

## Spatial integration of urban informality in Jakarta

A case study of Thamrin 10, H. Agus Salim, and Percetakan Negara blocks

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ARTICLE INFO	ABSTRACT
<p><i>Article history:</i> Received June 08, 2022 Received in revised form Aug. 16, 2022 Accepted September 28, 2022 Available online December 31, 2022</p> <p><i>Keywords:</i> Informality Informal sector Urbanism Urban informality</p> <p>*Corresponding author: Yohanes Basuki Dwisusanto Department of Architecture, Faculty of Engineering, Universitas Katolik Parahyangan, Indonesia Email: <a href="mailto:jbase@unpar.ac.id">jbase@unpar.ac.id</a> ORCID: <a href="https://orcid.org/0000-0003-2686-5048">https://orcid.org/0000-0003-2686-5048</a></p>	<p>Urban informality is an everyday life phenomenon in Jakarta but has not been extensively discussed, especially in relation to spatial design practice. This is important because formality and informality are not entirely separate but rather interconnected and complementary (Moatasim, 2019). It has also been discovered that on-street informality such as street vending demonstrates the existence and trend of urban space and also acts as the most visible manifestation of the informal economy. Therefore, this research focuses on investigating the integration of urban informality with special attention to its influence on the spatial or architectural aspects. This was achieved through the qualitative method which involves the application of a phenomenological paradigm by participating in the street vending and informal economy on Thamrin 10, Jalan H. Agus Salim, and Jalan Percetakan Negara streets in Jakarta. The results showed that informality is present at different degrees of contemporary urban life and there is a pressing spatial demand for such activities. Moreover, it was discovered that spatial integration of urban informality has the ability to sustain and catalyze greater urban frameworks, including the activities of the formal sector.</p>

### Introduction

Informality is an urban reality which has been reported not to be entirely different from formality but rather interconnected and complementary (Moatasim 2019). It is a part of everyday life which exists in living, working, producing, and resting, and its character is plural, relational, and full of conflicts (Roy et al. 2004; Roy 2009; Kamalipour 2016; Cavalcanti 2017; Cavalcanti 2019a; 2019b). Informality is the new paradigm to understand the urban culture (AlSaiyyad 2004) and also serves as the compass of modern civilization (Varley 2013). However, there are limited studies concerning this concept in the fields of economics and sociology (International Labour Organisation 1972; Hart 1973; Soto 1989; Roberts et al. 1989; Rakowski

1994; Levenson and Maloney 1999). Recent studies showed some binary views of informality and confirmed that it is not evidence of underdevelopment (Perlman 1975; Palat Narayanan 2019) or associated with poverty, decline, danger, and crime (AlSaiyyad 2004; Roy 2005, 2009; Devlin 2018a; 2018b). The binary view was rejected but it is important to independently understand the concept of informality. It has also been associated with soft rules, a more relaxed atmosphere, and the rearticulation of spatial control, rather than the absence of rules and control (Guerreiro 2021; Devlin 2011; 2019). Meanwhile, Roy (2005) used the term “urban informality” to indicate an organizing logic applied by an informal society to govern its own space.

Urban informality is multidisciplinary and is located to access jobs and housing opportunities (Kamalipour 2016; Kamalipour and Dovey 2020), ranging from informal settlements to informal trading and transport systems (Dovey 2013). According to Roy (2005), planning is implicated in the enterprise of informality. Dovey (2013) and Guerreiro (2021) also argued that integration of urban informality requires understanding the degree to which certain variables such as social, spatial, cultural, and aesthetic issues are accommodated or not practically allowed. This is expected to serve as an intermediate space, or as argued by Soja, the “an-other” enabling the renegotiation of boundaries to indicate identities (Soja 1998).

In relation to the spatial aspect, urban informality starts with materialization such as the application of architecture as a tool to informalize formal space and conduct different activities. Informal (architectural) practice is probably transgressive but also characterizes the best type of mixed-use urbanism (Dovey 2013). It was discovered that on-street informality such as street vending demonstrates the best form of urban space when compared to other practices (Devlin 2011). It represents one of the most visible manifestations of the informal economy (Recchi 2021). Street vending also presents the informal sector as a solution to several problems (Cross 2000) and creates liveliness and attractiveness in today's urban environment (Torky and Heath 2021). However, there is a tendency to perceive street vending as a problem despite its existence for several decades. Street vendors are often accused of illegally using public spaces and damaging the image of the city (Recchi 2021), thereby, leading to evictions and relocations. This action does not address the spatial crises experienced by informal actors but also further impoverishes wider urban communities. It is important to note that urban informality revives the lives of people living outside the threshold of formality. Therefore, investigating urban informality through the very forefront of informal society has become important and can also lead to a deeper understanding of several integral parts of informality.

Street vending is an urban issue in several global cities (Yatmo 2008; Devlin 2011; Recchi 2021; Torky and Heath 2021) including those in Indonesia such as Jakarta. The street vendors in this city have been negotiating and materialising in public spaces including the streets for a long

time. This is the reason Thamrin 10, Jalan H. Agus Salim, and Jalan Percetakan Negara streets at the centre of Jakarta are selected as the object of this research. The aim is to investigate the integration of urban informality by focusing on its influence on spatial (architectural) issues. The analysis is also extended to the examination of the intertwined contexts including social, cultural, and economic aspects. This was conducted through observations and interviews with street vendors on the site.

## Method

The research was conducted qualitatively using a phenomenological paradigm. Emphasis was placed on the mode of urban informality on each site and its interpretation by the actors. According to the Husserl method, there are four important stages in the phenomenological research process and these include intentionality, reduction, description, and essence. The method was further divided into several stages by Moustakas (1994) which include horizontalizing or determining units of information, thematizing or formulating the theme, textural description, structural description, and integrating structure and texture to produce essence and meaning.

The research was initiated with a comprehensive literature review after which relevant information was grouped into units or horizontalized. The units of information were later grouped into themes. It is important to note that the textural description contains information on “what is the influence of urban informality on spatial integration as shown in each of the case studies?” This is the first research question and it was answered through direct observation and in-depth interviews with stakeholders in the informal sector. Meanwhile, structural description focused on the experience in the space occupied by these informal actors and their activities and provided information on “how is urban informality spatially integrated into each case study?” which is the second research. This was used to determine the influence of urban informality in each case through the mapping and documentation conducted using field study, walk-by observation, and interviews to show the level of integration within the city.



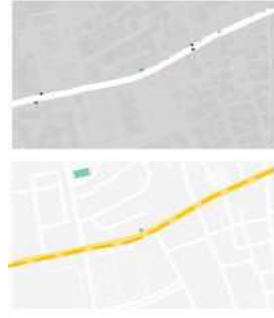
## Result and discussion

Spatial integration can materialise in several urban hierarchies based on the phenomena found on the street. It is important to break down the spatial analysis into several scales because a space usually has both spatial and social dimensions.

User's perceptions of urban informality in each block

The Thamrin and Jalan Percetakan Negara streets are characterised by government-owned offices. It was discovered from the interviews conducted in Jalan H. Agus Salim, Thamrin 10, and Jalan Percetakan Negara that each neighbourhood is filled with people from different parts of the city seeking life opportunities. This is indicated by the information provided in the following table 1.

**Table 1.** Themes and user's perceptions of each block

	Jalan M. H. Thamrin	Jalan H. Agus Salim	Jalan Percetakan Negara
Illustration			
Users' relevant statements	<p><b>Seller (S):</b> Thamrin is a central and major location which caters for the large needs of the offices in the area.</p> <p><b>Buyer (B):</b> It is a prime &amp; strategic location with close proximity to offices and business places. More people walking and commuting in addition to some stalls around the place is just making the street life lively.</p>	<p><b>S:</b> Several people are here during weekdays and weekends. It is not only the people working or living nearby but also those that live far away. This street has been famous for a long time, so maybe it's a nostalgia trip or just for fun.</p> <p><b>B:</b> They offer various options and the place is close to work. We normally gather here after work or during the weekend.</p>	<p><b>S:</b> It's a good location with many potentials. It's less known but it keeps growing rapidly as many people come and pass through here.</p> <p><b>B:</b> There are many options (of street vending) and the street is close to where I live.</p>
Emerging themes from users' statements	A central, prime, and strategic location	The street is famous.	A good location, maybe less known but it keeps growing.

The observations and interviews showed that all three study areas serve as concourses for people going to their workplace and back to their homes. They do not only connect primary streets but are also well served by major transits and are relatively passed by most city workers. Meanwhile, Jalan MH Thamrin and Jalan H. Agus Salim are located downtown unlike Jalan Percetakan Negara. These blocks are part of the major commercial streets in their respective neighbourhoods and generally have similar physical characteristics.

Jalan H. Agus Salim and Jalan Percetakan Negara interestingly have several informal workers and street vendors from culinary vendors

such as stalls and food trucks to service providers such as locksmiths and barbershops. Meanwhile, the Thamrin area is mainly restricted from informal sectors but it contains some parts of Jalan H. Agus Salim, thereby, adequately indicating the integration of informality in an urban space.

User's perceptions of urban informality based on spatial mobility on each block

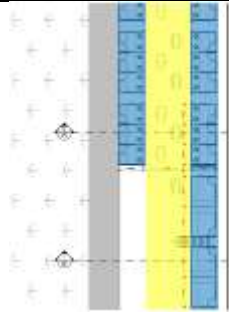

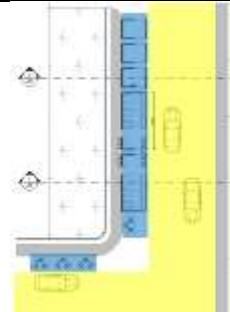
Castells (1996) defined mobility as the key to understanding socio-spatial relationships. Moreover, spatial mobility was observed to be important in understanding the flow of street vendors on each block. The results presented in

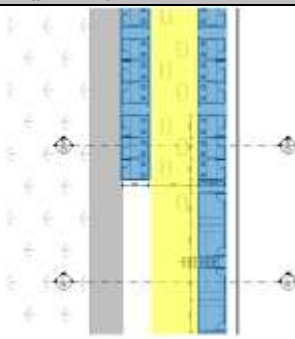
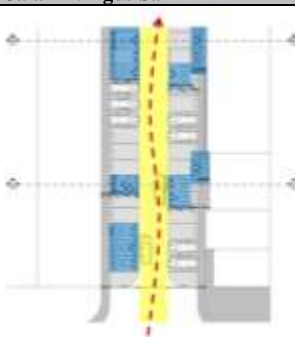
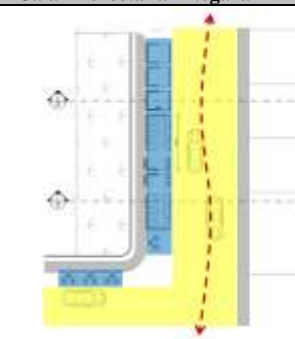
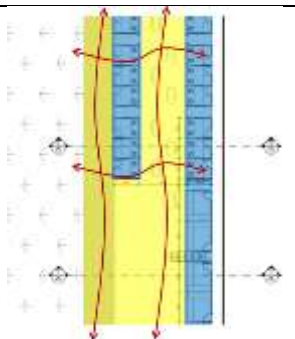
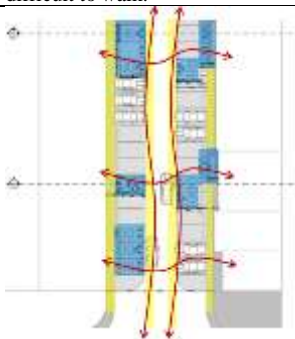

table 2 showed that the circulation of vehicles and pedestrians in the three study areas affects the use of space by the informal actors. For example, Jalan H. Agus Salim has heavy traffic due to vehicle parking and the tents of street vendors which are located next to each other without leaving any space. However, Jalan Percetakan Negara has a packed traffic flow at rush hours which recedes more quickly than the other blocks. The flow of formal sector workers in the area transiting or passing by as well as close residents returning from work dominate the social dynamics of the block. This, therefore, usually leads to organic pedestrian flow and well-occupied blocks after office hours through to midnight.

The existence of the actors in the informal sector depends closely on the flow of local people passing through and approaching a particular location. This is the reason the flow of vehicles is

contributing significantly to where kiosks are located. Moreover, the flow of people in Jalan H. Agus Salim seems organic without any definite pattern even though there is a relatively clear hierarchy of roads which includes the sidewalks, car parks, and the main street. The social dynamics in the block usually occur during the day, during office lunch hours, and at night, after office hours, supposedly due to its historical root as a culinary centre. Meanwhile, Jalan Percetakan Negara has slightly different circulation characteristics with the street vendors' tents located on the left side of the street because there is a single building along the road corridor with two gates as indicated in table 2. Most people normally approach these tents on foot or by motorbike because there is no parking space. Besides, the street vending activities are being conducted within a walking distance of offices and residences.

**Table 2.** Themes and user's perceptions of spatial mobility

	Thamrin 10	Jalan H. Agus Salim	Jalan Percetakan Negara
Location of informal kiosks			
Users' relevant statements	<p><b>S:</b> People visit during lunch &amp; dinner time and after working hours. More people visit when there's a special event or gathering here.</p> <p><b>B:</b> There's a proud feeling to see street vending getting its own space, and I can't wait for the crowd to fill up the space.</p>	<p><b>S:</b> I can sell here because my father and his brothers opened the shop a long time ago, before expanding to other places. They have served many long-time customers for decades.</p> <p><b>B:</b> I don't live or work close to this place but there are many shops I have frequently visited for a long time. This street is also well known for its culinary centres, old-school shops, and repair services.</p>	<p><b>S:</b> We adjust to the availability of land and the permits they offer, so we often move. The price of installing a tent cost less than renting a shop, and business is way busier.</p> <p><b>B:</b> I pass by here every day coming to/returning from work. Hanging out might be for people living around, but for me, it's more about my daily needs such as food and groceries.</p>
Emerging themes	<p>Informal actors are working in line with the working hours. People are proud to see street vending have a designated space.</p>	<p>Street vending activities have been operating on the block for a long time. Many buyers patronise it due to its well-known status and to visit their regular shops.</p>	<p>Sellers often move to adjust to the land availability. People come and visit to fulfil their daily needs.</p>

	Thamrin 10	Jalan H. Agus Salim	Jalan Percetakan Negara
Vehicle mobility			
Users' relevant statements	<p><b>S:</b> The area is prohibited from vehicles to allow pedestrians to have a walkable street.</p> <p><b>B:</b> Street vending is located far from the entrance but it is nice to walk without the disruption from vehicles.</p>	<p><b>S:</b> Many people travel here by car and motorcycles. They will park nearby and this offers an advantage for both parties. I get to serve faster and attend to more people.</p> <p><b>B:</b> Sometimes the streets become overcrowded as street vendors and vehicles have to share space. It's difficult to walk, you must navigate between the streets, the tenants, and the sidewalks.</p>	<p><b>S:</b> Most people travel by motorcycles or walk. This street block is rarely congested since the street is wide. So far, vehicle flow has not hampered the activities here.</p> <p><b>B:</b> Street vending here is easily accessible, either using public transport or a personal motorbike. It may be a little congested during office hours but the traffic flow recedes quickly.</p>
Emerging themes	The street is restricted to vehicles. It is nice to have a walkable street.	Sellers get to serve faster and attend to more people. Sometimes the street is overcrowded and difficult to walk.	Street vending is easily accessible. The street is sometimes congested but the traffic flow recedes quickly.
Pedestrian mobility			
Users' relevant statements	<p><b>S:</b> Layout and circulation are clear to facilitate pedestrian flow. People are expected to walk and interact naturally between the kiosks.</p> <p><b>B:</b> Since it's a little bit far from the entrance and parking space, I don't think I will come often. But the area is spacious and this is the reason it is enjoyable even when it is crowded.</p>	<p><b>S:</b> Street flow has been significantly improved since the one-way flow of vehicles. Buyers have more freedom to walk and shop.</p> <p><b>B:</b> I walk here because it's close to my office. Finding parking space is difficult and time-consuming. Perhaps if I don't come here for work, I'll take the car.</p>	<p><b>S:</b> Buyers that walk here usually live or work nearby. The crowd usually depends on people's routines: breakfast or takeaways in the morning, lunch break, and dinner or another takeaway after work.</p> <p><b>B:</b> I like buying here because it's closer, cheap, and fast. I can just drop by after work or while commuting.</p>
Emerging themes	People are expected to walk and interact naturally within the space. Moreover, the area is spacious and enjoyable even when it is crowded.	Sellers think that buyers have more freedom to walk since the street flow has improved. Parking is difficult and time-consuming.	The crowd depends on people's routines. Many people like to shop around the area because it's closer, cheap, and fast.

User's perceptions of urban informality based on the on-street occupation of street vending

The block segments of Jalan MH Thamrin and Jalan Percetakan Negara have the same primary status but they are different. Moreover, Jalan

Percetakan Negara also has the same theme as Jalan H. Agus Salim which is a secondary transit street from Central Jakarta (Jalan Salemba) to East Jakarta (Jalan Ahmad Yani). These blocks are more primary than the Jalan Percetakan

Negara and street vendors are not allowed to operate like at Jalan MH Thamrin. This indicates that even though the street is restricted from street vendors, they are still found moving without remaining stationary in some block segments.

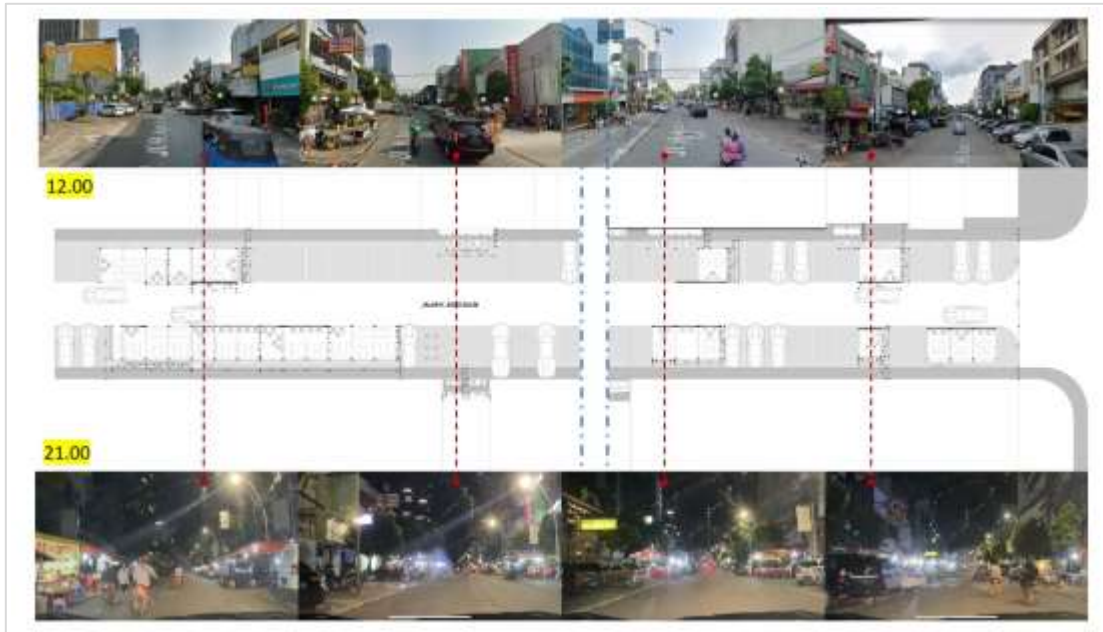


Figure 1. Occupancy difference in Jalan H. Agus Salim during the day and night

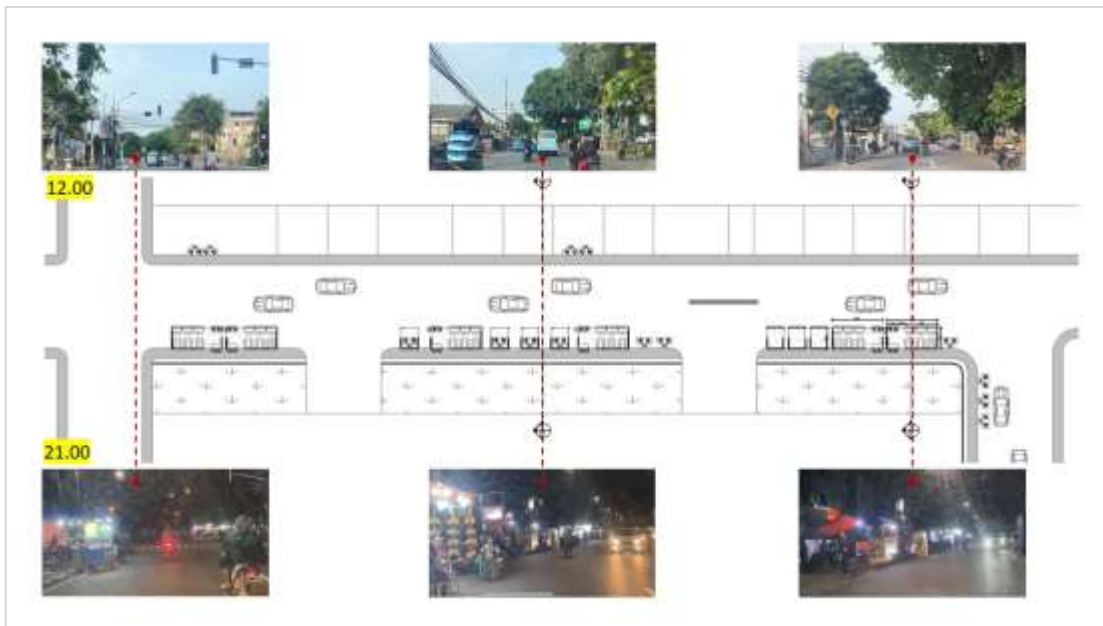


Figure 2. Occupancy difference in Jalan Percetakan Negara during the day and night

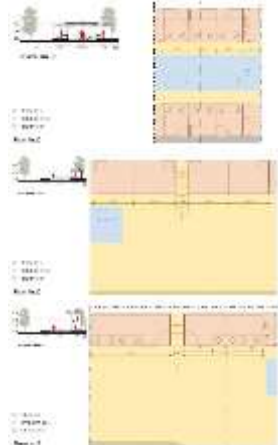
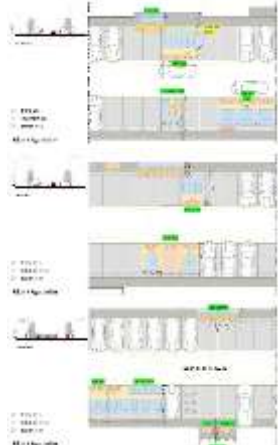
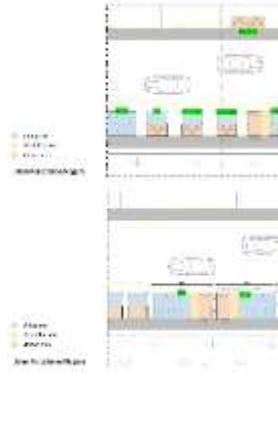
The informal activities on Jalan Percetakan Negara share a similar theme with those on Jalan H Agus Salim as indicated by the presence of

culinary stalls, culinary pickups, food trucks, and small stalls with different states of impermanence. It was also observed from figures 1 and 2 that the

street vending occupancy on each block segment is different depending on the operational hours. Those being conducted during the day cater for the daily needs of the formal workers during their operational hours while the night activities focus more on diverse needs with longer operational hours. It was discovered that the operational hours are averagely similar but the stationary time is different with some changing their locations from one intersection to another while some operate at one place at one time. The observation showed that night street vendors are mostly stationary and occupy more space on the streets while those operating during the day are more mobile and occupy limited space on the street. Furthermore, the large variety of street vendors and the number of visitors indicate that those that are stationary on the street contribute to the liveliness of the area. Meanwhile, limited visitors and vendors are usually seen during the day. It was further observed that spatial occupancy affects how

informal workers set up their spatial structures on the street. The perspective of the users concerning the occupancy difference was determined through the investigation of the architecture segments on each site. This is important because spatial occupancy has a strong relationship with the mobility of street vendors. It was discovered that some street vendors with a higher degree of being stationary conduct their business differently as indicated by more than two informal businesses occupying one location. This shows that it is possible for one informal spatial structure to be occupied by two or more businesses and two or more informal actors. This involves one actor renting its stall to another business or actor. The trend simply shows that informal business operations in block segments are managed differently in relation to the status of their location status and this highly affects the state of urban informality integration on the street.

**Table 3.** Themes and user’s perceptions of street vending spatial structures

	Thamrin 10	Jalan H. Agus Salim	Jalan Percetakan Negara
<b>Plans and sections</b>			
<b>Users' perception of architecture segments</b>	<p>S: We don't have to bother with disassembling our structures every day. The extra time can be used to prepare the goods.</p> <p>B: The building is organised and the seating area is spacious. The drawback is that each kiosk has no character and is less engaging, it all looks the same.</p>	<p>S: The choice of location depends on permission granted by the building manager and the local municipality. Since street vending has become a culture, people are more welcoming.</p> <p>B: The stalls are located close to each other, so we can flexibly choose and buy from several stalls at once.</p>	<p>S: The tent is easy to dismantle, although it leaks sometimes when it rains. People are also more likely to visit a tent stall than a shop because they know it will be affordable.</p> <p>B: The tenants are located right on the side of the road, easily accessible, and easy to spot. Their banners make it easy for us to see what they are selling.</p>
<b>Emerging themes</b>	Less time to build space, more time for business. People perceive that kiosk has no character and is less engaging.	People are more welcoming to street vending. Stall's close proximity eases buyers to buy things.	People prefer tent stalls to shops due to their affordability. Tent stalls are accessible and easy to spot because of their banners and location.

User's perceptions of urban informality based on street vending spatial structures

The spatial structure selected for street vending is related to the extent to which the city government is involved in organising street vendors. It was discovered from the interviews conducted at the block segments that both formal and informal authorities have the power to issue space permits. The formal authorities usually issue formal space or territory managed by the state while the informal ones are in charge of informal permits and manage informal occupations on the street, in-between buildings, and at the intersections. This implies the legal binary view is the most common concept adopted from the public perspective. Informality requires several permits such as the need to pay for utility and waste bills which can be issued together or separately with the space permits.

The physical and spatial boundaries used by informal actors in building their architecture vary from curtains, walls, doors, cloth, poles, and carts. The space usually provided to these actors is temporary like a grey area which can be crossed by anyone. Each tenant pays per square meter and usually performs activities within the space except for those that are service-related such as washing and taking out the garbage. The others such as cooking, trading, and shoppers' tables are within the confines of the tents. Moreover, each tent usually has an opening on each side to allow the sellers to interact and for the buyers to enter. It is important to note that each tent has its own opening.

It was discovered that there is limited availability of utilities such as clean water and sanitation networks at the planning stage which are not well-integrated into the residence, workplaces, and other areas in Jalan H. Agus Salim and Jalan Percetakan Negara. The electricity network is attached to the formal buildings behind these blocks. Moreover, informal businesses rarely have clean water due to its privatization but share toilets and water faucets with each other. The sharing of these services is perceived as a compromise to live together based on written or unwritten agreements.

Spatial integration of urban informality

Previous discussions showed that there is a hierarchy in spatial integration. This is evident in the form of contours which materialised at multiple scales but are seamless when perceived as a whole. Urban informality was observed to

occupy and inhabit the in-between spaces connecting streets to buildings from each neighbourhood to each architectural segment. This indicates it is possible to realise spatial integration of urban informality due to its influence on economic activities, social interactions, cultural heritage, and political negotiations. These factors work together to support the relevance of informal spatial practices (as suggested by Roy 2005; Dovey 2013; and Guerreiro 2021). Moreover, spatial integration catalyses economic and social activities in each location and this implies the legitimization of informal businesses can lead to the conduct of informal activities without concerns.

## Conclusion

This research investigated the integration of urban informality with a focus on its influence on spatial or architectural issues. It was discovered that the degree of spatial integration is at multiple scales with informal activities observed in-between the spaces of each degree. The findings showed that street vending's occupancy reflects the precarious daily life of urban society. It was further noted that informal space needs to be included as a habitable territory for life-supporting activities. This signifies there is a need to emphasise everyday life design and make informal architecture practice available.

It was also discovered that the emergence of spatial integration between informal and formal sectors is due to economic activities. Moreover, it sustains and catalyses larger urban frameworks like coalescence. The observation of several scales of urban informality integration leads to their perception as a spontaneous urban morphological reality which is needed to support each other's lives. The comparison of the areas studied indicated that informalizing formal space has a more direct impact and integrates larger contexts on the street. This is due to the fact that people, including street vendors, like to conduct their day-to-day duties in a laid-back and spontaneous manner. Furthermore, accessibility and close proximity are the main purposes of selling on the streets. This implies spatial integration has many positive impacts on the survival of urban communities.

## References

- AlSayyad, Nezar. 2004. 'Urban Informality as a New Way of Life'. In *Urban Informality: Transnational Perspectives from the Middle East, Latin America, and South Asia*, edited by Ananya Roy and Nezar AlSayyad. United States: Lexington Books.
- Anastasi, Giuseppe, Carlo Bartoli, Paolo Conti, Emanuele Crisostomi, Alessandro Franco, Sergio Saponara, Daniele Testi, Dimitri Thomopoulos, and Carlo Vallati. 2021. 'Optimized Energy and Air Quality Management of Shared Smart Buildings in the Covid-19 Scenario'. *Energies* 14 (8): 1–17. <https://doi.org/10.3390/en14082124>.
- Ascione, Fabrizio, Rosa Francesca De Masi, Margherita Mastellone, and Giuseppe Peter Vanoli. 2021. 'The Design of Safe Classrooms of Educational Buildings for Facing Contagions and Transmission of Diseases: A Novel Approach Combining Audits, Calibrated Energy Models, Building Performance (BPS) and Computational Fluid Dynamic (CFD) Simulations'. *Energy and Buildings* 230 (January): 110533. <https://doi.org/10.1016/j.enbuild.2020.110533>.
- Beichner, Robert J, and Jeffery M Saul. 2003. 'Introduction to the SCALE-UP ( Student-Centered Activities for Large Enrollment Undergraduate Programs ) Project'. In *Proceedings of the International School of Physics*, 1–17. Italy: Enrico Fermi, Varenna. [https://www.ncsu.edu/PER/Articles/Varenna\\_SCALEUP\\_Paper.pdf](https://www.ncsu.edu/PER/Articles/Varenna_SCALEUP_Paper.pdf).
- Cavalcanti, Ana Rosa Chavas. 2017. 'How Does Work Shape Informal Cities? The Critical Design of Cities and Housing in Brazilian Slums'. *The Plan Journal* 1 (2). <https://doi.org/10.15274/tpj.2016.01.02.04>.
- . 2019a. "'How Does Work Shape Informal Cities?'" *Urban Informality Shaped by Labor* 8: 65. <https://journals.open.tudelft.nl/abe/article/view/3934/3951>.
- . 2019b. 'Work, Slums And Informal Settlements Traditions'. *Urban Informality Shaped by Labor* 8. <https://journals.open.tudelft.nl/abe/article/view/3933>.
- Centers for Disease Control and Prevention. 2019. 'Ventilation in Buildings'. Cdc.Gov. 2019. <https://www.cdc.gov/coronavirus/2019-ncov/community/ventilation.html>.
- Clark, Ruth C., Frank Nguyen, and John Sweller. 2005. *Efficiency in Learning: Evidence-Based Guidelines to Manage Cognitive Load*. 1st ed. Pfeiffer.
- Cross, John. 2000. 'Street Vendors, and Postmodernity: Conflict and Compromise in the Global Economy'. *International Journal of Sociology and Social Policy* 20 (1/2): 29–51. <https://doi.org/10.1108/01443330010789061>.
- Devlin, Ryan Thomas. 2011. "'An Area That Governs Itself'": Informality, Uncertainty and the Management of Street Vending in New York City'. *Planning Theory* 10 (1): 53–65. <https://doi.org/10.1177/1473095210386070>.
- . 2018a. 'Global Best Practice or Regulating Fiction? Street Vending, Zero Tolerance and Conflicts Over Public Space in New York, 1980-2000'. *International Journal of Urban and Regional Research* 42 (3): 517–32. <https://doi.org/10.1111/1468-2427.12628>.
- . 2018b. 'Asking "Third World Questions" of First World Informality: Using Southern Theory to Parse Needs from Desires in an Analysis of Informal Urbanism of the Global North'. *Planning Theory* 17 (4): 568–87. <https://doi.org/10.1177/1473095217737347>.
- . 2019. 'A Focus on Needs: Toward a More Nuanced Understanding of Inequality and Urban Informality in the Global North'. *Journal of Cultural Geography* 36 (2): 121–43. <https://doi.org/10.1080/08873631.2018.1531474>.
- Dovey, Kim. 2013. 'Informalising Architecture: The Challenge of Informal Settlements'. *Architectural Design* 83 (6): 82–89. <https://doi.org/10.1002/ad.1679>.
- Government of Canada, Canadian Centre for Occupational Health and Safety. 2016. '1-Introduction: OSH Answers'. Ccohs.Ca. 2016. <https://www.ccohs.ca/oshanswers/prevention/ventilation/introduction.html>.
- Guerreiro, Paulo. 2021. 'On Informality - Programmed Spontaneity in Spatial Design'. *Academia Letters*, June. <https://doi.org/10.20935/AL1421>.
- Hart, Keith. 1973. 'Informal Income Opportunities and Urban Employment in Ghana'. *The Journal of Modern African*

- Studies* 11 (1): 61–89.  
<https://doi.org/10.1017/S0022278X00008089>
- International Labour Organisation. 1972. *Employment, Incomes and Equality; a Strategy for Increasing Productive Employment in Kenya*. Geneva: ILO.
- Kamalipour, Hesam. 2016. 'Forms of Informality and Adaptations in Informal Settlements'. *International Journal of Architectural Research: ArchNet-IJAR* 10 (3): 60. <https://doi.org/10.26687/archnet-ijar.v10i3.1094>.
- Kamalipour, Hesam, and Kim Dovey. 2020. 'Incremental Production of Urban Space: A Typology of Informal Design'. *Habitat International* 98 (April): 102133. <https://doi.org/10.1016/j.habitatint.2020.102133>.
- Kocakulak, Mustafa, and Ismail Butun. 2017. 'An Overview of Wireless Sensor Networks towards Internet of Things'. In *2017 IEEE 7th Annual Computing and Communication Workshop and Conference (CCWC)*, 1–6. IEEE. <https://doi.org/10.1109/CCWC.2017.7868374>.
- Levenson, Alec R., and William F. Maloney. 1999. *The Informal Sector, Firm Dynamics, and Institutional Participation*. Policy Research Working Papers. The World Bank. <https://doi.org/10.1596/1813-9450-1988>.
- Moatasim, Faiza. 2019. 'Informality Materialised: Long-Term Temporariness as a Mode of Informal Urbanism'. *Antipode* 51 (1): 271–94. <https://doi.org/10.1111/anti.12434>.
- Moustakas, Clark. 1994. *Phenomenological Research Methods*. 2455 Teller Road, Thousand Oaks California 91320 United States of America: SAGE Publications, Inc. <https://doi.org/10.4135/9781412995658>.
- Palat Narayanan, Nipesh. 2019. 'The Production of Informality and Everyday Politics'. *City* 23 (1): 83–96. <https://doi.org/10.1080/13604813.2019.1575118>.
- Perlman, Janice E. 1975. 'Rio's Favelas and the Myth of Marginality'. *Politics & Society* 5 (2): 131–60. <https://doi.org/10.1177/003232927500500201>.
- Rakowski, Cathy A. 1994. 'Convergence and Divergence in the Informal Sector Debate: A Focus on Latin America, 1984–92'. *World Development* 22 (4): 501–16. [https://doi.org/10.1016/0305-750X\(94\)90107-4](https://doi.org/10.1016/0305-750X(94)90107-4).
- Rands, Melissa, and Ann Gansemer-Topf. 2017. 'The Room Itself Is Active: How Classroom Design Impacts Student Engagement.' *Journal of Learning Spaces* 6 (1): 26–33. <https://files.eric.ed.gov/fulltext/EJ1152568.pdf>.
- Recchi, Sara. 2021. 'Informal Street Vending: A Comparative Literature Review'. *International Journal of Sociology and Social Policy* 41 (7/8): 805–25. <https://doi.org/10.1108/IJSSP-07-2020-0285>.
- Roberts, Bryan R., Saskia Sassen-Koob, Juan Carlos Fortuna, Monica Lanzetta de Pardo, Alex Stepick, Jose Blanes Jimenez, Gregory Grossman, Lourdes Beneria, Vittorio Capecchi, and Josep-Antoni Ybarra. 1989. *The Informal Economy: Studies in Advanced and Less Developed Countries*. United States: Johns Hopkins University Press.
- Rogers, Lindsay Smith, and J. H. Bloomberg. 2020. 'Interview by Stephanie Desmon: How Indoor Ventilation Systems Can Help Prevent or Permit the Spread of COVID-19'. Johns Hopkins Bloomberg School of Public Health. 2020. <https://publichealth.jhu.edu/2020/how-indoor-ventilation-systems-can-help-prevent-or-permit-the-spread-of-covid-19>.
- Roy, Ananya. 2005. 'Urban Informality: Toward an Epistemology of Planning'. *Journal of the American Planning Association* 71 (2): 147–58. <https://doi.org/10.1080/01944360508976689>.
- . 2009. 'Why India Cannot Plan Its Cities: Informality, Insurgence and the Idiom of Urbanization'. *Planning Theory* 8 (1): 76–87. <https://doi.org/10.1177/1473095208099299>.
- Roy, Ananya, Nezar AlSayyad, Asef Bayat, Ray Bromley, Alan Gilbert, Arif Hasan, Janice E. Perlman, et al. 2004. *Urban Informality: Transnational Perspectives from the Middle East, Latin America, and South Asia*. United States: Lexington Books.
- Soja, Edward W. 1998. 'Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Places'. *Capital & Class* 22 (1): 137–39.

- <https://doi.org/10.1177/030981689806400112>.
- Soto, Hernando De. 1989. *The Other Path: The Invisible Revolution in the Third World*. United States: HarperCollins.
- Spachos, Petros, and Dimitrios Hatzinakos. 2016. 'Real-Time Indoor Carbon Dioxide Monitoring Through Cognitive Wireless Sensor Networks'. *IEEE Sensors Journal* 16 (2): 506–14. <https://doi.org/10.1109/JSEN.2015.2479647>.
- Torky, Esraa, and Tim Heath. 2021. 'Perception of Street Vendors and Their Effect on Urban Settings in Portobello Road, London'. *Archnet-IJAR: International Journal of Architectural Research* 15 (3): 589–604. <https://doi.org/10.1108/ARCH-12-2020-0294>.
- Varley, Ann. 2013. 'Postcolonialising Informality?' *Environment and Planning D: Society and Space* 31 (1): 4–22. <https://doi.org/10.1068/d14410>.
- Yang, Yuan, Jiang Liu, Wei Wang, Yu Cao, and Heng Li. 2021. 'Incorporating SLAM and Mobile Sensing for Indoor CO2 Monitoring and Source Position Estimation'. *Journal of Cleaner Production* 291 (April): 125780. <https://doi.org/10.1016/j.jclepro.2020.125780>.
- Yatmo, Yandi Andri. 2008. 'Street Vendors as "Out of Place" Urban Elements'. *Journal of Urban Design* 13 (3): 387–402. <https://doi.org/10.1080/13574800802320889>.

#### Author(s) contribution

**Ruth Dea Juwita** contribute to the research concepts preparation and literature reviews, data analysis, of article drafts preparation and validation.

**Yohanes Basuki Dwisusanto** contributed to the research concepts preparation, methodologies, investigations, data analysis, visualization, articles drafting and revisions.

