space (transfer of functions) or by adding buildings. Period I, when it functioned as a residence for the king's relatives, the completeness of the *Dalem Mangkubumen* was classified as the most complete compared to other noble palaces. Divided into 6 (six) zones, namely the outer zone which functions to receive guests in general, there are important buildings, namely the Duchy Mosque and *Banjar Andap*. Front Zone, the zone where the crown prince entertains his chosen guests. The main building in this zone is the *Pendapa Agung*. The Central Zone is divided into 2 (two), namely Central Zone 1 where the crown prince sleeps and has an office, Central Zone 2 is the core of the Mangkubumen palace, because there is the Proboyekso Ward, a large building where heirlooms are placed. The back zone and service zone are used to support the daily activities of the crown prince and his relatives.

Period II was when the *Dalem Mangkubumen* was converted into an educational function, housing several faculties of Gadjah Mada University (UGM). The faculties that conducted lectures in the Mangkubumen palace were the medical faculty, and the dental faculty, therefore several buildings were converted into classrooms, laboratories, and offices. During its use, UGM built new buildings, many of which were placed in the front zone. The transition of functions for education occurs in the front zone, middle zone 1, and back zone. Meanwhile, the service area has changed into a residential area apart from several buildings in the front zone and Middle Zone 1 which have changed their function to become residential.

Period III, the *Dalem Mangkubumen* continued to function as a place of education. The difference with the previous function is that there are several different levels of education, namely elementary school and university. Not many new buildings were erected in Period III. Most of them use buildings that had been built by UGM and repurpose existing buildings. A new building was created in the back zone to meet the university's needs as a classroom. In period III, there was also a return to function according

to period I, namely *Pendapa Agung* was reused as a reception area and hall, whereas in period II this building was given walls (semi-permanent) which were used as classrooms.

Based on table 1. The function that has never changed is the duchy mosque. Meanwhile, buildings that are considered important and main, such as *Bangsals Prabayekso*, retained their function or were even left empty after the *Dalem Mangkubumen* became an educational function. The construction of new buildings is taking place in the front and back zones to increase the educational function space. Meanwhile, the addition of residential buildings often occurs in service zones or existing residential buildings.

Table 1: Changes in the function of each building

Zona	Building Name	Function		
		Periode I 1874-1949	Periode II 1952-1982	Periode III 1982-sekarang
A Outer Zone	Kandang kereta barat	carriage room	classroom	classroom
	Kandang kereta timur	carriage room	classroom	classroom
	Masjid Kadipaten	prayer room	prayer room	prayer room
	Banjar Andap	guard/transit room	classroom	classroom
	Banjar Baru	open space	classroom	classroom
B Front Zone	Pendapa Agung	hall	classroom	hall
	Maosan	dining room	residence	residence
	Dapur Maosan	kitchen	residence	residence
	Gedhong Gongso Timur	storage	classroom	office
	Gedhong Gongso Barat	storage	classroom	residence
	Regol Cemeng	guard room	office	office
C Middle Zone 1	Gedong Lumuten	residence	residence	residence
	Bangsals Pringgitan	puppets room	classroom	classroom
	Keprabon	dressing room	residence	residence
	Gedong Inggil	main bedroom+office	office	rectorate
D Middle Zone 2	Bangsals Prabayeksa	weapons room	weapons room	kosong
	Bangsals Alit Kilen	playroom	-	classroom
	Bangsals Alit Wetan	jambanan	meeting room	classroom
	Mandragiri	bed room	-	classroom
E Back Zone	Besalen	weapon crafting	office	office
	Pawon Agung	kitchen	weapon crafting	residence
	Bangunan baru B	open space	open space	classroom
F Service	Keparak	residence	residence	residence
	Tamansari	bathing place	-	residence
	Bangsals Sriwedari	residence	residence	residence
	Gedhong Jaran	horse stable	clinic	classroom
	Bangunan baru C	open space	residence	residence

Source: Yuniastuti et al., 2014

4.3. Permeable Study in Mangkubumen

Access and connectivity are concepts of permeability in a residential area. The road network in the form of main roads and village alleys can be a link in an area, with a variety of road types. Permeability allows vehicles such as motorbikes, bicycles, and pedestrians to pass through various routes to increase accessibility and connectivity (Urrohmah, 2023). There has been a change in the permeable level during the existence of Mangkubumen until now. Based on zones, in period I; The Central zone is the primary territory, where only courtiers and courtiers serving household activities can access this area. The front zone and back zone can be accessed by the public with permission from the house owner. Meanwhile, the outer zone can be accessed by the general public. Changes in territorial hierarchy occurred in Central Zone 1 during period II. These changes occurred in *Pendapa Agung* which functions as a classroom. Many changes occurred in period III, the primary territory zone occurred in the entire service zone. This is because the entire zone functions as a residential area, while the front zone to the back zone are educational areas. The outer zone remains a public area, this area combines educational functions and can be accessed by everyone without having to have an interest in Mangkubumen.

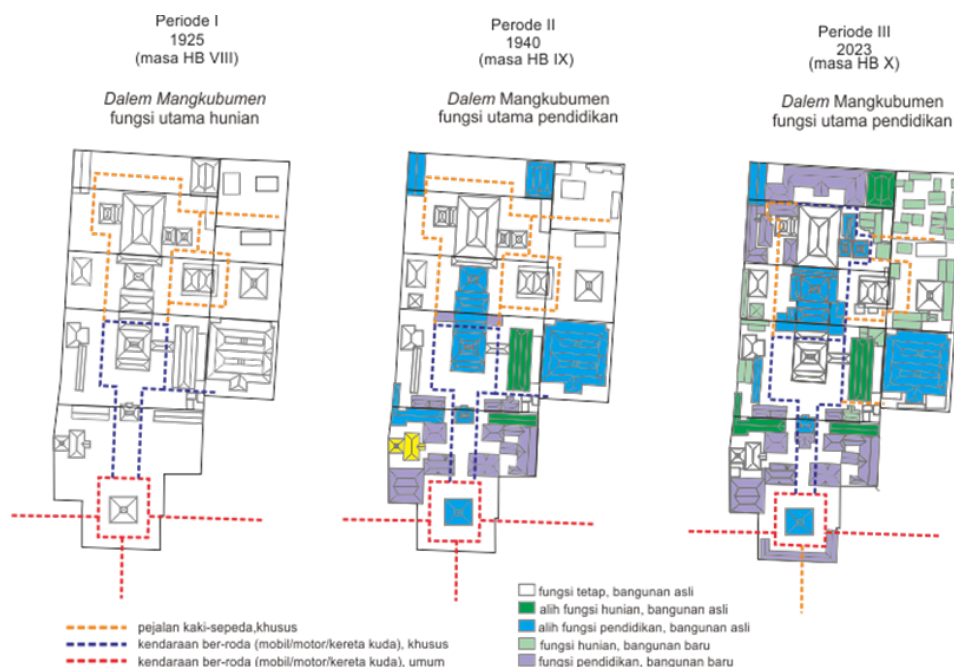


Figure 5: Accessibility functions and patterns in each period

As a result of changes in function, it also affects the pattern of accessibility types. Period I is divided into 3 types, namely the outer zone which can be accessed by the public because in this area there is a mosque as a place of worship for people who live in Mangkubumen and the surrounding community. The front zone and middle zone 1 are areas that can be accessed by vehicles (at that time in the form of horse-drawn carriages) because guests of the house owner can easily enter these two areas. This is because in this area there is a *Pendapa Agung*, *Maosan* (dining room), and *Gedong Hinggil* (office), which are buildings to accommodate the activities of the owner of the palace and his guests. Middle Zone 2, back zone, and service can only be accessed on foot. Areas that can only be accessed on foot are the most private areas because only the owner and servants are there.

Period II still has similarities with Period I, even though the *Dalem Mangkubumen* has changed its function to an educational function. The addition and change of function of space to support educational functions still predominantly occurs in the outer zone and outside zone, front zone, and Middle zone 1. Period III saw a change in accessibility patterns, Middle Zone 2 which was initially only accessible by pedestrians. Changed to being accessible by motorized vehicles due to the establishment of a new classroom in the rear zone area. The service zone as a whole can only be accessed by pedestrians, making the area have a primary territory hierarchy.

5. Discussions

Traditional Javanese houses, in this case the prince's palace, are not only limited to the building but to the surrounding environment. Like *Dalem Mangkubumen*, it still uses traditional house practices where it is surrounded by fort and building units that have different functions (Retnaningtiyas, 2018) and standard spatial planning. *Dalem Mangkubumen* is surrounded by a fort with 3 (three) entrances, from the east, south and west. Overall, the spatial layout between the *Dalem* has similarities because it is formed by a long-standing tradition. Although the *Dalem Mangkubumen* compared to other *Dalem* has a more complicated spatial layout (Widayatsari, 2002). As a traditional Javanese house, it consists of the front building (*Pendhapa*), the main building (*Dalem Ageng*), and other buildings that function to facilitate the daily needs of *Dalem* users. *Dalem Mangkubumen* has this, there is even a difference, namely with the existence of a building that functions as an office (*Gedong Hinggil*). Another thing that

another *Dalem* does not have is the existence of *Pemandian* (a park with a bathing area) on the east side of the main building.

The complexity of the *Dalem* Mangkubumen is with a layered courtyard area. Generally, the *dalem* has 2 (two) courtyard areas, namely the front and the back. *Dalem* Mangkubumen itself has a front yard, a middle yard and a back yard. Each page is bounded by a gate called a *Regol*. The area of the page shows the nature of the page. The front yard is public-semi-public, while the middle and back courtyards are semi-private. As a crown prince complex, the Mangkubumen palace has the same peculiarities as the *Dalem* Kadipaten, which has an architectural pattern similar to Kraton (Yuniastuti et al., 2014). *Dalem* Kadipaten was the residence and official office of the crown prince during Hamengku Buwono I. The location of this palace is on the east side of the Yogyakarta Palace. The current condition of the *Dalem* Kadipaten has been destroyed, (Retnaningtyas, 2018).

As long as the *Dalem* Mangkubumen has undergone a change in function to an educational function, the orientation of the *Dalem* has not changed. The orientation of the *Dalem* still follows the north-south axis (Arvisista & Dwisusanto, 2020). The consistency of orientation also occurs in other *Dalem*, as is the case with the *Dalem* Joyokusuman, even though it changes its function to residential and commercial (Wardani, 2007). However, it is undeniable that the change in the function of the *Dalem* also changes the order of time. However, the *Dalem*, which still functions as a residential function, has not changed too much (Arvisista & Dwisusanto, 2020). *Dalem* Mangkubumen which is currently changing its function to education, but there are still residential areas where there is still a connection with the heirs of the *Dalem* users when it functions as a residence. It is another case if the *Dalem* changes its function to commercial, allowing the transformation of the sacred space into a proven room (Wardani, 2007).

The permeability level of the Mangkubumen area has changed according to the nature of the zone. At the beginning of the *Dalem* Mangkubumen, the nature of the zone is in accordance with the *Dalem* in general. Changes in the nature of the zone according to the position of the page. The public zone is located in the front yard where there are *Banjar Andap* and Masjid. The semi-public zone is located in the inner front yard where there are the *Pendapa Agung* and *Maosan*. The *Pendapa Agung* is categorized as semi-public because of its function as a social space because it functions as a place for ceremonies and meetings of nobles with their relatives and neighbors (Setiprayanti & Prijotomo, 2010). The middle courtyard is a private zone because there is a *Dalem Ageng*. This is because it can only be entered by the close family of the nobles. In addition, the *Dalem Ageng* is the center of the *Dalem* (Setiprayanti & Prijotomo, 2010). Meanwhile, the outdoor space around the palace and backyard is a semi-private zone because it is used for daily support functions. The buildings around the palace are called *Gandhok*

Gandhok which at the beginning of the function of the *Dalem* Mangkubumen was as a sleeping room for the courtiers (*abdi dalem*), a dining room for the courtiers (*abdi dalem*) or a room to support the daily life of the courtiers (*abdi dalem*). *Gandhok* is a space that can be easily extended or new structures added (Cahyono, 2015). The current condition is dominantly used as a residential area for residents and educational support facilities such as classrooms. This makes the current *Gandhok* area can develop as needed, with a flexible layout and simple appearance (Cahyono, 2015).

The change in permeability occurred in the area around the *Dalem Ageng*, which is currently developing into a residential area. This settlement arose because from the beginning it was used as a residential area for relatives of palace users and servants (*courtiers*). Meanwhile, due to the educational function, the semi-public zone has changed to public because of the diversity of types of transportation that can pass through this zone. This change in the type of transportation is influenced by the education headquarters, in this case the rectorate and administration rooms are located in *Gedong Hinggil*. *Dalem Ageng*, which was initially included in the private zone, when it became an educational function, changed to a public zone (Arvisista & Dwisusanto, 2020). The change is because the *Bangsar Pringgitan* and part of *Prabayekso* are used for classrooms and libraries.

6. Conclusion

Based on the study, the permeability in Mangkubumen is divided into 3 (three) periods. Period I when it still functions as a residence as a whole, Period II when it functions as an educational function (several UGM faculties), and Period III functions as an educational function (Widya Mataram University and Growing Elementary School). As a result of this change in function, there was a change in function of the building and additions to the building. The transfer of functions initially occurred in the outer zone, front zone, middle zone 1, and back zone. However, in period III, function transfer occurred in all zones. Many building additions occurred in the front zone, back zone, and service zone.

The level of permeability is in line with the change of function and addition of buildings in each zone in each period. The change in function to a social function (education), disturbed the palace, whose original function was as a noble house. Primary territory zones occur in residential areas although overall the interior functions as a social function. Areas that can only be accessed on foot show how people who live in these areas do not want to be disturbed by vehicle movements, in other words, only people who are interested and familiar with the area can access them.

This research needs to be developed with a variety of samples, to compare the level of permeability. There are several other *Dalem* that are in the *Baluwarti* of the Kraton. If researchers will continue to study related to the *Dalem* Mangkubumen, you can focus on the pattern of spatial changes in each building.

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