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Algorithm as a Pattern of Kampung (Case Study: Cilincing Fisherman Village)

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ABSTRACT

Fisherman Village is one of the Jakarta informalities that has been growing with the city since its former role as a port city. This phenomenon not only contributes to the city's economic value but also to its overall dynamic sectors. Its existence confirms the important role of its built environment; the research objective is to reveal the kampung pattern for preserving and developing this kampung. Unlike other urban grains, this kampung consists of naval and maritime qualities, despite general critique towards environmental and spatial conditions. The morphology is utilized to detect its architectural form; thus, its algorithm can be extracted through QGIS, steps are: 1) mapping, 2) massing, and 3) algorithm. QGIS converts mapping into a massing series, unraveling the geometry of the kampung house silhouette as an algorithm pattern. The outcome is Kampung's algorithm pattern. The discovery involves nautical and maritime influences, while the originality is the Kampung Cilincing order formula. This research promotes a specific housing unit and type as a local potency to stimulate the development of Kampung's module guideline. The dominant type can be used for typical replication while questioning the recessive type to stimulate innovation as a guide.

Keywords: ***algorithm, cilincing, fisherman, kampung, pattern***

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INTRODUCTION

The Kampung Nelayan Cilincing is one of the most significant coastal kampungs in North Jakarta that becomes a melting pot between the land and the sea, a networking informality nestled surrounding the Cilincing Fish market, such as clam peelers, salted fish producers, seafood cleaners, informal kitchens, etc. Situated in the Cilincing historic district, North Jakarta, the Kampung is located at an unnamed road and undetected location according to a satellite map, this kampung can also be accessed through the Cakung Drainage Road channel, or via Cilincing Krematorium road (Figure 1). The absence of its infrastructure is the research gap, a reason for investigating its structural pattern, while the algorithm of its massing series order is targeted as the research novelty. The kampung, which serves as a supportive region, is one of Jakarta's leading marine producers, including naval and maritime facilities. Located in front of the Java Sea, situated within 500 m of Cilincing dock, Cilincing funeral & crematorium, Lalitavistara Temple, and Marunda Global Terminal, this kampung is currently marked by the Cilincing Seafood Market, a central fish market and informal fisherman trader's node for economic driver. The Kampung area is surrounded by the sea, docks, estuaries, and water pockets, contributing a unique coastal environment as its context. Thus, this research aims to reveal the kampung coastal pattern as the local potency for architectural guidance.

1.1.Kampung Nelayan Cilincing as an Icon of Cilincing

This kampung is well-known as a fisherman hub, three-generation accommodation, and a port for fishermen. Despite its important urban function, this kampung has not gotten sufficient attention from the government in terms of architecture and infrastructure, a part of its potential in the marine context, and its unique experience as cultural and natural tourism (Desiyana, 2022). Furthermore, urban kampungs in the city center drew more academic interest than those on the periphery, particularly those along the sea, which are still uncommon. This is justified by a finding that this kampung has not been fully detected on digital maps, and its massing and infrastructure have not been properly updated. This includes the number of spatial points in the village that is still considered minimal, few are missing, and others are imprecise so that it does not provide sufficient directions digitally in the mapping (Fricker, Kotnik, & Piskorec, 2019), thus it is an urgency to position the village as an integrated part of the city (Lianto, Trisno, Choandi, & Husin, 2020). Although it cannot be done instantly, an investigation focusing on the Kampung Nelayan spatial patterns may provide a better archive while stimulating more research for the character. Kampung Nelayan Cilincing is an original informal space that represents the values of historic fishermen's lives. Raising the Kampung algorithm entails analysing the dimensions and layers of the kampung both mathematically and scientifically, which provides a new direction for the guidelines, including the sustainability of the sea and the development of its city (Kustianingrum & Haerdy, 2023).

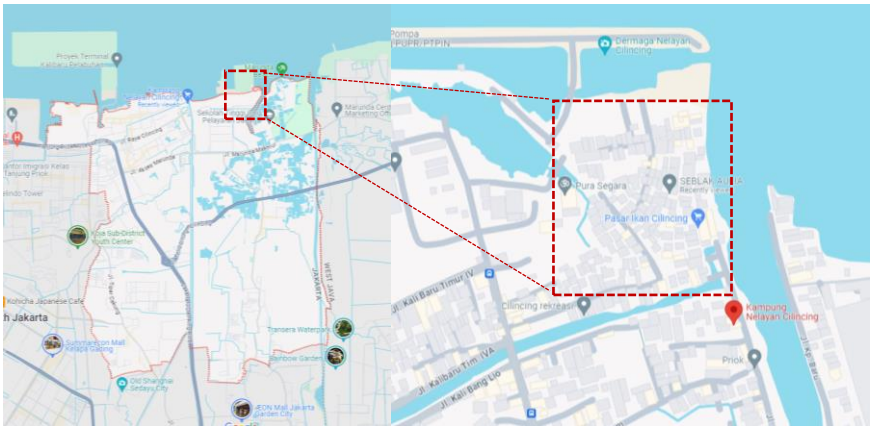

Figure 1. Incomplete Satellite Imaginary of Kampung Cilincing
Source: Google maps, (2024).

1.2.Coastal Fisherman Village Characteristic of Kampung Nelayan Cilincing

Kampung Nelayan Cilincing, which is located in the city center, has comparable features to a fisherman's community. This kampung resembles a coastal community in terms of social and cultural adaption to waterfront settings. The majority of the kampung masses show differences in their configuration, namely a combination of centralized, gathered, linear, and more demonstrating two polar orientations, namely outward and inward, the originality of the architectural pattern of the village is typical in a specific environment (Lake & Salura, 2021). Likewise, in the types of fishing village houses, some variations show a strong landscape transformation between land houses to boat houses or vice versa, although many are dominated by stilt houses: another form of urban (Frampton, 2021). This kampung also indicates specific fluidity in accordance to the land and the sea, a loosely bounded aggregate with a consistent gap between houses, and a doubled even triple-layered neighborhood that shares both communal space and access to the body of water throughout its networks. Fish auctions, anchorages, seafood markets, and even boats have greatly influenced the morphology of fishermen's houses and have formed special patterns in this kampung, that is why the fishermen's living space contains maritime influences that are fundamental in shaping the informal marine activities in the area. Ocean life, natural materials, organicity, density, and the aroma of the sea often become a challenge to create the image of this kampung (Ismawan, 2008). Although sensory and conventional compositional aspects may be important to elevate its branding, an internal perspective needs to be built regarding the Kampung, a more digitalized research approach is required to improve kampung principles (Groat & Wang, 2013). By understanding the kampung organizational system, pattern, and logic in its structural algorithm (Basserud & Cotten, 2008), sustainable planning development can be planned more strategically in maintaining the original patterns of this built environment (Das & King, 2019).

1.3.Village pattern as a formula of an urban Built Environment

The layers of the village as both architectural and urban elements consist of infrastructure, mass, icons, signage, open spaces, and the natural environment (Ariffin, Rashid, & Salleh, 2013). Apart from the structure of this kampung has grown naturally since its original settlement, there are spatial patterns that are formed behind its

development layers (Charleson, 2005). The pattern consists of various networks that indicate a complex relationship between the kampung internal organization and its external environment as its context: a series of kampung masses that have been proliferated according to the grid and its topography to where the form becomes concentrated (Dominguez, 2022). By focusing on the form and dimensions, the kampung village networks can no longer be seen as a separate element from its surroundings, but as a series of houses that are formed by a module in a specific context: the land and the sea (Figure 4). In the context of Cilincing, the series of masses is analyzed as a part of the city network as it grows together with the city as an urban built environment. It is a type of local marine architecture that embodies kampung collective forms in Jakarta. Like other daily spaces in an urban area, this informal settlement also depicts specific rhythms (Husin, Prijotomo, & Sugiharto, 2021). Although in general, the kampung space shows an irregular pattern, it indicates a unique variation in its configuration. A rule can be extracted from within the kampung network if an investigation is conducted by focusing on its pattern (Lake & Germany, 2023).

METHODS

The obtained data consists mostly of massing geometry and dimension in the form of satellite-extracted maps. QGIS extracts maps and its layers serve as a validation tool for mapping data obtained from the cad mapper and precedents. Autodesk cad is used to analyze massing form and kampung spatial patterns, as well as to create diagrams and do calculations. The research utilizes a morphological study to detect the architectural form of the 143,39 m kampung network where the main infrastructure and the kampung landmark are located. It is studied based on the mapping reconstruction method by focusing on the silhouette of the houses as the urban fabric. Using a combination of satellite image extraction, the kampung image is reconstructed based on its layers, putting aside conventional visit documentation. Reconstruction emphasizes networks as the shaper of the kampung while eliminating decorative and tertiary elements. The modified maps are then redone using QGRS and Autodesk Cad. Spatial dynamics are displayed as mathematical series using the Kampung technique. This research was conducted from July to December 2024 via satellite data and a topo plan. Research steps are 1) Mapping and Dimension; 2) Massing extraction is grouped, sorted, and highlighted according to the dominance and recession; 3) Dimensions are studied and arranged as a sequencing system thus an algorithm pattern can be formulated (Shtepani & Xhexhi, 2023). The mapping data from the satellite, QGIS, cad mapper, and cad are layered to cross-check and validate findings from the existing maps. The village algorithm may differ from that of planned cities; nonetheless, the village's non-uniformity may indicate distinct potential spatial configurations to provide naturalness, everydayness, and familiarity in contrast to generic city formulation.

RESULT AND DISCUSSION

The below mapping result is a sample of urban fabric visualization that displays infographic data, containing a three-dimensional geometry and dimensional extractions. As an isometric view, the observer may benefit from a straightforward, and clear visual representation of kampung massing as an object. This supports a more practical guide of

identification through informal gestures in most informalities regarding the pattern of irregularity and asymmetricity. Cross-verification with historical data and multiple data sources have been used via satellite and various applications such as cad mapper, QGIS, and existing maps combined with field observation conducted on 26th-27th September 2024 for sample measurements.

The aerial satellite images show a tendency of general fluid-semiparametric aggregate (Figure 2). From the upper left to the bottom right, the images capture: 1) the general layout shows the small grain and loosely bounded aggregates, 2) 3D images both show high-density tendency and similar heights with a variation of 1-3 floors, 3) Axonometry emphasizes various gestures towards the waterfront, a combination of voids, communal spaces including boat houses, 4) Infrastructure displays variation of grid and loop as the circulation type, 5) Silhouette highlights a variation of strong rectangular and square shapes, 6) general morphology suggests a fluidity, following the waterbody, interaction towards waterfront as built in a semi-circular, linear and collective gesture.

The network sample was chosen to represent a transition location between land and sea, which is critical for representing Kampung Nelayan Cilincing design as a hybrid of boat and naval architecture. The aggregate of the kampung shows a contrasting configuration when compared with its neighboring fabrics. Even if the surrounding fabrics show a tendency of informal configuration, the Kampung Nelayan Cilincing fabric demonstrates a contrasting organic gesture towards fluidity following the silhouette of the waterfront shape while its neighbor tends to display a more straight tendency. The Kampung Nelayan fabric depicts a flowy arrangement towards the sea, using a blend of semi-circular and linear shape textiles. The location of the sample network is the main

Figure 2. Various Mapping Illustrations (2D, 3D, massing, infrastructure, building silhouette, urban fabric)
Source: recolored and highlighted based on cad mapper extraction

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road, the most important infrastructure for the kampung, where the seafood market is situated and become the strongest landmark of the area. As can be seen, the sample displays a combination of interlocking arrangements with communal voids between collective compositions. Interestingly, the sample also contains contrasting configurations, sizes, and shapes, differentiating between the front and the back when compared between both sides.

The network sample (Figure 3) indicates a strong development pattern with close similarities despite showing a contrasting display. There are 39 masses have been detected within the network showing a variation of shapes, configurations, and orientation along a corridor. The left side contains 20 rectangular houses varying from 20s sqm unit types (7 units), 30s (4 units), 40s (4 units), 50s (3 units) to 70s (2 units), and 3 square houses vary from 20s sqm units (2 units) to 30s (1 unit). The right side consists of 14 rectangular houses varying from 20s sqm unit types (4 units), 30s (4 units), 40s (1 unit), 60s (2 units), 100s (2 units), to 400s (1 unit), 2 square houses varying from 20s sqm units (1 unit) to 30s (1 unit). Between houses, there are 2 cul-de-sac type lanes are found. The market has been detected as the largest unit found in the kampung, and acting as the landmark in the area.

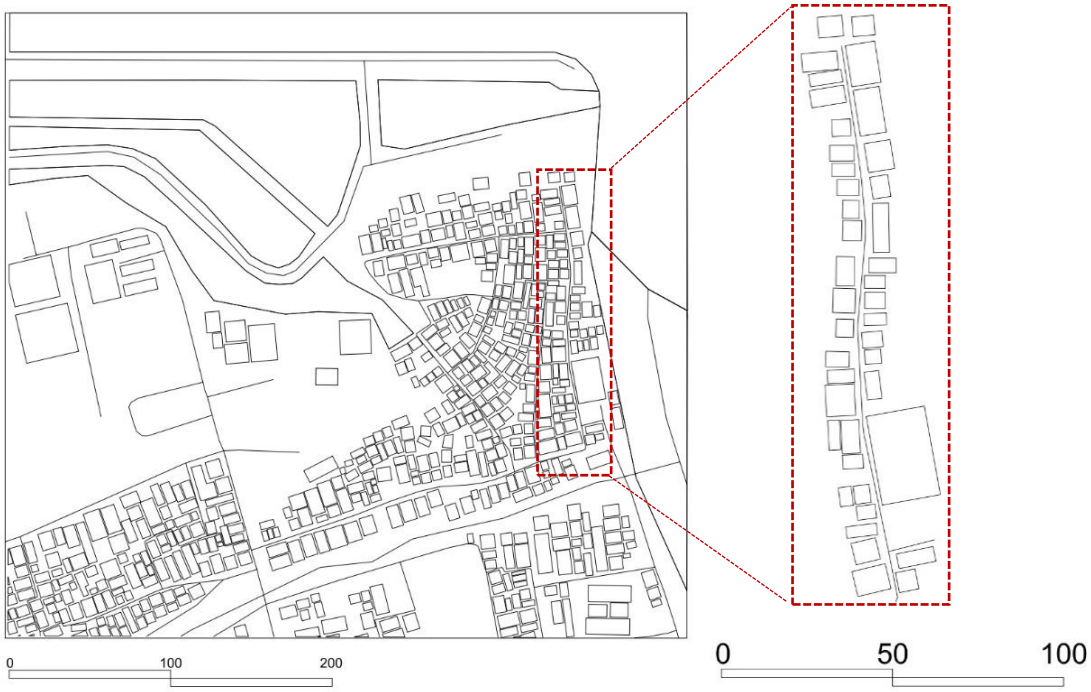

Figure 3. Cilincing Network's Mapping
Source: redrawn-based QGIS digital extraction

Table 1. Kampung Nelayan Cilincing Sample Algorithm

No.	Type	Dimension (cm)	Angle	Unit (sqm)	Information
Left					
1	Rectangular	720 x 600	90^0	43.2	
2.	Rectangular	1040x540	90^0	56.16	
3.	Rectangular	960x360	90^0	34.56	
4.	Rectangular	1000x500	90^0	50	
5.	Square	500x500	90^0	25	
	Lane				Culdesac
6.	Rectangular	700x500	90^0	35	

No.	Type	Dimension (cm)	Angle	Unit (sqm)	Information
7.	Rectangular	680 x380	90^0	25.8	
8.	Rectangular	640x460	90^0	29.44	
9.	Rectangular	490x530	90^0	25.97	
10.	Square	550x550	90^0	30.25	
11.	Rectangular	540x850	90^0	45.9	
12.	Rectangular	650x710	90^0	46.15	
13.	Square	510x510	90^0	26.01	
14.	Rectangular	680x450	90^0	30.6	
15.	Rectangular	780x400	90^0	31.2	
16.	Rectangular	850x920	90^0	78.2	
17.	Rectangular	530x970	90^0	51.4	
18.	Rectangular	600x400	90^0	24	
19.	Rectangular	470x540	90^0	25.3	
20.	Rectangular	550x400	90^0	22	
21.	Rectangular	900x330	90^0	29.7	
22	Rectangular	730x640	90^0	46.72	
23.	Rectangular	990x750	90^0	74.25	
Right					
1	Rectangular	640x570	90^0	36.48	
2.	Rectangular	860x1200	90^0	103.2	
3.	Rectangular	760x1350	90^0	102.6	
4.	Rectangular	760x850	90^0	64.6	
5.	Rectangular	520x640	90^0	33.28	
	Lane				Culdesac
6.	Rectangular	470x1440	90^0	67.68	
7.	Rectangular	810x420	90^0	34.02	
8.	Rectangular	600x370	90^0	20.2	
9.	Rectangular	600x470	90^0	28.2	
10.	Rectangular	650x350	90^0	22.75	
11.	Rectangular	600x460	90^0	27.6	
12.	Square	470x470	90^0	22.09	
13.	Rectangular	400x800	90^0	32	
14.	Rectangular	1720x2630	90^0	452.36	market/ landmark
15.	Rectangular	1100x440	90^0	48.4	
16.	Square	580x580	90^0	33.64	

Source: QGIS area calculation by using Autodesk, (2020).

According to the data in Table 1, the rectangular house is the predominant kind in the kampung, while the square is not regarded rare, unlike other Jakarta informalities. The most prevalent unit type observed in the network sample is 20 sqm as a result of replication between 400 cm, 500 cm, and 600 cm as the primary modules. The secondary unit type is a 30s sqm unit type, a result of replication between 500s cm, 600s cm, and 700s as the main modules. While the rest is a proliferation between these two main types. Despite the 20s sqm unit type being considered common, there are 100s sqm unit types found in the development, and it is recommended as the wealthiest and largest unit in the kampung though elaborated from the same module. Although the seafood market is the largest, it is not considered the main type but a node as a signifier. It is a marker of the area and represents a conceptual function of the area while the house is the dominant material that signified the existence of kampung. This seafood market is also a unique landmark that differentiates this kampung from other typical Jakarta kampungs where the mosque becomes a common icon. Understanding the general pattern of this network allows us to deduce that the Kampung algorithm is dominated by 20 and 30 modules, even though the

order formula is 20, 30, 40, 50, 60, 70, and 100. The algorithmic gradation has a significant impact on the kampung's visual fabric. Despite being supported by its terrain, it has a strong fluidity, as if it were flowing. On the other hand, the anomaly in the module contributes to the production of the gaps, stimulating the creation of contrasting compositions and communal voids, mimicking naval arrangement or maritime configuration.

CONCLUSION

The Kampung Nelayan Cilincing demonstrates a strong pattern of 20 and 30 as the main modules with rectangular and square as the dominant, recommended housing types guide for kampung development as showing a domination. The algorithm shows a sequential pattern of 20, 30, 40, 50, 60, 70, and 100 as the order formula that can be suggested for developing Kampung's module guide. Although visually both sides of the main sample illustrate contrasting shapes and patterns, the algorithm suggests the other way around, both patterns show similarities and are implemented as similar modules yet unit developments. The distinction is that the seafood market exists as an outlier, even though it keeps showing strong development from the 1920s as its core module. The other 100s types are considered the most proliferated and best-achieving type development in the sample, similarly, with the seafood market it is consistently built from the 20s as its main module. The consistent gradation in its algorithm contributes a flowing visual effect of the kampung while the anomaly of the pattern sizes stimulates the development of the gaps and voids, strongly encouraging a contrasting collective yet interlocking configuration between fabrics in this waterfront context. The algorithm pattern can be used as a development method for rebuilding kampung or advanced simulation, recommending modules, units, or volumes based on kampung houses as the *oikos,* an alternative aside conventional method for building spatial structures.

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REFERENCES

Shtepani, E., & Xhexhi, K. (2023). Structuralism, Modular Construction, and "Grid" As Universal Instruments for Building Designs. *International Journal of Advanced Natural Sciences and Engineering Researches, 7*(3), 198-197.

Ariffin, N. A., Rashid, M. M., & Salleh, N. H. (2013). *Methodologies in Architectural Research.* Selangor: IIUM Press. Retrieved November 11, 2022, from https://core.ac.uk/download/300423106.pdf

Basserud, K., & Cotten, J. (2008, 11 11). Architectural Genomics. *Silicon + Skin: Biological Processes and Computation. 08,* pp. 238-245. Minneapolis: ACADIA CumInCad. doi:https://doi.org/10.52842/conf.acadia.2008.238

Charleson, A. W. (2005). *Structure as Architecture.* Burlington: Elsevier.

Das, A., & King, R. (2019). *Surabaya: The Legacy of Participatory Upgrading of Informal Settlement.* Ross Center. Washington DC: World Resource Institute.

Desiyana, I. (2022). Shape Grammar for House Facade along the Alley in Urban Kampung, Tambora, Jakarta. *RUAS, 20*(1), 130-140. doi:10.21776/ub.ruas.2022.020.01.13

Domínguez, G. M. (2022). From Individual to Community: The Grid as a Mediating Tool in Jan Verhoeven's School Buildings. *Architectural Histories, 10*(1), 1-25. doi: https://doi.org/10.16995/ah.8342

Frampton, K. (2021). Megaform as Urban Landscape. *Journal of Delta Urbanism, 2*, 12-24. doi:doi.org/10.7480/jdu.2.2021.6224

Fricker, P., Kotnik, T., & Piskorec, L. (2019). Structuralism: Patterns of Interaction Computational design thinking across scales. *Journal of Digital Landscape Architecture, 4*, 230-247. doi:https://doi.org/10.14627/537663026

Groat, L., & Wang, D. (2013). *Architectural Research Methods* (Vol. 2). New Jersey: Wiley.

Husin, D., Prijotomo, J., & Sugiharto, B. (2021). The Informality of Urban Kampung: A Model of an Architectural Form. *ISVS, 8*(4), 16-30.

Ismawan, D. A. (2008). Kerentanan Kawasan Permukiman Padat terhadap Bencana Kebakaran Kecamatan Tambora Jakarta Barat. *Tugas Akhir*. Semarang: Jurusan Perencanaan Wilayah dan Kota Fakultas Teknik Universitas Diponegoro.

Kustianingrum, D., & Haerdy, R. S. (2023). Sintaksis Pola Ruang Kawasan Permukiman Informal Sentra Tahu Cibuntu Bandung. *Border: Jurnal Arsitektur, 5*(2), 16-26. Retrieved from https://border.upnjatim.ac.id/index.php/border/article/view/718/3

Lake, R. C., & Jeraman, P. (2023). Structuralism perspective to interpret the patterns and meanings found in vernacular architecture. *Local Wisdom Scientific Online Journal, 15*(2), 120-136.

Lake, R. C., & Salura, P. (2021). Revisiting Architectural Structuralism: Archi-Cultural Pattern as a Method to Read the Meaning of Tamkesi Vernacular Architecture. *Journal of Design and Built Environment, 21*(2), 1-9.

Lianto, F., Trisno, R., Choandi, M., & Husin, D. (2020, November). Pemetaan Struktur Luar Kampung Kota Tanjung Gedong. *Jurnal Bakti Masyarakat Indonesia, 3*(2), 466-475. Retrieved from https://journal.untar.ac.id/index.php/baktimas/article/view/8820/6652

DOI: https://doi.org/10.33005/border.v6i2.1088

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