

Urban Fortifications and Quarantine Strategies during the COVID-19 Pandemic

ABSTRACT

This study examines the transformation of urban fortifications and quarantine strategies during the COVID-19 pandemic, focusing on residential enclaves in Jakarta, Indonesia. The research problem centers on how quarantine boundaries were defined within fortified urban enclosures and how residents reacted to spatial changes during the pandemic. The objectives include analyzing the forms of fortification, understanding residents' perceptions, and evaluating the effectiveness of pandemic-related policies. The study employs a mixed-methods approach, combining online questionnaires with 205 informants, field surveys of 36 residential enclosures, and detailed map-tracing techniques to correct and validate spatial data. Findings reveal that fortifications, such as walls and gates, were reinforced during the pandemic, serving as both physical and symbolic boundaries to limit virus transmission. Residents' perceptions highlighted the importance of safety measures, though these measures sometimes contradicted principles of open urban design. The research also identifies key actors influencing spatial patterns, including local officials, security personnel, and residents. Implications of the study contribute to urban design and architectural theory by proposing methods for mapping fortified boundaries and advocating for balanced, resilient urban planning that integrates health protocols without compromising community openness.

KEYWORDS

quarantine, strategic planning, urban health, pandemic, health and architecture, spatial dynamics



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INTRODUCTION

On previous research, the author discussed a study related to the topic of fortification by exploring the phenomenon of changing the building façades after infamous anarchist riots followed by lootings, during waves of demonstrations in Jakarta, on May 1998. Furthermore, the phenomenon that the author understood later, then referred to the theory of fear within the urban and architectural sphere by

Ceccato [1], which discusses aspects of fear as a perspective in viewing space. Next, continued with a challenging study on the principles of The Charter of New Urbanism [2], especially the principle #21 related to openness, where the presence of fortification as efforts to protect the safety and comfort of a housing settlement, actually contradicts the principles of this very Charter.

There have been efforts by the society to better protect themselves, their property, their possessions, and their territory by keeping the additional barriers such as walls or gates. These extra protections are carried out in many forms to increase security measures related to the physical condition of the environment within residential areas. These then result in more closed residential zones, by limiting access for outsiders and residents who live inside. Fortification as a defensible medium within the urban scope (as a reaction to various incidents that shape it) affects the spatial pattern as a result of the application of the residents' urban strategies.

The practical scientific scopes of residential community studies by Duany and Plater-Zybrek, accompanied by Ceccato's are what prompted the authors to examine the topic of fortification further in the context of urban architecture, including also to understand the context in other scientific perspectives, whereas COVID-19 pandemic. This study of fortification has become very relevant to the discussion on territorial restrictions, and/or local and regional quarantine models related to the pandemic outbreak. In a sense, the aspect of fortification plays a role, which states that there is a strategy to limit the movement of people regulated by the governmental policy [3], which regulates the daily activities of urban residents, both in small to larger areas. Different levels of quarantine have been implemented in different countries, but all have actually been reinforcement efforts to contain and limit the spread of the virus. The accumulation of crowds which mediates the acceleration of the spread of the COVID-19 virus was managed by controlling the 5M standard of Indonesia's COVID-19 instructions [4], which includes limiting face-to-face meeting activities within a certain scope of space. The crucial factors of spreading are through airflow and/or transmittable surface medium/object, specifically that are indicated as infected, then recognized as a form of danger, where it is necessary to implement quarantine measures to contain and limit the spread.

In subsequent research developments related to the COVID-19 pandemic, after conducting field observations and collecting study data on a grounded basis, the research emphasis then referred to Spiro Kostof's theory [5][6] regarding walls and gates, as the essence of the boundaries on the existence of a fortress (city) or a form of fortification that defines (a) city territory [7][8] in nature. Other supporting theories are related to urban enclosures, fortified gated communities, and other recent ones related to the context of the COVID-19 pandemic [9][10].

History records, there are examples of cases in several housing complexes in Jakarta, experienced a series of urban fortifications [11] since May 1998's riots during Indonesia's reformation movement. The residents of these neighbourhoods decided to close their gates and limit access to outsiders to protect themselves and their properties, for more safety and protective reasons. Research by Trisnawan, et.al., [12], examined how the fortifications affect the contestation of (urban) spaces. They found that the walls and gates became sort of fortresses that opened other opportunities for activities, such as trading/commercializing, socializing/third

placing, and storing/parking due to functional yet temporal reasons. They also found that the residents had mixed opinions on fortification, spatial use patterns, and its impact on the urban space, affecting their daily activities. A similar comparison to the fortification and architecture perspectives by Hirst [13][14], which saw fortification as a matter of defence places, this research's fortifications were identified also as barriers for security and protection from outsiders, but yet it has been an effort that contradicted to one of the very ideal principles of The Charter of New Urbanism, which encourages modern developments to be more open and liveable.

The research questions arise 1) How to determine the quarantine boundaries of the fortified urban enclosures? 2) How the residents react on spatial changes during the COVID-19 pandemic health quarantine period?

RESEARCH METHOD

Online Questionnaires

In combination with the field survey observational data, map tracings, and identification of walls and gates elements, due to limitations in personally collecting field data during the COVID-19 pandemic, an online questionnaire was conducted using the GoogleForms application to 205 informants. These informants were spread fairly and evenly and must have the criteria of living in any specifically agreed residential enclosure model, which is similar as the other case study models.

Previous interviews were conducted with several informants regarding the form of fortification at several opening case study locations, as well as candidates of the case study objects, to get a general overview on what form of fortification transformation looks like during the pandemic, which is important for consideration in selecting case study objects. This initial step helped in forming additional respondent's list of questionnaires, as a support the data analysis to build a research construction framework and obtain propositions and findings. This method helps build the way data is represented and analyzed accordingly.

Field Surveys

As many as 36 (thirty-six) enclosures of residential complexes in Jakarta and its surroundings (see Figure 1) were picked as objects for this fortification research study. Approximately one-third of the total number of study objects are located within the area, where the author lives. The author witnessed firsthand the phenomenon of fortification and its development until now, including the COVID-19 pandemic period. The form of residential enclosures chosen as study objects is considered as typical fortified urban residential enclave models in the city of Jakarta and its surroundings (Greater Jakarta), with elements of walls and gates, marking its boundaries as then made them fortified territories [15].

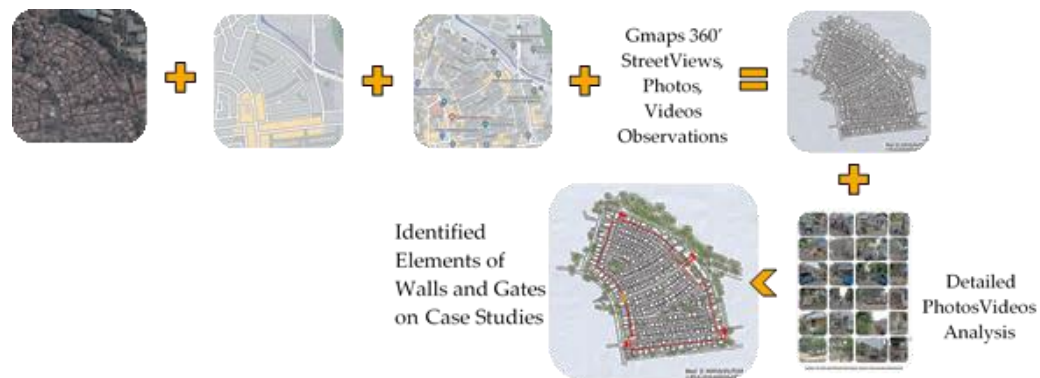


Figure 2. *Detailed Tracing the Maps* method to produce residential enclaves' fortifications map

The novelty of the research lies on the tracing method of maps, by seeing and identifying manually defining boundaries, while correcting mistakes, on different maps available online. Others use existing maps and judge them as valid, using them as is, without further questioning if any errors are found. My tracing methods correct those tracing mistakes by comparing 3 different maps and making necessary adjustments. These steps importantly capture the concept of territorial fortifications, followed by the questionnaire method. The open field research started with a structured interview, based on one fortified urban residential model, followed by more cases through documentation from tracing the combination maps. The research data collection focuses on mapping various forms of wall and gate elements to define the boundaries, as part of the territorial essence of fortification. All layering stages are based on data from field observations, in-depth documentation of the form and variety of fortifications, complemented by simultaneous comparative studies on the analysis, traced with validation and calibration using Google Maps service records (digital drawings and photos of buildings and structures which show the form of fortifications).



Figure 3. Sample case study 01. Fortified area and identified urban fortifications - RW 02 Residential enclave of Kelurahan (District) Kayuputih, Pulogadung, Jakarta Timur

Do, places (hand) drawing techniques in an important position, related to signs, actions, and reactions [16]. Do believes that computational sketching interfaces for architectural design or computer-assisted sketch drawings are sometimes less able to convey the expected information data, although related to the accuracy (size) of the images produced, the computer has more precision.

The drawing boards of all the residential enclosure case studies are represented in a similar style as the graphics above. Every enclosure has been documented to have a territorial boundary [17] map, which explains the positions of wall and gate elements. The map was produced by the detailed tracing of the map technique, to capture the most needed information regarding the spatial configuration of the access of the enclosure.

Post-pandemic, we should envision differently the connection between people and place, evaluating existing paradigms in urban studies to escape change in everyday life that involve repetition and monotony, as these directly affect the way people live related to access and mobility. This perspective refers to three pillars of guidelines by Abusaada (2022), who mentioned: 1) metamorphosis in urban form, 2) changes in public life, and 3) digital transformation in a time of uncertainty [18]. During the pandemic, more and more apps are being developed, to confront (un)seen monotony and boredom changes in public spaces. These changes also affect the shifting behaviors and mobility patterns of the residents during the pandemic within the fortified enclaves of the study cases.

The quarantine period groups, namely 1) The Normal (situation) period, then entered 2) The *PSBB* (Large-Scale Social Restrictions in Indonesian terms) period, when the initial period of the rapid spread of the virus, then 3) The Emergency *PPKM* (Enforcement on Restrictions on Community Activities in Indonesian term) period, 4) Regional Level 3-4 (High-level *PPKM*) and 5) Micro *PPKM* (for smaller health control area), then decreased to 6) Regional level 1-2 *PPKM* or recognized as Low-level *PPKM*. These statuses period spanning from March 2020 until November 2021, where active cases of COVID-19 have reduced to more endemic than pandemic until now.

RESULT AND DISCUSSION

Conception of the urban fortification forms (Quarantine Boundaries)

After the data collecting phase, the research continued to develop and construct some thoughts to write, regarding the conception of forms of fortification during the COVID-19 pandemic, which refers to the following framework diagram on Urban Fortification Forms during the COVID-19 Pandemic (see Figure 4).

The construction of thought (framework) was developed as an important stage of the research after going through a process of literature study, initial research, field observations, detailed tracing maps, identification of walls and gates, along enforcement. These understandings were used for advanced surveys of respondents of the residential enclosures similar to 36 previously fortified residential cases.

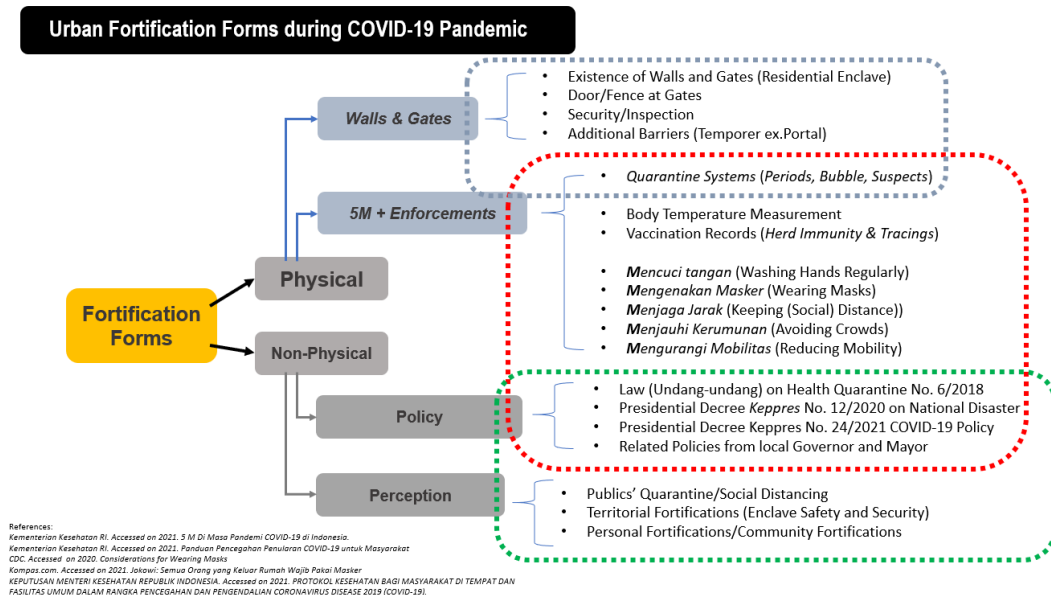
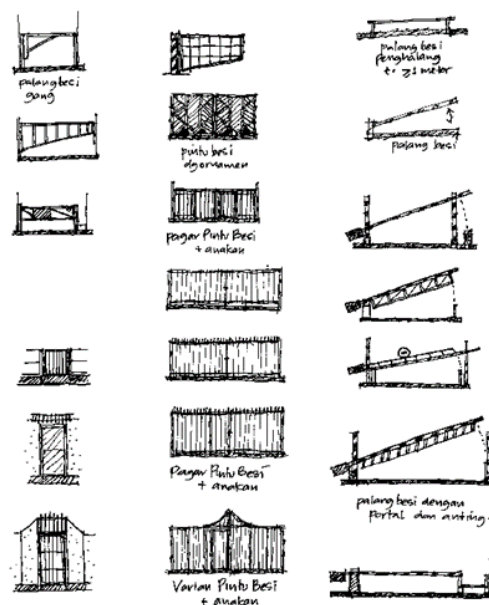


Figure 4. Conceptual Diagram of Fortification Forms during the COVID-19 Pandemic.

The new graphics can be used as the basis for analyzing the spatiality, based on observation and field surveys of residents. The validity of the new base map (tracing results) is suitable for identifying the quarantine boundaries' elements. The elements, also include identification of the shape and model of doors and fences at related gates (see Figure 5), elements of guarding and inspection such as the security guard post (*Satpam*), and other temporary additional barriers.



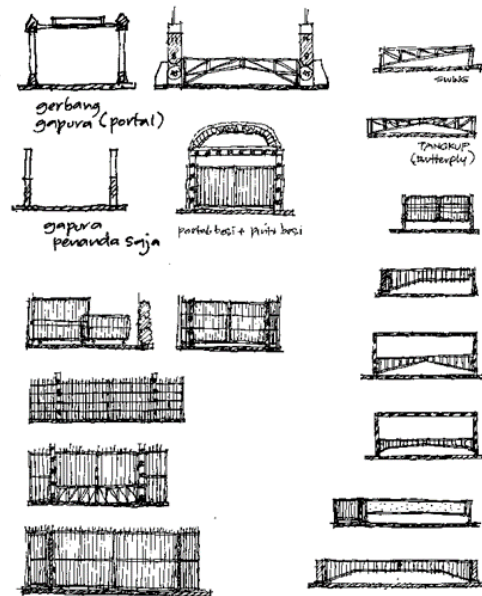


Figure 5. Various designs of the fortification forms (gates/doors) of the enclaves

Perception of the Forms of Fortification

Spatial perception by respondents was formed by understanding of the essential elements of the quarantine fortifications within their own environment, in the form of surrounding walls and access gates, which also define the perceived boundaries. Respondents need to be able to perceive the existence of protection, security, and safety (secure and safe territory), as well as changes in urban behaviors that follow, during fluctuating conditions of the pandemic. These non-physical aspects can be elaborated on in the following subs.

Perception of the Essence of 5M Habits and Enforcements

Respondents' perceptions of the addition of 5M enforcement elements (health protocol rules) and/or COVID-19 enforcement, in the form of 1). Posters or banners regarding messages/warnings about the dangers of COVID-19 and or recommendations for complying with health protocols; 2) Reminder to always wear a mask; 3) Place for washing hands or providing hand sanitizer liquid; 4) Blocking and limiting outsiders to implement the rules of StayAtHome [19], Social Distancing [20], or Avoiding Crowds [21]. Additional information to enforcement completed the results of the respondents' survey.

Effectiveness of Policies for Handling the COVID-19 Pandemic – The Shapers of the Fortification Conception

The effectiveness of the application of personal and communal rules as derivatives of government policy rules, during the Normal (situation) period, the PSBB (Large-Scale Social Restrictions) and also PPKM (Implementation of Restrictions on Community Activities) periods, emergency/high, and low levels.

Community Knowledge regarding the Pandemic on a Surrounding Scale

It is important to acquire a level of community understanding and spatial strategies in dealing with the COVID-19 pandemic situation in the context of its surrounding environments. The results of the survey of 205 respondents became the basis for strengthening the results of tracing walls and gates' conceptions at the identification stage, as well as changes or adjustments to spatial behavior [22] following this situational understanding. The questionnaires help to see the residents' spatial behaviors and patterns (see Figure 6).

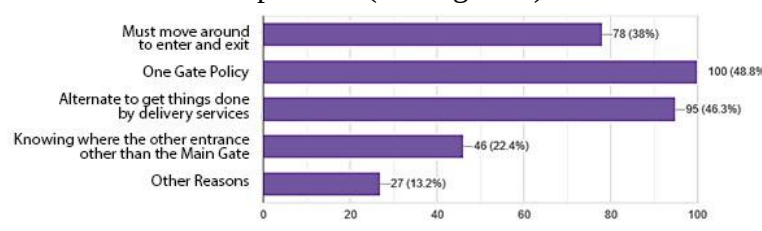


Figure 6. Shifting behaviors and changes in mobility patterns of the residents during the pandemic within the fortified enclaves

Spatial Patterns' Determining Actors Surrounding the Gates

The actors determining the spatial pattern are those who, in daily practice, determine what happens in the scope of study related to the fortification. They are 1) the Government, in this case, the local (*RT/RW*) officials who determine local policies based on the government's regulations (Indonesia's COVID-19 Task Force); 2) Field implementers implementing policies related to quarantine and isolation regulations, including implementing health protocol enforcement. This includes security officers (security guards); 3) Residents of the residential enclave and visitors/guests of the enclave; 4) Holders of spatial "authority" for the informal spaces produced; and 5) The perpetrators of formal commercial and business activities, as well as the informal sector, both goods and services, around the very gates. Further micro-spatial research might be interesting on these matters.

In Figure 7, we have collected photos of all the spatial pattern-determining actors that play a role in the changes at the fortification points (the Gates). They are active actors who make each gate and residential enclave in the case study unique and different. Even though many of the gates are still functioning as gates, more designated gates have transformed into walls during the COVID-19 pandemic. The determinants of spatial patterns can be sorted into the following groups:

- | | |
|---|--------------------------------------|
| 1. Residents | 2. <i>RT/RW</i> local administrators |
| 3. Outsiders (non-resident outsiders) | 4. Security Officer (Security Unit) |
| 5. Food/beverage sellers (non-mobile) | 6. Carts (mobile) food/beverage |
| 7. Service (Sewing & <i>Vermak</i> & Tire Patching) | 8. Beggar (Street Homeless) |
| 9. Motorcyclists | 10. <i>Bajaj</i> driver |
| 11. Car/Motorcycle/ <i>Bajaj</i> "parking person" | 12. Sidewalk Users (Load/Unload) |
| 13. Janitor (Garbage Man) | 14. People Laying Down/Resting |



Figure 7. Determining Actors Surrounding the Gates (Personal Observation and Analysis)

Discussion

The following findings are important to understand that with the quarantine element's tracing method, we were able to define the forms of fortification that occurred in cases of residential enclosures during the COVID-19 pandemic period. In addition, with these findings, the research questions can be answered properly, and breakthroughs regarding methods, techniques, and the possibility of producing new and up-to-date spatial planning development or urban design and architectural theories.

Causal Correlation of Policies and The Forms of Fortification

The presence of forms of fortification in the context of the COVID-19 pandemic triggers changes in new spatial patterns (movements). Nundy et al., (2021) [23], described that when the world began to experience the global pandemic of COVID-19, it had many detrimental impacts on human life, economically, and environmentally, including the energy and transportation sectors, compared to pre-pandemic scenarios. The sectors mentioned above are interrelated so that the lockdown strategy and stay-at-home orders to reduce transmission are effective. During lockdown, all industrial and transport sectors are closed, affecting the reducing numbers of energy use, and yet impacting the grids and generation. Since more and more people are staying at home and using work-from-home schemes, without proper attention to indoor environment quality, this might increase the risk of the disease. In the new normal or the forgotten normal settings, COVID-19 impacts will change and contest the contemporary architecture and urbanism paradigm [24].

Sarkar, et al. (2021) study, showed how population density is vital in explaining the pattern of COVID-19 transmission in Bangladesh [25], in comparison to Dhaka and Narayanganj, also among the worst affected areas, where spatial auto-correlation of population density clusters significantly at 95% confidence intervals, as an influential determinant of the spread in Bangladesh. This quarantine and fortification research, with the same findings as the Bangladesh story, helps the government agencies and the public, determine the boundaries and territorials, in making effective and well-informed decisions to implement strategies to contain the further spread of the virus. Society's responses and epidemiological stats dynamics are mostly significant for consideration.

Residents' Resilience

Chen (2021) considers spatial interactions in terms of travel between cities in a model [26]. Based on the developed model, it can be evaluated how different forces are in efforts to enforce social distancing policies, which can affect compliance rates and ultimately resistance to the spread process. The model developed and the simulation results of Chen's research help build the basis for a better assessment of the level of preparedness of citizens to face COVID-19 and the next pandemic outbreak. On the same token, Afrin suggests rethinking strategies toward resiliencies in urban design, perceptions, and planning [27]. On the other hand, Lak offers lessons learned from the COVID-19 pandemic from a health science perspective, to reach a more resilient urban form that complies with the pandemic [28][29].

In the realm of perception (non-physical), namely the realm related to what is felt and understood based on knowledge and experience that has been and is being experienced by members of the public, socialization activities, updating public information, media opinion, and experience, determine the formation of public perceptions of pandemic response efforts [20][30]. This realm of subtle perception will only be briefly discussed regarding its position.

Consequentially Fortified Residential Enclosure

The role of design has taken place in changes to the boundaries of residential enclaves during the pandemic [31][32]. The fortified enclave that formed is considered the result of human (residents) spatial reaction which forms spatial patterns within the environment. Meanwhile, consequential which means important, necessary, significant, and logical (reasonable), appears as a response. Thus, a consequentially fortified residential enclave can be interpreted as a fortified (settlement) enclosure that has consequential values.

De Cos Guerra (2021) analyzes the spatial pattern of the spread at the environmental level from a space-time perspective [33]. In terms of this research analytics, space-time refers to the pandemic status periods, which are represented on a diagrammatic series of representations of every enclave. Differ from research conducted by Stankowska (2022), which deals with the third wave of COVID-19 versus the residential preferences in Poland, which makes assessments of economic factors and psychological determinants toward it [34], this research sees only the aspects of forming either physical and/or non-physical fortifications, driven by the communal response to policies, and epidemiological report dynamics updated by the National COVID-19 Task Force. Similar to what Li, et al., [2021) see in the heightened 'security zone' function of gated communities during the COVID-19 pandemic [35] and it change the housing market dynamics, about the housing demand with stronger security measures. The presence of a form of physical fortification in the context of the COVID-19 pandemic, resembles a pocket, a residential enclave. It is a logical consequence of the residents' reaction to policy regulations that require them to make efforts to protect themselves, their families, and their environment. These various responses are significant and important things to do, to control the spread of the virus which is also correlative to the policies that preceded it [36]. Based on the discussion and analysis, we see that there are several spatial patterns including the social aspect [37], in the context of the COVID-19 pandemic, as a necessary and important consequence (of its presence), and as a form of citizen reaction to the situation (demands security) and policies, with locus limitations, namely the scope of the settlement where ones live. Another study by Yang, et al., (2023) focuses on the influence of life attitudes, leisure and sports values, and workplace perceptions on urban development and public well-being [38], all with considerations under the risk of COVID-19. This new form of urban fortification research focuses on the conception of a more heightened zone, by a new model of barriers, pushed by the risky pandemic period.

CONCLUSION

This research contributes on: First, the science of architecture in the form of research methods for architects or urban designers on understanding the spatial pattern scenarios of urban space in a more honest, cross-checked, and corrected. The method stood within the contextual presence of actual quarantine and fortification forms, inspected as responses to COVID-19 pandemic urban health. By referring to the essential factors of boundary and fortification, the expected principles of protection and security, as well as aspects of the openness of forms, territories, and spatial strategies, a balance could be defined between fortification efforts, spatial contestation, and community resilience. This would form a more lively, open, community-friendly, inclusive settlement model, in a more dynamic and better residential atmosphere for Indonesian cities.

Specifically in this paper, the contribution on document representation (maps), as a strategic way to obtain new data in the form of basic spatial maps derived through detailed tracing of the maps techniques and represent them again in the form of new images. The freehand drawing strategy was rare, which might not be done by many research architects anymore. Bearing in mind that these drawings produced, have gone through a long and careful process, as records of observations, analysis, comparisons, and execution of the important elements of the form of fortification, into a new informative and corrective spatial map image. In architectural discussions, the representation of information in the form of images is the basic thing that becomes a weapon in conveying findings or ideas.

According to this statement, the authors are certain that the new map results are better for the use of defining the closure and boundary of every enclave researched. Second, the contribution was related to the discussion on boundaries (in real nature), namely about territorial and regional boundaries, to the last discussion about gated communities and the idea of the term consequential fortified residential enclosure in the context of health quarantine (COVID-19 pandemic), as the nature of the new quarantined boundaries. This research provides a new perspective on an investigative model of fortified enclosure formation within the urban living, both planned (gated or non-gated), as well as residential enclosure that were not fortified at all, in the context of health quarantine.

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