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RESEARCH ARTICLE

# Spatial Distribution of Small and Big-Scale Modern Retail Through the Growth of Yogyakarta Urbanized Area

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**Abstract.** The focus on the growth of modern retail has become increasingly important due to several generated externalities. Therefore, this research aimed to identify spatial distributional pattern of modern retail in order to implement precise policies. Data were obtained from The Department of Licensing Service of Yogyakarta City and supplemented with observation through Google Maps. The global pattern was analyzed using the Moran Index (Moran's I), while the spatial pattern was evaluated using Local Indicators of Spatial Association (LISA). The analysis resulted in a significant cluster pattern for small and big-scale modern retail. The LISA analysis indicated the existence of agglomeration in the suburban area, which was the urban growth area with a high-high (HH) cluster of both small and big-scale modern retail. In conclusion, agglomeration in the suburban area was of great concern for policymakers due to the possibility of conflicts arises.



## 1. Introduction

The retail industry in Indonesia is experiencing rapid growth with the utilization of various formats, including four distinct typologies, namely hypermarkets (Carrefour, Giant, and Lotte Mart), supermarkets (Superindo, Alfa Midi), convenience stores (Alfamart and Indomaret), and traditional retail stores (Mcdonald, 2018). Yogyakarta is a city of tourism and education, which attracts population and consequently generates activity, including retail industry. The urbanization in Yogyakarta has expanded to the surrounding areas forming Yogyakarta Urbanized Area (YUA). Yogyakarta City and Sleman Regency are the areas experiencing the fastest urbanization process compared to other regions. These two areas are the leading destinations for migrants (Giyarsih et al., 2013).

The modern retail industry in Yogyakarta contributed about 7% to the gross domestic regional product (GDRP) in 2019 (Statistic of Yogyakarta Municipality, 2020). Besides, it also brings several externalities. The growth of shopping centers or big-scale retail in Yogyakarta has led to issues such as space capitalization, as evidenced by parking lot grabbing and uncontrolled advertising (Rianto, 2020). On the other hand, the growth of convenience stores or small-scale retail has resulted in symmetrical conflict with the traditional one (Santosa & Indroyono, 2011). The local government has implemented a moratorium policy through Sleman Regency Regulation Number 18 of 2012 concerning Licensing of Shopping Centers and Modern Stores, as well as Yogyakarta Mayor Regulation Number 79 of 2010 on Limitation of Franchise Business in Yogyakarta to address these issues. However, the policy has no specific location implementation, which potentially obstructs the regional economy if totally prohibited, considering the retail contribution in GDRP. Furthermore, the presence of modern retail is an unavoidable phenomenon, which makes it crucial to map spatial distribution pattern of modern retail as the basis for implementing the regional moratorium policy. Therefore, the policy can be conducted precisely in specific locations allowing for the harmonious growth of modern retail while mitigating any negative externalities.

Shopping centers and convenience stores are modern retail included as private sector activities that determine their location based on economic benefits to maximize profit (Haryanto et al., 2016). While both types of retail consider market demand when deciding on their locations, they differ in terms of service scale, space capitalization, and availability. It is important to conduct a detailed analysis of the location choices made by big and small retailers to determine the appropriate application of a moratorium policy for each type of modern retail.

Previous research examined the pattern of retail distribution locations in the context of small-scale retail (Poerwati et al., 2019), big-scale retail (Reardon et al., 2002; Turk

& Aydemir, 2010), food retail (Bahn & Abebe, 2017; González-Alejo et al., 2019), as well as catering and accommodation (Xing & Meng, 2020). Ye et al. (2020) examined small and big retail pattern using different spatial analysis, such as Kernel density estimation. Other spatial analyses used in previous research included Kendall's Tahu correlation (Poerwati et al., 2019), spatial metrics (Xing & Meng, 2020), and Moran Index (Liang & Wilhelmsson, 2011; Ozuduru & Varol, 2011; Ruiz-Rivera et al., 2016; Widaningrum et al., 2017). This research examines the spatial pattern using spatial autocorrelation Moran Index (Moran's I) combined with Local Indicators of Spatial Association (LISA), which provides visualization of where the spatial pattern existed.

Identifying the spatial pattern of retail is essential in urban development as it impacts the socioeconomic of the neighbourhood (Araldi & Fusco, 2019). The spatial autocorrelation analysis helps to identify where strategic locations are selected by retailers, which requires determining the area of interest in carrying the policy. Therefore, this research aims to investigate the spatial distributional patterns of both big and small-scale retail. The result of this research can functionally support implementation of the policy, especially moratorium in the context of YUA.

## 2. The Methods

Research on retail spatial distributional patterns was carried out by taking a case study in Yogyakarta City and the surrounding villages traversed by Ringroad. A total of 64 villages were included, consisting of 45, 10, and 9 villages located within Yogyakarta Municipality (red), Sleman Regency (green), and Bantul Regency (yellow), as in Figure 1. This limitation was taken to determine retail distribution patterns in the urban and suburban areas of YUA.

Retail data were obtained through the Department of Licensing Service of Yogyakarta City in 2013. However, due to the limited nature of data, observations from Google Maps were also incorporated. Hypermarkets and supermarkets were classified as big-scale modern retail. As for small-scale modern retail category, data were taken from Alfamart. Indomaret retail data were not included as the locations of the two retails were typically close in proximity, following Hotelling's theory (Seong et al., 2022). Therefore, the presence of one of the two retails represents sample data to analyze the spatial distributional pattern of small-scale retail. The data on the migrant population in 2019 was accessed from the Annual Report Subdistrict in Figures published by Statistics of Yogyakarta Municipality, Statistics of Bantul Regency, and Statistics of Sleman Regency. Information regarding conflicts was obtained from a literature review of previous research and online news sources.

The retail spatial distribution pattern was analyzed using Moran's I and LISA statistics. Moran's I has been widely used to analyze spatial patterns of accessibility (Wang et al., 2019), measures the degree of randomness of urban sprawl (Steurer & Bayr, 2020), and examine the distribution pattern of air pollution (Han, 2020). Meanwhile, the LISA has been used to analyze urban segregation (Ruiz-Rivera et al., 2016) and identify urban sprawl (He et al., 2017).

Moran's I is a statistical tool analysis that can determine whether a particular phenomenon or variable is spatially clustered, dispersed, or randomly distributed in its spatial arrangement. Moran's I has a value ranging from -1 to 1, where values close to 1, -1, and 0 indicate clustered, dispersed, and random patterns, respectively (Han, 2020). The following is the equation for Moran's I.

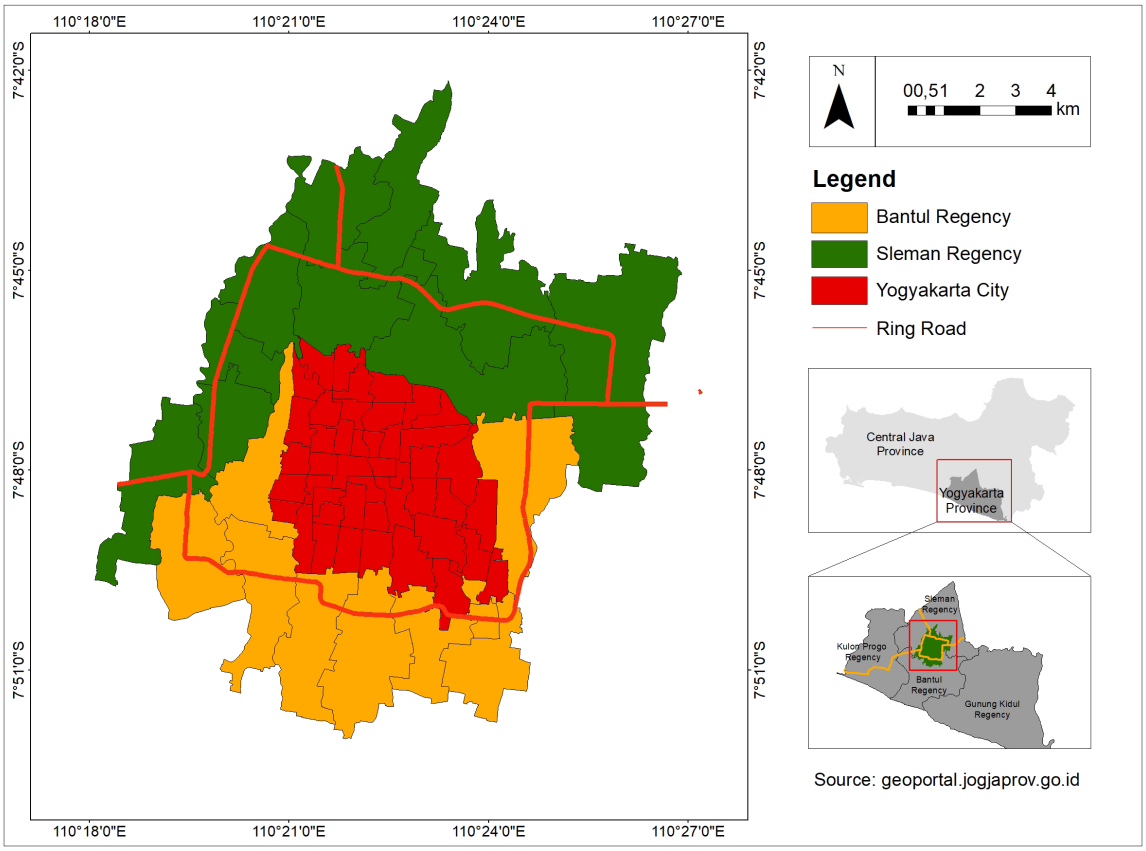



Figure 1. Study area

$$I = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} W_{ij}(z_i - \bar{z})(z_j - \bar{z})}{S_z^2 \sum_{i=1}^{n}\sum_{j=1}^{n} W_{ij}}$$

LISA can analyze the spatial distribution based on the proportion of local variance associated with the distance-weighted mean variance. It provides an overview of the spatial relationship between retails represented in the high-high (HH), high-low (HL), low-high (LH), and low-low (LL) clusters. The following equation is used to calculate LISA:

$$I_i = \frac{\sum_{j=1}^{n} W_{ij}(z_i - \bar{z})(z_j - \bar{z})}{S_z^2 \sum_{j=1}^{n} W_{ij}}$$

$I$ = Moran's I; $I_i$ = LISA; $Z_i$= number of retail located at $i$; $Z_j$ = number of retail at location j or neighbouring; $\bar{Z}$ = average number of retail ; $W_{ij}$ = relationship matrix i and j (weighted matrix); $n$ = number of villages; $S_z^2$ = values of variance. The unit of analysis in this research is 64 villages.

## 3. Result and Discussion

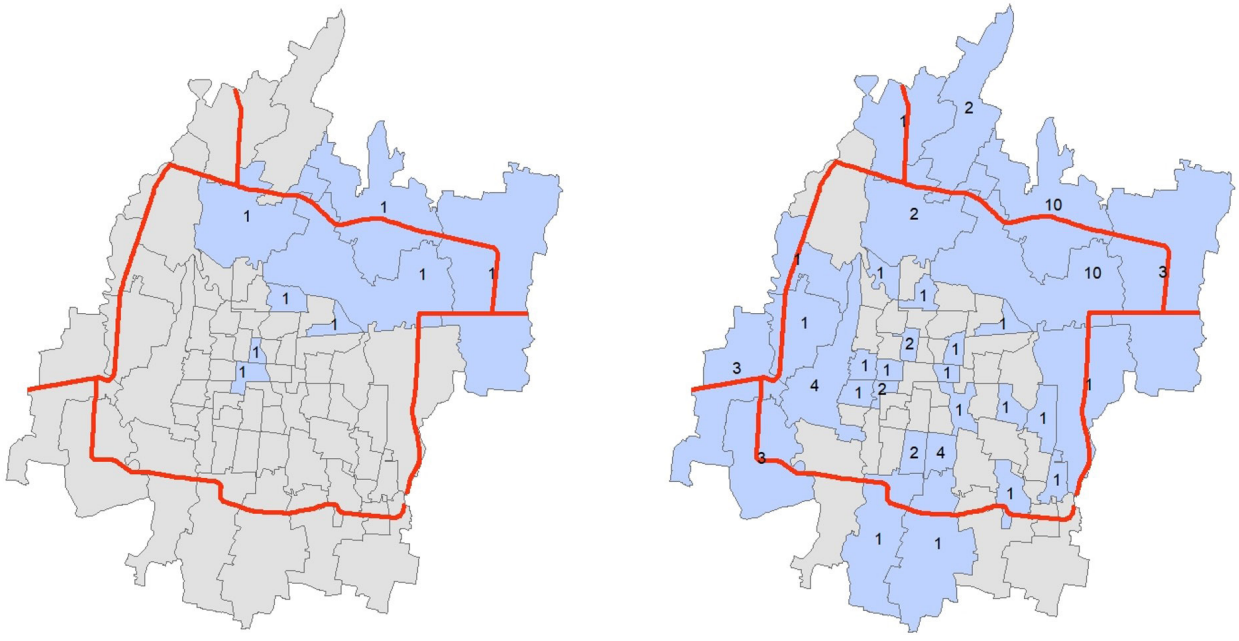
### Spatial Pattern Distribution of Modern Retail

Big-scale modern retail is distributed in the northeast and at the center of YUA, as shown by the blue area in Figure 2(a). This includes several malls, such as Malioboro Mall, Galeria Mall, Plaza Ambarukmo, Lippo Plaza Jogja, Jogja City Mall, Hartono Mall, Ramai Mall, and Sahid J Walk. The mall in the city center, such as Malioboro Mall and Galeria Mall are older than the suburban mall. Malioboro Mall was built in 1993, and Galeria Mall started operating in 1995. Meanwhile, more suburban malls, such as Hartono Mall and Lippo Plaza Jogja opened in 2015. The phenomenon indicates the retail suburbanization process, which explains transition of retailers in selecting the location to build their business towards the suburban area (Bailey, 2023).

The blue area in Figure 2(b) indicates a diverse distribution of small-scale retail businesses in YUA, with a higher number of such businesses located in suburban areas. The number of retail businesses in an area is closely linked to its urbanization level, which reflects the level of consumption activities in the city (Burger et al., 2014). Therefore, it can be inferred that the suburban areas of YUA are undergoing the process of urbanization.

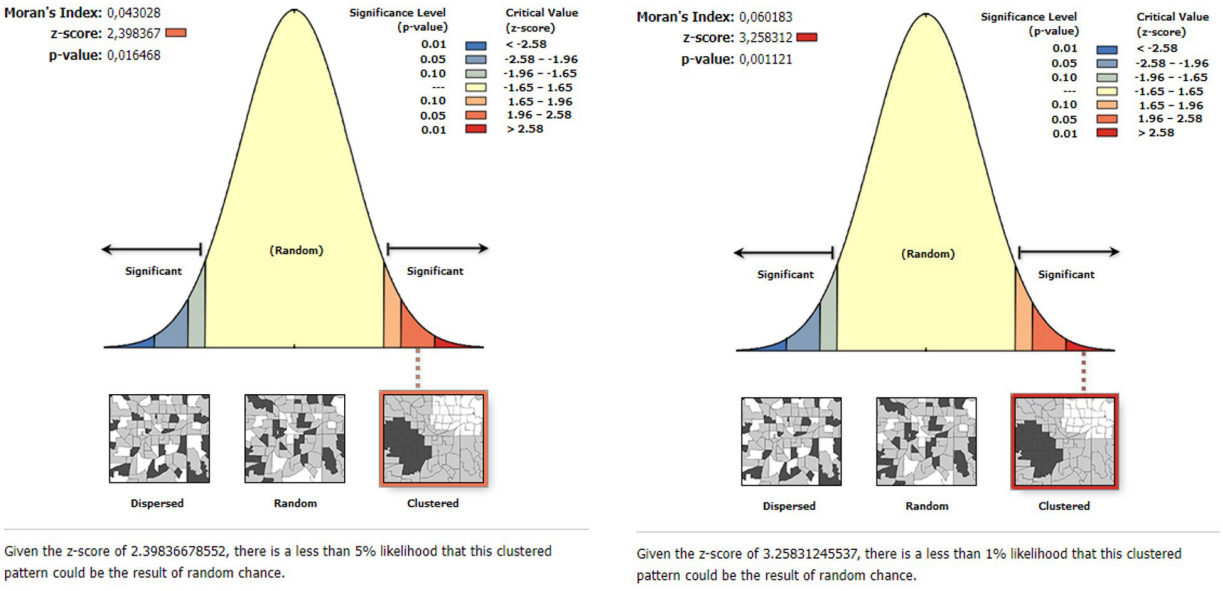
The Moran's I analysis results indicate that both big-scale retail shopping centers and small-scale retail Alfamart exhibit a clustered pattern with the Moran's I values of 0.043028 and 0.060183, respectively. The clustered pattern indicates the existence of agglomeration in both modern retail in some neighbouring areas. Figure 3 (a) shows that the p-value for big-scale retail shopping centers was 0.036792, while the p-value for small-scale retail Alfamart was 0.002914, as indicated in Figure 3 (b). These results indicate that small-scale retails agglomerate stronger than big-scale retail shopping centers.

Figure 4 shows that both retail exhibit a HH cluster pattern in the northeastern area of YUA, as indicated by the pink color. This area encompasses Maguwoharjo, Condongcatur, and Caturtunggal Subdistricts, part of Sleman Regency. The corridor that connects Yogyakarta and Surakarta (Giyarsih, 2012) has influenced the direction of this cluster. This finding supports the result of Moran's I analysis, which shows the existence of agglomerations of both big and small-scale retail in this area. The area is a suburban area with moderate to low compactness (Devi et al., 2020), and it has become the location for the growth of YUA, which is expanding towards the northeast (Wijaya & Umam, 2016). The urbanization process in Sleman and Bantul Regencies occurred directly adjacent to Yogyakarta City (Sudrajat, 2016). These results indicated that modern retailers select suburban areas as their business locations (Kickert & vom Hofe, 2018; Praharsi et al., 2014; Ramírez-Toscano et al., 2022).



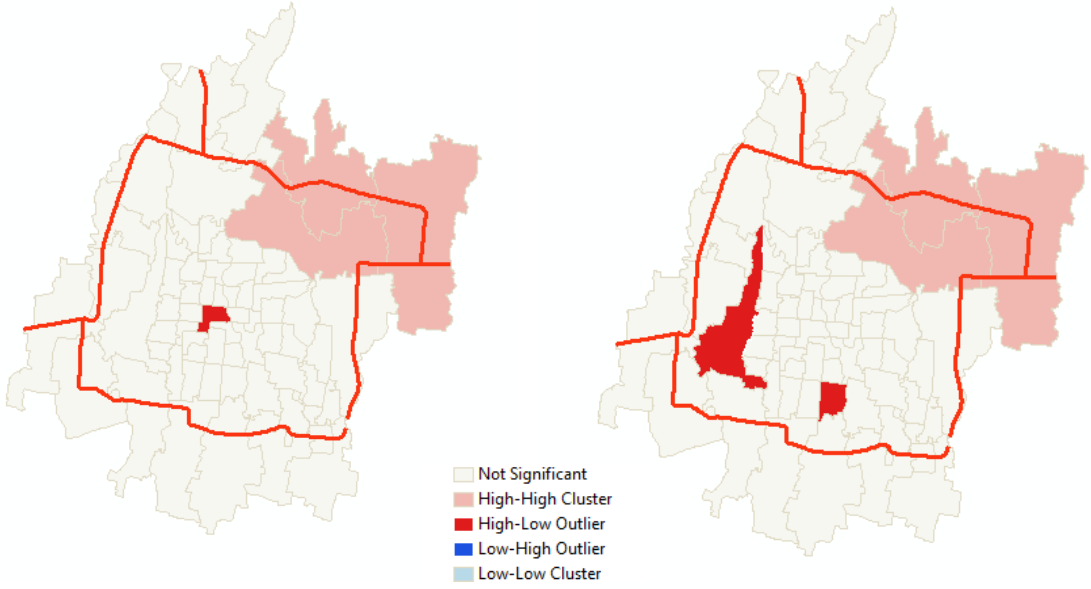
(a) (b)

Figure 2. The Distribution of (a) Big-scale Modern Retail; (b) Small-scale Modern Retail




(a) (b)

Figure 3. Moran's I (a) Big-scale Modern Retail; (b) Small-scale Modern Retail




(a) (b)

Figure 4. LISA Cluster (a) Big-scale Modern Retail; (b) Small-scale Modern Retail

Businesses often cluster together in a specific location, known as spatial agglomeration. This decision is typically based on the belief that it will increase profitability by considering consumers' behavior pattern (Adeniyi et al., 2020). The differentiation in market segmentation between small and big-scale retail further drives this trend, as there is usually little to no competition between them. Small-scale retail serves a lower middle market segment with a smaller threshold, whereas big-scale retail has a middle to upper-class market with a broader market threshold. Previous research also showed that spatial agglomeration could lead to increase productivity (Hochman, 2011; Kim et al., 2021; Yu et al., 2021).

High Low (HL) cluster for big-scale retail also exists in the city center, as indicated by the red color in Figure 4 (a), where a low cluster surrounds a high cluster. The age of retail establishments in the area also plays a role in this cluster. Malioboro Mall, a big-scale retail, was constructed in 1993 and the primary retail destination in Suryatmajan. This suggested that significant retail development had already occurred in the city center.

Big-scale retail that has recently developed is clustered in the northeast area of YUA. This observation supports the hypothesis that land value is a significant driving factor for such activities. Due to the high land value, the city center was not selected for these new big-scale retail establishments. The land value in this area is simply unaffordable for this sector. Additionally, the city center has been designated as a preservation area in the detailed spatial plan of Yogyakarta Municipality, and as such, strict regulation activities are enforced in this area. According to Han et al. (2020), this phenomenon indicates that land value is influenced by city regulation planning.

High-Low (HL) cluster in small-scale retail is situated in the southern and western suburban YUA, particularly in Ngestiharjo and Brontokusuman, indicated by the red color in Figure 4 (b). The decision to select this area is influenced by the growth of YUA but not as strong as the northern area. In addition, the accessibility and land value also played a role in determining the distribution of HL cluster. The primary collector road Yogyakarta-Kebonagung 1 internode and Yogyakarta-Bakulan internode pass through these two villages, facilitating easy consumer access (Black et al., 2011).

Spatial distribution analysis of the migrant population corroborates why retail has recently developed in suburban areas. The analysis showed that they tend to settle clustered in the northeastern suburban area, as shown in Figure 5 (a) and spatially represented in Figure 5 (b). The agglomeration also existed in Ngestiharjo, highlighted in red in Figure 5(b), which explains why the small-scale retail selected this area to build the business. Suburban areas typically have high settlement growth and dynamic lifestyle (Erkip & Ozuduru, 2015), which attract the migrant population. The area become the high potential consumer market, and the efficiency concept encourages retailers to select locations approaching consumers.

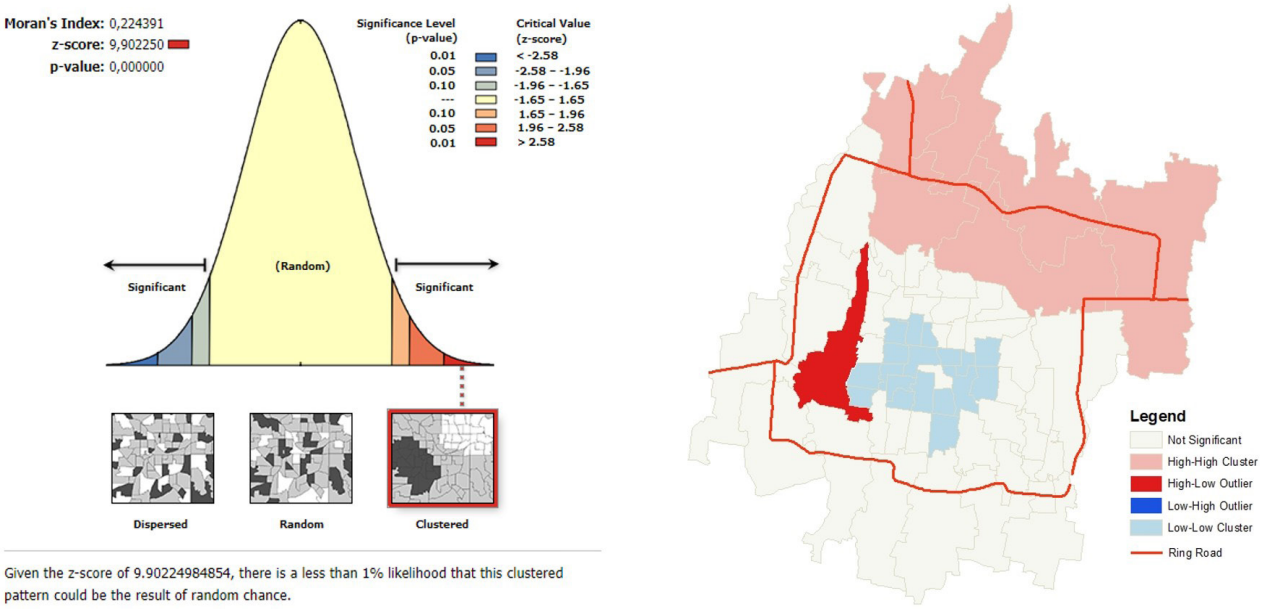
The development of modern retail contributed to shaping the urban structure (Blazy & Łabuz, 2022; Erkip & Ozuduru, 2015). The influence of retail on city growth is particularly strong in concentric cities, as opposed to polycentric ones. This is due to the market fragmentation competition and the distance between retail centers (Burger et al., 2014). Yogyakarta is an example of a concentric city with a ring road structure that promotes concentric growth. However, the retail suburbanization process can potentially contribute to urban sprawl (Pojani, 2011). Urban sprawl has several negative impacts on environmental deterioration, such as increased $CO_2$ emissions (Han, 2020), the conversion of agricultural land and forests (Kurnianti et al., 2015), and the emergence of slum areas, poverty, and unemployment, which are social problems caused by urban sprawl.

## Area of Interest for Conducting Policy

The suburban area in the northeastern YUA is the location of retail agglomeration, both on big and small-scales modern retail. The HH and HL clusters should be the area of interest for policy implementation concerns. In HH cluster both big and small-scale retail have the exact location, while in HL, big retails are found in the city center. The HL cluster for small-scale retail is in southern and western suburban area. The potential for conflict between modern and traditional retails is likely to occur in this area because of the conflict of interest. Izza (2010) revealed that traditional retail, specifically traditional groceries, experienced negative impacts after the opening of Ambarukmo Plaza in Caturtunggal. In 2014, "Kelompok Pengusaha Kecil Selokan Mataram (KPKSM)" protested against the construction of a new mall in Caturtunggal (TribunJogja, 2014). Additionally, there was an issue of traffic congestion in agglomeration areas which arose from the activity generated by big-scale retail (Sari, 2019). The development of big-scale retail requires a comprehensive analysis because the impact on the surrounding environment is greater complex than the small one (Erkip & Ozuduru, 2015).

In 2015, a group of residents from Maguwoharjo known as "Forum Pedagang Pugeran dan Krodan (FPPK)" held a protest against the establishment of two small-scale modern retail stores (Kuniawan, 2015; Nursalikah, 2015). The residents rejected the proposal as they believed it would negatively impact their shops and groceries, which had already seen a decreased turnover. Area with HL cluster also requires to be the area of interest both big and small-scale retail. In 2016 there was a conflict between residents with the Malioboro Mall due to the land disputation for parking allocation (RadarJogja, 2016).

Planning and regulation effectively translate collective interests (Fernandes & Chamusca, 2012). The current retail moratorium policy can be carried out more precisely in this agglomeration area. This agglomeration mapping needs to be supported by other strategies to create regional activity opportunities for modern and traditional retails. The Mayor




(a) (b)

Figure 5. Moran's I for Migrant Population (a); LISA for Migrant Population (b)

of Yogyakarta has issued Regulation Number 56 of 2018 to govern the development of minimarket businesses, including provisions for the distance of modern retail establishments. Based on the research's findings, it is recommended to enforce the policy in areas where modern retail growth has reached overcapacity and become retailer's main center of interest.

Modernization has led to the rise of modern retail, which is unavoidable. However, the existence of traditional retail also needs to be preserved. Transitioning to a modern retail environment gradually can create problems such as limited food access (Reardon et al., 2002; Reardon et al., 2003; Reardon & Hopkins, 2006). The growth of modern retails also contribute in shaping urban sprawl regarding the growth of market location. Therefore, regulation must adopt an inclusive approach that accommodates both modern and traditional retails that coexist (Berger & van Helvoirt, 2018). Further research is required to determine what regulation can address competition between retails.

## 4. Conclusion

The spatial distributional pattern of modern retail is related to the urban growth of the YUA. Small and big-scale retail showed similar spatial clustering patterns, with both predominantly located in the northeastern part of Yogyakarta City towards Sleman Regency. This indicates a relationship between big and small-scale retail agglomerations. Small-scale retail agglomeration was more significant than big-scale retail, indicated by a more significant small retail p-value. The retail agglomeration location was a growing area in the suburban area of YUA, which expanded towards Sleman Regency. Therefore, potential conflicts between modern and traditional retails could be mapped spatially, allowing for a more targeted implementation of the moratorium policy.

Further research is required to analyze both relationships using time-series data on population density and retail development. The traditional retail distribution needs to be mapped to compare with modern retail, hence, the evidence of the conflict is apparent. Additionally, Geographically Weighted Regression (GWR) can be used to comprehensively analyze the factors that influence retail growth. These steps will allow for a more comprehensive policy arrangement to address the issues identified.

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