



The Process of Public Space Activation through Grey Space and Lingering Space in Semarang's Old Town

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Abstract

Heritage revitalization commonly emphasizes physical improvements, while the socio-spatial processes that shape the vitality of public space remain insufficiently explained in relational terms. This study examines how the configuration of grey space generates lingering conditions as part of the process of public space activation in Semarang's Old City. An exploratory case-study approach was employed, using structured spatial observation and behavioral mapping, to identify morphological typologies and patterns of temporary-staying activities. The findings indicate that edge quality, spatial subdivision, scale proportion, shading, and connectivity with active functions contribute to longer durations of lingering. However, this relationship is not deterministic, rather, lingering intensity is shaped by the interplay between spatial configuration and temporal dynamics. Lingering functions as a transitional phase linking morphological structure and social interaction, thereby supporting the vitality of public space in a gradual, contextual manner. This study positions grey space as an analytical framework for understanding the relational process of public space activation in heritage contexts, extending the discourse beyond purely physical and descriptive approaches toward a more process-oriented perspective.

Keywords : grey space, heritage district, lingering space, public space activation, Semarang

Proses Aktivasi Ruang Publik melalui Grey Space dan Lingering Space di Kawasan Kota Lama Semarang

Abstrak

Revitalisasi kawasan heritage umumnya berfokus pada penataan fisik, sementara proses sosial-spasial yang membentuk vitalitas ruang publik belum banyak dijelaskan secara relasional. Penelitian ini menganalisis bagaimana konfigurasi grey space membentuk kondisi lingering sebagai bagian dari proses aktivasi ruang publik di Kota Lama Semarang. Studi kasus eksploratif dilakukan melalui observasi spasial terstruktur dan behavioral mapping untuk mengidentifikasi tipologi morfologis serta pola dan intensitas aktivitas tinggal sementara. Hasil penelitian menunjukkan bahwa kualitas edge, subdivisi spasial, skala ruang, naungan, dan keterhubungan dengan fungsi aktif berkontribusi terhadap kemunculan lingering berdurasi lebih panjang. Namun, hubungan tersebut tidak bersifat deterministik; intensitas lingering dipengaruhi oleh kombinasi kondisi spasial dan dinamika temporal. Lingering berperan sebagai fase transisional yang menjembatani konfigurasi morfologis dan interaksi sosial, sehingga mendukung vitalitas ruang secara bertahap dan kontekstual. Penelitian ini menempatkan grey space sebagai kerangka analitik untuk memahami proses aktivasi ruang publik secara relasional dalam konteks kawasan heritage.

Kata-kunci : aktivasi ruang publik, grey space, kawasan heritage, Kota Lama Semarang, lingering space

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Introduction

Over the last two decades, the revitalization of heritage areas has largely been characterized by physical restructuring, visual enhancement, and the reinforcement of place identity. Semarang's Old Town exemplifies this trajectory through a series of interventions, including corridor reorganization, pavement improvement, traffic management, and the strengthening of commercial and tourism functions. As one of the most significant heritage districts in Semarang, the area has attracted increasing scholarly attention, particularly in relation to conservation, tourism development, and urban revitalization.

Existing studies on Semarang's Old Town have made important contributions to understanding the area as a heritage landscape, yet they have largely done so through perspectives that emphasize preservation, governance, perception, and historical transformation. Yuliati et al. [1] examined Semarang's Old Town as a cultural asset oriented toward UNESCO recognition, focusing on its historical significance, conservation strategies, and the strengthening of its outstanding universal value. Their study is particularly important for situating the area within a heritage-protection agenda, rather than for addressing the everyday functioning of its public open spaces. Hardiansyah et al. [2] examined revitalization as a strategy for stimulating economic activity and restructuring the area. Their analysis is valuable in explaining the socio-economic implications of revitalization and related governance issues, but it is not specifically concerned with public open spaces as settings of routine social use. Dameria et al. [3] examined the dimensions of sense of place and conservation behavior intentions among both building owners and visitors in Semarang's Old Town. Their findings indicate that the association between these dimensions was relatively weak, which was attributed to the area's still material-oriented approach to tourism. While this study offers insight into perceptions and conservation-related attitudes, its analytical emphasis remains on subjective evaluation rather than on directly observed spatial practices. Meanwhile, Prabowo et al. [4] employed the Historic Urban Landscape (HUL) approach to trace the chronological layers of the area's physical development. This work substantially enriches the understanding of the area's historical and morphological transformation, but it does not extend to examining how spatial form relates to the everyday occupation of public open space.

Taken together, these studies demonstrate that Semarang's Old Town has primarily been examined as

an object of preservation, revitalization policy, social perception, and historical-morphological interpretation. Far less attention has been given to the everyday spatial performance of its open public spaces, particularly to the ways in which their physical configuration may support temporary staying, stopping, and informal social interaction. This issue is especially significant in a revitalized heritage district, where paved open spaces do not merely serve circulation or visual functions, but also operate as settings for encounter, pause, and social presence. Understanding this relationship is essential for explaining how public-space vitality is produced in everyday urban life.

In this study, public-space vitality is understood not only as the presence of activity, but also as the continuity of use, the emergence of social interaction, and the capacity of space to support everyday engagement [5][6][7]. Within this perspective, paved open public spaces become analytically important because they often function as the main interface between movement, waiting, observation, and informal encounter [7]. The term green-grey is commonly used to distinguish vegetated open spaces from those dominated by hard, impermeable surfaces [8]. However, this study does not use grey space as a purely quantitative category within that dichotomy. Rather, grey space is positioned as a morphological typology of public open space characterized by hard surfaces, spatial openness, and the articulation of boundaries [9].

As an analytical category, grey space is examined through several morphological qualities: circulation connectivity, enclosure, edge quality, shading, scale, and the relationship to active surrounding functions. Circulation connectivity refers to the degree to which a space is linked to pedestrian movement networks and adjacent destinations; enclosure refers to the extent to which spatial boundaries provide orientation, protection, and a sense of room-like definition; and edge quality refers to the character of the boundary condition, especially where facades, steps, columns, terraces, or other transitional elements support lingering and observation [10][11][12]. Within this framework, lingering behavior is understood as temporary staying, pausing, sitting, waiting, or watching that exceeds mere passage. Accordingly, lingering space in this study refers to the spatial condition that enables such temporary occupation to occur.

Accordingly, this study investigates how the configuration of grey space creates lingering

conditions that contribute to public-space vitality in Semarang's Old Town. To address this objective, the study identifies the typologies and morphological characteristics of grey space, examines patterns and intensities of lingering, and interprets the relationship between spatial configuration and activity dynamics as a mechanism of public-space activation. Building on this framework, this study argues that public space vitality is shaped not only by the presence of activity, but also by users' tendency to pause and temporarily occupy space. Within this perspective, lingering space is conceptualized as the spatial condition that supports temporary staying behavior. This concept is informed by Gehl's notion of staying activities, which he identifies as an indicator of public-space quality [11].

Methods

This study employs an exploratory case-study approach within a constructivist paradigm. This approach was selected because the research aims not only to describe the physical form of space, but also to understand how space is produced and interpreted through social practices. Within the constructivist paradigm, reality is understood as a contextual social construction [13]. Meanwhile, a qualitative approach is used to explore the meanings that individuals construct in relation to particular phenomena [14].

In this study, the vitality of public space is approached as a socio-spatial phenomenon formed through the relationship between spatial configuration and social practice. That relationship is identified through a step-by-step analysis consisting of: (1) identification and classification of grey-space typologies based on morphological characteristics (openness, enclosure, edge articulation, shading, and circulation connectivity); (2) behavioral mapping to record patterns, duration, and intensity of lingering; and (3) interpretive comparison using a cross-reference matrix to identify recurring connections between spatial characteristics and observed activity patterns. A comparative approach across typologies is used to understand how lingering tendencies vary across different spatial configurations.

In addition, visual overlay was used as an analytical step to compare the spatial configuration map with the mapped distribution of user activities in order to identify concentration points or clusters of lingering behavior. The visual overlay used in the analysis related these mapped activity patterns to the morphological structure of grey space. Through typological comparison, cross-reference reading, and visual overlay, this study examines how the

morphological conditions of grey space support the formation of lingering space and thereby contribute to the vitality of public space.

Method of Collecting Data



Figure 1. Map of the Old Town area and the Heerenstraat road corridor as the research location. Source: Google maps, with author development, 2024

The study was conducted in Semarang's Old Town with a particular focus on the Heerenstraat corridor and its surrounding open public spaces as the main observation area. Figure 1 shows the location of the research area within the Old Town and the position of the Heerenstraat corridor as the primary spatial setting of the study. The location was selected because it represents one of the most active revitalized heritage corridors in the area, where pedestrian movement, commercial activity, and temporary occupation of public space occur intensively. The research data were collected through structured spatial observation and behavioral mapping conducted over four days, covering both weekdays (two days) and weekends (two days), in order to capture variations in the intensity of space use. Observations were undertaken during two daily periods, namely 09:00–13:00 WIB and 16:00–19:00 WIB, representing lower-activity periods and peak visitation periods. All observations were conducted under sunny to cloudy weather conditions, without rain, in order to maintain consistency in the reading of spatial behavior. Structured spatial observation was used to identify the physical configuration of grey space, including spatial form, boundaries and enclosure, pavement materials, shading elements, circulation connectivity, and relationships with surrounding buildings and functions.

Behavioral mapping was used to record activity types, interaction patterns, dwell-time tendencies, and the spatial distribution of users. The observation employed a 10-minute interval scan-sampling technique, in which periodic visual scans were carried

out to identify patterns of presence and tendencies toward lingering behavior in each spatial zone. Duration of stay was estimated based on the length of time an individual remained present within the observation cycle, with minutes used as the analytical reference. For analytical purposes, duration was classified into short stays (less than approximately 5 minutes), medium stays (approximately 5–15 minutes), and relatively long stays (more than approximately 15 minutes). Activity intensity was not measured as an absolute number of users, but interpreted qualitatively based on the relative density, recurrence, and consistency of activity across observation intervals. Low intensity indicates sporadic activity involving few users and limited spatial concentration; medium intensity indicates repeated activity with moderate user presence and more stable spatial distribution; and high intensity indicates consistent activity with relatively dense user concentration and wider spatial occupation. These categories were used as interpretive levels for comparing activity tendencies across grey space typologies.

To clarify the behavioral-mapping procedure, Figure 2 illustrates the recording of user position, activity type, and duration tendency within the observed spatial zones. This mapping forms the basis for identifying the distribution and concentration of lingering behavior in relation to the morphological characteristics of grey space.

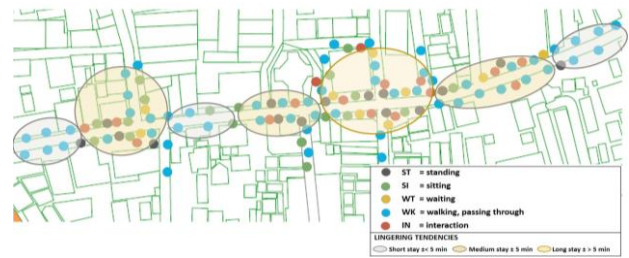


Figure 2 Overlay mapping of user position behavior, activity type, and lingering duration tendencies along the *Hereenstraat* corridor. Source: Google maps, with author development, 2024

Field photographs, Figure 3, 4, 5, 6, 7 and Figure 8, were used as visual documentation to support the interpretation of spatial conditions and to verify activity patterns identified through behavioral mapping. The photograph documented selected grey space typologies, including their boundary conditions, shading elements, edge characteristics, and the presence of temporary staying activities.

To clarify how the main concepts of the study were translated into observable indicators and analytical parameters, Table 1 presents the operationalization of the key research concepts. The table links the conceptual framework of the study with the observational focus used in the field, including morphological observation, behavioral mapping, and interpretive relational reading. Table 2 further specifies the grey space typologies and morphological characteristics used in the first stage of analysis. It

Table 1. Operationalization of Research Concept

No	Concept	Concept Definition	Operational Indicators	Observation Parameters
1	Grey space	Paved public open space that provides flexibility for everyday social activity.	Spatial size and form; paving material; presence of edge elements; enclosure; relationship to active surrounding buildings/functions.	Morphological observation and visual documentation.
2	Lingering Space	Spatial condition that encourages users to stay temporarily and engage in social interaction.	Duration of stay; type of activity (sitting, talking, waiting, observing); intensity of interaction; spatial distribution of activity.	Behavioral mapping
3	Public space activation	The degree of spatial vitality indicated by the continuity and diversity of social activity.	Relative density of activity; diversity of activity; continuity of use across observation periods.	Interpretive synthesis of grey space and lingering patterns.

Table 2. Grey Space Typology and Morphological Characteristics

Grey Space Typology	Morphological characters	Enclosure & edge	Active Function Relations	Shade	Temporal Variations
Open Plaza	Large field, minimal subdivision	Weak	Limited	Minimal	Activity increases in the evenings & weekends
Heritage Building Yard	Medium-sized field, limited active facade	Strong (edge support)	Directly connected to cafes, restaurants, or galleries	Present	Consistently higher in the afternoon
Paved Corridor	Medium field, limited active facade	Moderate	Partial	Limited	Fluctuates depending on traffic regulations

provides the basis for identifying and classifying the observed spaces according to their spatial attributes, including accessibility, enclosure, edge quality, paving, and relationship to surrounding functions.

Data Analysis Method

Based on the research concepts presented in Table 1, the data were analyzed through three interpretative stages. First, grey space was identified and classified according to its morphological characteristics, including typology, accessibility, enclosure, edge quality, paving, and relationships with surrounding functions. This stage produced the typological categories used for comparison across the observed spaces.

Second, behavioral mapping data were examined to identify patterns of lingering based on duration, activity type, interaction intensity, and spatial distribution. The results were organized into distribution maps and interpretive categories of lingering tendencies for each grey space typology.

Third, spatial characteristics and activity patterns were read together through a cross-reference matrix and visual overlay. This stage was used to identify recurring connections between morphological conditions and lingering tendencies, as well as the concentration of activity in particular locations. Through these stages, the analysis moved from descriptive classification toward an interpretative understanding of how grey space configuration relates to everyday spatial practices.

Synthesis Method

The synthesis stage integrated the results of spatial and behavioural analysis into a coherent explanation of public space activation. Within a constructivist framework, synthesis was carried out by bringing together the grey space typologies, the identified lingering patterns, and the recurring connections found through cross reference reading and visual

overlay. Through this process, the study developed a conceptual model showing how the configuration of grey space creates conditions that support lingering, and how lingering may develop into social interactions and spatial vitality. In this way, the synthesis moved beyond separate descriptions of space and activity toward an integrative understanding of how physical space and social practices shape one another in the heritage setting of Semarang's Old Town.

Result and Discussion

The grey space in the *Heerenstraat* corridor can be classified into three main typologies: open plazas, heritage courtyards, and paved corridors. The typology characteristics of Grey Space, as follows:

1. Open Plaza

Open plazas are characterized by large paved surfaces, weak spatial boundaries, and limited vertical elements. Morphologically, these spaces tend to be open and centrally positioned, allowing flexibility for circulation, gathering, and short-term collective activities. However, their openness often reduces the sense of protection and spatial orientation needed to support longer stays.

This condition is visible in Figure 3 and Figure 4. Figure 3 shows an open plaza that supports temporary gathering and photo-taking activities on a broad paved surface with relatively weak spatial boundaries. Figure 4 shows the plaza functioning as a flexible space for gathering, waiting, and movement-related activity. In both cases, the space accommodates a range of lingering durations, from short to long, depending on the presence of collective activity, temporary occupation, and more comfortable shaded areas.

Theoretically, enclosure and edge quality are important in creating safety, comfort, and visual orientation [15]. Spaces that are overly open, without clear boundaries, tend to reduce users' tendency to stay, although in this study open plazas could still

support longer-duration lingering under certain conditions.



Figure 3. The open plaza supports temporary gathering and photo-taking activities on a broad paved surface with relatively weak spatial boundaries. Lingering duration tends to be short to long



Figure 4. The open plaza functions as a flexible space for gathering, waiting, and movement-related activity. Lingering durations tends to range from short to long, with longer stays more likely to occur in shaded areas or during collective activities

2. Heritage Building Yard

This typology refers to public open spaces located in front of or alongside heritage buildings and directly associated with active frontages, such as cafes, galleries, and other commercial or public functions. The presence of openings, terraces, and transitional elements between interior and exterior spaces creates strong edge conditions that support temporary staying. This condition is visible in Figure 5 and Figure 6. Figure 5 shows a heritage building yard in front of prominent heritage façades, functioning as an open public forecourt that supports pedestrian pause, temporary gathering, and short to medium lingering. Figure 6 shows a heritage building yard associated with active frontage and corner – side access, creating a more visible and accessible setting for temporary staying. In this setting, the relationship between the building edge, pedestrian route, and surrounding activity supports pausing, observing, and lingering more comfortably.

Users of public space tend to prefer areas with edge support, such as walls, stairs, or columns, because these elements provide a sense of protection and opportunities to observe surrounding activities [12]. This interpretation is further supported by the tendency of public spaces with informal seating element and microclimatic protection to encourage staying activities [11]. In this study, the courtyard of the heritage building exhibits the highest intensity of lingering among the identified typologies.



Figure 5. Heritage building yard in front of prominent heritage façade, showing an open public forecourt that supports pedestrian pause, temporary gathering, and short to medium lingering



Figure 6. Heritage building yard associated with active frontage , edge support, and corner-side accessibility, creating favorable conditions for pausing, observing, and lingering

3. Paved Road Corridor

Paved road corridors demonstrate the dynamic relationship between circulation and social activity. Morphologically, these spaces are linear, directly connected to movement routes and framed by buildings edges, sidewalks, and street furniture. Their primary function is circulation, yet under certain conditions they can also accommodate temporary staying.



Figure 7. Paved road corridor supporting pedestrian movement, brief pauses, and small-scale activity along a heritage frontage. Lingering duration tends to range from short to medium



Figure 8. Paved road corridor with stronger shade and edge support, allowing waiting, resting, and temporary staying along the building edge. Lingering duration tends to range from short to medium

These conditions are visible in Figure 7 and Figure 8, shows a paved road corridor along a heritage frontage where pedestrian movement, brief pauses, and small-scale interaction occur alongside the circulation. Figure 8 shows a similar corridor with stronger shade and edge support, where users occupy benches and building edges for waiting, resting, and temporary

staying. In both cases, lingering duration tends to range from short to medium, indicating that the corridor functions not only as a transit space, but also as a temporary social space.

This transformation indicates that grey space is adaptive and can change its function in response to traffic restrictions and spatial comfort. Conceptually, this aligns with the understanding of public space as a social space produced through everyday practices [16].

Table 3. Lingering patterns in various grey space typologies

Grey Space Typology	Dominant Activity Type	Dominant Duration	Relative Intensity	Distribution Pattern	Complexity
Open Plaza	Informal sitting, taking photos, waiting	Short - long	Low - medium	Centered along the edge	Fluctuating
Heritage Courtyard	Sitting, conversation	Short - medium	Low-medium	Concentrated on the edge	Uneven
Corridor	Small talk, waiting	Short	Short - medium	Dispersed	Contextual

These typology classifications are based on the character of the enclosure, the relationship to active functions, shade, and variations in temporal use, as summarized in Table 3. The main differences between the typologies lie in the quality of the edges and the relationship to active functions. Heritage courtyards have the strongest edge condition because they directly border active facades such as cafes and galleries. In contrast, open plazas have weak enclosure due to spatial boundaries, such as differences in floor elevation and sometimes rows of plants. However, the findings indicate that these morphological characteristics do not automatically result in the same level of activity. The open plaza, while flexible, tends to be used as a transit space during weekday hours. Activity increases in the evenings and weekends, indicating the influence of temporal rhythms on the space's performance. Thus, the physical configuration provides potential, but its actualization is contextual. These findings suggest that grey space has varying relational potential depending on its configuration and temporal context.

Lingering Pattern and Intensity

As shown in Table 3, the analysis was conducted comparatively across grey space typologies, showing that differences in lingering patterns extend beyond dominant duration to include relative intensity and the quality of user engagement. In Table 3, relative

intensity is used as an interpretative category to describe the relative frequency and recurrence of lingering within each typology, rather than as a statistical measure. Relative intensity indicates the relative frequency and recurrence of lingering observed within each grey space typology. It is used as an interpretative category rather than as a statistical measure. Open plazas tend to accommodate a wider range of lingering duration, from short to long, with relatively low to medium intensity and a more scattered pattern of occupation. Lingering in this typology generally occurs when collective activities, temporary occupation, or shaded areas encourage users to remain in place. By contrast, heritage courtyards more often show short to medium lingering with similarly low to medium intensity, but in a more spatially supported manner due to stronger edge conditions, and closer relationship to active building frontages. In open plazas and paved road corridors, lingering is more likely to occur in areas supported by specific physical elements, such as shade, building edges, or street furniture, while the more central and homogeneous parts of the space function primarily as routes for passing through.

Public space activities can be classified into three categories, namely necessary optional, and social, [11]. Within this framework, passing through is considered a necessary activity and is therefore relatively independent of spatial quality. In contrast, lingering is treated in this study as an optional activity that may develop into a social activity when the space offers comfort, protections, and opportunities for interaction.

Table 4. Spatial configuration and lingering intensity relationship matrix

Spatial Variables	Plaza	Heritage Courtyard	Corridor	Interpretation
Edge condition	Weak - Low lingering	Strong - High Lingering	Moderate - fluctuating	Edge reinforces the tendency to stay
Shade	Minimal - Short duration	Present - longer duration	Limited	Protection increases length of stay
Spatial Scale	Too wide - transit	Proportional - support staying	Linear - transit dominant	Scale affects staying tendency and spatial relatedness
Active Function	Limited	Directly connected	Partial	Surrounding activities strengthen lingering

Tables of 2, 3, and 4 were derived from the cross - reference matrix analysis and present the comparative reading between grey space morphology and lingering patterns. Table 4, in particular, shows that typologies with strong edge qualities and clear spatial

subdivisions tend to support longer-lasting lingering and richer forms of user engagement. However, not all lingering develops into active social activity, some forms remain relatively passive, such as sitting, waiting or observing. This suggests that spatial quality increases the likelihood of optional activities, but does not deterministically lead to social activities. Thus, the relative intensity of lingering in this study is understood as an early empirical indicator of public space activation, marking a shift from transit-oriented use toward deeper engagement. This activation is gradual and contextual, depending on the interaction between the physical configuration of space and the social practices occurring within it.

The Relationship between Grey Space Configuration and Lingering

As derived from the cross-reference matrix analysis and summarized in Table 4, the relationship between the spatial configuration of grey space and the intensity of lingering is not shaped by a single factor. Rather, it emerges through the interplay of edge conditions, shading, spatial scale, and connections to surrounding active functions.

1. Edge condition

Heritage courtyards emerged as the spatial element most consistently associated with moderate to high levels of lingering. Characterized by clear physical and visual boundaries, such as building facades, columns, or elevation changes, these spaces provide a sense of protection and spatial orientation. This interpretation is consistent with the observation that users tend to prefer positions along the edges of a space rather than in the center of an open area [12]. By contrast, plazas with weak edge definition are more likely to accommodate brief transit and shorter-duration lingering.

2. Shading elements

These elements appear to enhance dwell time. In spaces that combine natural and artificial shading, users tend to remain longer. This indicates that lingering, as an optional activity, is strongly influenced by the comfort quality of the space [11].

3. Space scale

Spatial scale and proportion of enclosures influence users' willingness to stay. Plazas with excessively large scales tend to be dominated by passing activity, whereas courtyards with more measured proportions show a more stable distribution of lingering. In linear corridors,

lingering patterns tend to fluctuate and depend on specific points that offer additional spatial support.

4. Active function

Connections to active functions, especially commercial activities and the informal economy, tend to increase the intensity of lingering. Spaces directly connected to economic activity are more likely to support more vibrant forms of social engagement. However, this relationship is not deterministic. Some corridor segments show increased lingering when temporary activities emerge, despite relatively weak enclosure. Conversely, courtyards with strong enclosure but limited surrounding activity support may exhibit lower intensity

Overall, the cross-reference matrix results presented in Table 4 indicate that no single spatial factor automatically produces lingering. Instead, lingering emerges through the combined influence of edge quality, shading, spatial scale, and connections to active functions. This suggests that relationship between grey space configuration and lingering is multidimensional and non-linear, shaped by the interaction between physical setting and situated social practice over time.

These findings indicate that lingering does not emerge from a single spatial factor, but from the combined influence of typological conditions, observed activity patterns, and their relational configurations. For this reason, a synthesis stage was undertaken to integrate the result presented in Tables 2, 3, and 4 into a coherent explanation of public space activation. This stage was intended to clarify how grey space configuration creates conditions for lingering, and under what circumstances lingering may develop into social interaction and contribute to spatial vitality.

Public Space Activation Process

Based on the integration of the typology classification results (Table 2), lingering patterns (Table 3), and the relational matrix (Table 4), the process of public space activation in grey space can be understood as a series of contextual, emergent stages. This synthesis is summarized in Table 5.

As shown in Table 5, the first stage is grey space configuration, namely, the morphological conditions that shape initial spatial opportunities. Elements such as edge quality, shading, spatial scales, and connections to surrounding functions provide the basis for comfort, orientation, and temporary occupation. However, these conditions only create

potential; they do not automatically generate social activity.

Table 5. Synthesis of public space activation process

Stage	Empirical indicators	Supporting Conditions	Resisting Conditions
1. Grey Space Configuration	Edge, shade, scale	Edge, shade, scale	Edge, shade, scale
2. Lingered Emergence	Medium-long duration	Edge support & active function	Dominant transit
3. Development of Interaction	Small group conversation	Temporal consistency	Temporary activities
4. Vitality of Space	Continuity of activities	Stability of use	Extreme fluctuations

The second stage is lingering emergence, marked by a shift from transit-oriented use toward temporary staying. At this stage, users begin to pause, wait, sit, or observe, indicating that the space is no longer used solely for movement. Lingering emerges when a space is not only passable, but also temporarily habitable. However, the dominance of transit flows or limited spatial support, or weak connections to surrounding activities may constrain this stage.

The third stage is interaction development, when lingering begins to evolve into conversations, shared observations, or small-scale social engagement. Not all lingering progresses to this stage. The continuity of interaction depends on the consistency of use, the presence of other users, and the degree of support offered by the surrounding spatial and functional setting. When activity remains temporary and unstable, interaction is less likely to be sustained.

The fourth stage is the formation of spatial vitality, characterized by the continuity and diversity of activities over time. In this study, vitality is understood not as a fixed condition, but as the accumulated result of repeated and mutually reinforcing practices. At the same time, vitality may weaken when the use of space depends too heavily on temporary events or fluctuates too sharply over time.

Thus, the process of public space activation is neither linear nor automatic. As illustrated in Figure 9 the morphological configuration of grey space first creates conditions of comfort and connectedness, which open the possibility for lingering to emerge. Lingering then acts as a transitional phase between transit-oriented use and deeper forms of engagement, and may develop into social interaction and spatial vitality when adequate spatial and temporal support is present. In this sense, public – space activation results

from a dynamic relationship between morphological structure and everyday social practice.

The study also shows that the process is contextual and non-deterministic. Grey space configuration does not function as a sole cause, but as a condition of possibility. The actualization of social activity depends on the interaction between edge quality, shading, spatial connectedness, active surrounding functions, and the temporal dynamics of use. Lingering therefore serves as an early empirical indicator of activation, marking the shift from a predominantly transit space toward one with social potential. Within the Indonesian heritage context, this process shows distinctive characteristics. In Semarang's Old Town, public open space is used in an adaptive and overlapping way, where circulation, tourism, informal occupation, and everyday social interaction often coexist. This indicates that spatial vitality in heritage areas is shaped not only by formal design, but also by flexible and negotiated patterns of everyday use.

This interpretation is consistent with the view that public open spaces function not merely as physical setting, but also as social arenas shaped by user engagement [17]. It is further supported by findings showing that the use of public space is influenced by physical characteristics such as active edges, seating, shade, and visual relationship with surrounding functions [18]. In this study, the analyses in Tables 2 and 4 similarly suggest that edge quality, spatial subdivision, and connections to active functions support the emergence of lingering and the gradual activation of space.

Accordingly, the findings do not indicate a deviation from the theoretical framework. Rather, they confirm its relevance while demonstrating that its empirical manifestations are shaped by the specific socio-spatial context of heritage space. Western theories remain relevant as interpretative references, but not

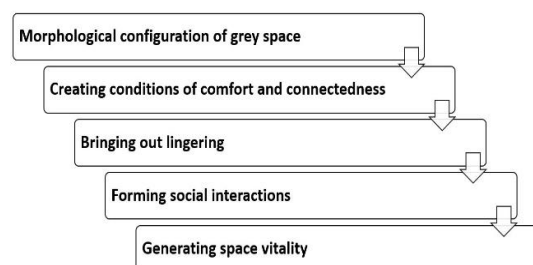


Figure 9. Conceptual model of the public space activation process in grey space

as universally transferable models. Their relevance in this study is contextual and partial rather than absolute. Figure 9 therefore should be understood

not as a fixed linear sequence, but as a conceptual representation of a gradual socio-spatial process in which configuration, lingering, interaction, and vitality unfold unevenly across heritage space.

Conclusion

This study shows that the configuration of grey space shapes lingering conditions through edge quality, spatial subdivision, spatial scale, shading, and connections to active functions. However, these influences are neither direct nor singular. Lingering emerges through the interplay of spatial conditions and temporal dynamics, and only under certain circumstances does it develop into social interaction that contributes to public space vitality.

These findings suggest that public space activation in grey space should be understood as a gradual and contextual process rather than as an automatic outcome of physical design. The process moves from morphological configuration, to the emergence of lingering, and then to the potential development of social interactions and spatial vitality. In this sense, the study expands previous understandings of public space quality by showing that physical elements do not operate deterministically, but relationally and contextually within everyday spatial practice.

The study also highlights a distinctive characteristic of the Indonesian heritage context. In Semarang's Old Town, public open space is used in adaptive and overlapping ways, where circulation, tourism, informal occupation, and everyday social interaction often coexist. This suggests that vitality in heritage areas is shaped not only by formal spatial design, but also by flexible and negotiated patterns of use. Accordingly, Western theories remain relevant as interpretative reference, but not as universally transferable models. Their application in this study is contextual and partial rather than absolute.

The conceptual contribution of this study lies in interpreting grey space as an analytical framework for understanding public space activation in relational and contextual terms. Lingering is positioned as a transitional indicator that links morphological structure with the possibility of social interaction and spatial vitality.

The study is limited by its case study scope in Semarang's Old Town, and should therefore be understood as context-specific rather than universally generalizable. The observations were conducted within a limited time frame and may not fully capture seasonal variation, special events, or longer-term

changes in tourism and urban activity. In addition, the study adopts a qualitative and interpretative approach, focusing on recurring spatial tendencies rather than statistical causality, and does not fully address users' subjective perceptions and motivations in occupying public space.

Future research may extend this work by examining other heritage districts, applying longer observation periods, and combining behavioral mapping with interviews or other qualitative methods. Such studies would help clarify how grey space morphology, lingering, and public space vitality operate across different heritage contexts in Indonesia.

AI Use Declaration

The authors acknowledge the use of ChatGPT (GPT-5.4 Thinking, OpenAI) for language editing, grammar checking, improving clarity of expression, and assisting in the organization of manuscript revisions and reviewer responses. Example prompt included: "Please revise this text for grammar and clarity while preserving academic meaning" used only to improve language quality and manuscript organization. It was not used for data generation, data analysis, interpretation of findings, drawing conclusions, or producing the final scholarly content of the article. All substantive academic content and final decisions remain the sole responsibility of the authors.

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