

# Commercializing Traditional Green Spaces: A Sustainability Analysis of *Telajakan* Transformations Along Karna Street Ubud Bali

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**Abstract.** This study explores the transformation of *telajakan*—traditional green buffer spaces in Bali—into commercial zones, analyzing the influence of economic, social, environmental, and cultural factors. *Telajakan*, once important for maintaining environmental quality and cultural values, is increasingly being converted into commercial spaces, particularly in tourism-heavy areas. The research was conducted among 44 business operators along Jalan Karna, Ubud, where *telajakan* spaces are being transformed into kiosks. Data were collected using a Likert scale survey to assess the impact of these factors. The regression analysis revealed that while cultural factors significantly resisted the transformation ( $p = 0.008$ ), economic and social pressures, such as financial incentives and community influence, had a greater impact. Environmental factors were not significant. The negative relationship between cultural factors and commercialization suggests that, although respondents did consider cultural values, these considerations were ultimately overpowered by economic priorities or cultural values were adapted to accommodate commercial needs. This study provides empirical insights into how economic forces and social dynamics are driving the commercialization of Bali's traditional green spaces.

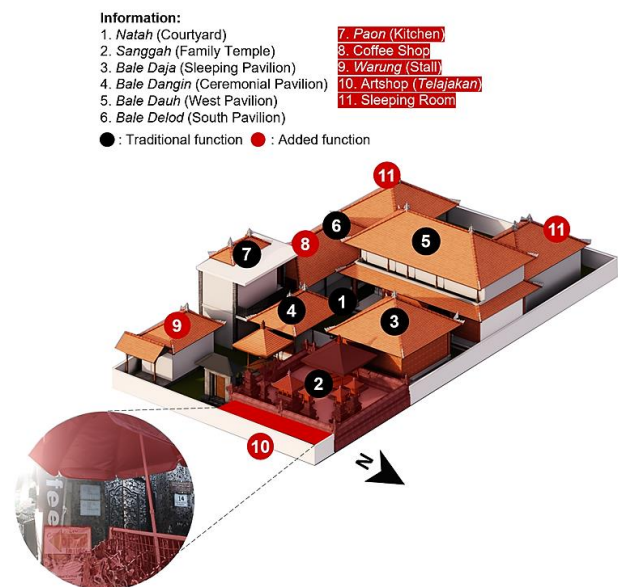
**Keywords;** *Four Pillars Of Sustainability, Telajakan Transformation, Traditional Green Spaces, Tourism-Driven Change*

## I. INTRODUCTION

*Telajakan*, the traditional green space between housing compound walls and roadsides in Bali, plays a crucial role in providing a buffer for noise reduction, improving air quality, and maintaining the aesthetic and cultural values of traditional settlements [1]. However, the rise of tourism and urbanization in Ubud has led to significant transformations of *telajakan* into commercial spaces [2,3]. This research aims to explore the key factors driving these changes and the extent to which economic, social, environmental, and cultural factors influence the transformation process, addressing the central question: What are the primary factors driving the transformation of

*telajakan* from traditional green spaces into commercial areas, and how does the permanence of kiosks correlate with these transformations?

*From Tradition to Transaction: The Commercialization of Vernacular Spaces*



Adapted *Telajakan* as Artshop

**Figure 1.** *Telajakan* in Balinese Traditional Housing

The transformation of *telajakan*—once a culturally and socially significant green buffer—into commercial spaces highlights a profound shift in how vernacular architecture adapts to modern economic pressures [1,4]. Traditionally, *telajakan* served multiple functions, including improving air quality, reducing noise, and providing a space for cultural rituals. These spaces were integral to the social fabric of Balinese communities, representing not just a physical buffer but a symbolic connection between residents and their environment. However, as tourism has become a

dominant economic force, *telajakan* is increasingly being converted into commercial areas to cater to the needs of tourists and business operators. This shift underscores the growing trend of prioritizing economic transactions over the preservation of traditional, community-centered spaces [5,6].

The transformation from community-centered spaces to tourism-driven commercial areas disrupts the original purpose of *telajakan*. Where once these spaces fostered social cohesion and supported cultural practices, they are now redefined to accommodate kiosks, cafes, and shops aimed at generating economic benefits. This commercialization is often seen as a necessary adaptation to meet the demands of urbanization and tourism, but it alters the way communities engage with these spaces. Instead of serving as areas for social interaction or environmental preservation, *telajakan* becomes a commodity, catering to the flow of tourists and external economic needs, which shifts the focus away from local, communal values. As *telajakan* spaces transform, the social impacts of commercialization become more apparent. The shift toward commercial use redefines the community's relationship with the space, altering the way it is perceived and utilized. The once shared, community-centric use of *telajakan* is replaced by commercial ownership and individual profit-making. Furthermore, community pressure plays a key role in this transformation. While some members may support commercialization as a way to increase income, others may resist the change, creating a tension between maintaining cultural integrity and pursuing economic growth. This tension reflects broader societal changes, where economic priorities often override the preservation of traditional, communal spaces.

The transformation of *telajakan* illustrates the broader challenge faced by many traditional spaces in tourism-heavy regions: the need to balance economic growth with social and cultural preservation. While commercialization can bring economic benefits, it often comes at the cost of social cohesion and cultural identity. As these spaces evolve to meet economic demands, it becomes essential to consider how to preserve their social function and maintain a sense of community within the commercial landscape. In the case of *telajakan*, finding a sustainable balance that integrates both commercial activities and the social needs of the community will be crucial in ensuring that these spaces do not lose their cultural and social significance entirely.

### *The Sustainability Imperative in Vernacular Architecture*

As urbanization and tourism continue to reshape traditional landscapes across the globe, the balance between economic growth and sustainability becomes increasingly precarious [7]. In regions like Bali, where vernacular architecture such as *telajakan* plays a critical role in the cultural and environmental identity of the community, the pressures of commercialization threaten to undermine these traditional spaces [8]. This paper addresses the growing challenge of preserving the social, environmental, economic, and cultural values embedded in vernacular architecture while accommodating modern economic demands. By examining the transformation of *telajakan* spaces, this study seeks to highlight the critical importance of integrating sustainable development practices that ensure long-term preservation of community heritage and environmental health without sacrificing the potential for economic growth. The discussion of sustainability across multiple dimensions—social, environmental, economic, and cultural—is essential to understanding how to protect these spaces from unchecked modernization and commercialization.

Vernacular architecture inherently supports social sustainability by fostering strong community bonds, traditions, and shared practices. In traditional spaces like *telajakan* in Bali, these architectural features are not just physical spaces but areas that reinforce social cohesion [9]. The community gathers, interacts, and participates in cultural rituals, all of which strengthen the social fabric. However, as these spaces transform to accommodate commercial activities driven by tourism, the risk of losing this social connection grows. To maintain social sustainability, it is essential to find ways to adapt traditional spaces for modern use while ensuring that they continue to serve their community-building functions. From an environmental sustainability perspective, vernacular architecture like *telajakan* is often naturally aligned with climate-responsive and resource-efficient design principles. These spaces, which traditionally feature greenery, open layouts, and natural materials, help improve air quality and reduce noise pollution. The shift toward commercial use, however, poses a threat to these environmental benefits. The addition of permanent structures and kiosks can reduce green space, contribute to urban heat islands, and increase pollution. Preserving the environmental benefits of traditional architecture during modernization requires strategies that integrate green infrastructure with new developments, allowing spaces to maintain their role as environmental buffers. In terms of economic sustainability, the transformation of vernacular spaces like *telajakan* is

often driven by the desire for economic growth, particularly in tourism-heavy areas like Ubud. Commercializing these spaces can bring economic benefits to local business owners and communities, helping to increase income and improve living standards. However, the challenge lies in ensuring that this economic development is inclusive and long-term, rather than sacrificing the cultural and environmental value of the spaces for short-term gains. Sustainable economic growth in these contexts requires balancing profitability with the preservation of traditional landscapes, ensuring that modernization doesn't undermine the very qualities that make the space attractive to visitors.

**Table 1.** Literature Review of the *Telajakan* Transformation Study

Aspect	Variable
Transformation Level (Y)	Degree of transformation from green space to commercial space <sup>b</sup>
	Permanence level of kiosks in <i>telajakan</i> spaces <sup>c</sup>
Social Aspect (X)	Influence of the community or neighbors on the decisions to commercialize <i>telajakan</i> <sup>d</sup>
	The consideration of social relationship changes <sup>e</sup>
Economic Aspect (X)	Impact of economic benefits on the decision to commercialize <sup>b</sup>
	Impact of transformation costs on decisions <sup>b</sup>
Environmental Factors (X)	Impact of air quality degradation on <i>telajakan</i> commercialization decisions <sup>a</sup>
	Impact of noise pollution on <i>telajakan</i> commercialization decisions <sup>a</sup>
	Impact of green space reduction <sup>a</sup>
	Waste management considerations <sup>c</sup>
Cultural Factors (X)	Impact of traditional ceremonies on decisions to maintain <i>telajakan</i> <sup>b</sup>
	The importance of traditional aesthetics in decision-making <sup>b</sup>
	Impact of daily rituals on the maintenance of traditional elements <sup>e</sup>
	Importance of cultural value preservation in commercialized areas <sup>e</sup>

Note: The table provides a comparative analysis of multiple sources, adapted as follows

<sup>a</sup>Source: Adapted from [5]

<sup>b</sup>Source: Adapted from [10]

<sup>c</sup>Source: Adapted from [11]

<sup>d</sup>Source: Adapted from [12]

<sup>e</sup>Source: Adapted from [13]

## II. RESEARCH METHODOLOGY

This study employs a quantitative research methodology to examine the factors influencing the transformation of *telajakan* into commercial spaces and how the permanence of kiosks correlates with these changes. A regression analysis was chosen due to its ability to quantify the relationship between multiple independent variables (economic, social, environmental, and cultural factors) and the dependent variable (the level of *telajakan* transformation) [14]. SPSS software was used for this analysis because it provides robust tools for handling large datasets and conducting precise statistical evaluations. The research surveyed 40 respondents, all of whom are business operators along Jalan Karna in Ubud, Bali. These respondents were selected due to their direct involvement in the commercialization of *telajakan* spaces, which allowed for detailed insights into the transformation dynamics in this region. A Likert scale was used to assess the degree to which these factors affected respondents' decisions. The data were analyzed using regression analysis to determine the significance of each factor in predicting the level of *telajakan* transformation.

The dependent variable (Y) was the *Telajakan* Transformation Level. The independent variables (X) were social, economic, environmental, and cultural factors (Table 1). The research hypotheses were structured to examine the influence of each factor:

Economic Factors:

- Ho1: Economic factors do not significantly influence the level of *telajakan* transformation.
- H1a: Economic factors significantly influence *telajakan* transformation.

Social Factors:

- Ho2: Social factors do not significantly influence the level of *telajakan* transformation.
- H1b: Social factors significantly influence *telajakan* transformation.

Environmental Factors:

- Ho3: Environmental factors do not significantly influence the level of *telajakan* transformation.
- H1c: Environmental factors significantly influence *telajakan* transformation.

Cultural Factors:

- Ho4: Cultural factors do not significantly influence the level of *telajakan* transformation.
- H1d: Cultural factors significantly influence *telajakan* transformation.

## IV. RESULT AND DISCUSSION

*The Shifting Landscape: Telajakan Transformation and Kiosk Permanence Level*

The commercialization of telajakan spaces in Bali, driven by tourism and urbanization, has resulted in significant changes to these traditional green areas. Once serving key environmental and cultural functions, telajakan are increasingly being repurposed for commercial use. This section presents the results of the study, focusing on the extent of telajakan transformation and the corresponding kiosk permanence. By analyzing these factors, the data provides a clearer understanding of how commercialization is reshaping telajakan spaces, with important implications for both cultural preservation and economic development.

**Table 2.** *Telajakan* transformation and kiosk permanence level

Transformation Level	Number of Respondents	Percentage (%)	Kiosk Permanence Level	Number of Respondents	Percentage (%)
No Change (1)	0	0.0	No Kiosk (1)	0	0.0
Slight Change (2)	1	2.27	Temporary Kiosk (2)	3	6.81
Moderate Change (3)	6	13.64	Semi-Permanent Kiosk (3)	11	25.0
Significant Change (4)	32	72.73	Partially Permanent Kiosk (4)	27	61.36
Complete Change (5)	5	11.36	Fully Permanent Kiosk (5)	3	6.82

The data presented in Table 2 provides a comprehensive overview of the transformation of *telajakan* spaces and the corresponding kiosk permanence levels. *Telajakan*, traditionally functioning as cultural and environmental buffer zones in Bali, are increasingly subject to commercialization due to the pressures of tourism and urbanization. The transformation of these spaces is categorized into five levels: No Change, Slight Change, Moderate Change, Significant Change, and Complete Change. Notably, the data reveals that 72.73% of respondents reported a significant transformation of *telajakan*, highlighting that a large proportion of these spaces have undergone extensive modification. Furthermore, 11.36% of respondents indicated that their *telajakan* had experienced complete transformation, signaling a total departure from the traditional functions of these green spaces. In contrast, 13.64% of respondents reported moderate changes, while only 2.27% indicated slight changes. Significantly, none of the respondents

reported no change, which underscores the pervasiveness of commercialization in the studied areas.

In parallel, the table also presents data on the permanence of kiosks established in these transformed spaces. Kiosk permanence is an important indicator of how entrenched commercialization has become within *telajakan* areas. The data shows that 61.36% of respondents reported the presence of partially permanent kiosks, suggesting that commercial structures have been integrated into *telajakan* spaces in a relatively fixed manner, yet still allow for some degree of temporary use. Additionally, 25% of respondents identified semi-permanent kiosks, which indicates that commercial activities, while not entirely permanent, are expected to persist for extended periods. Moreover, temporary kiosks account for 6.81%, while fully permanent kiosks represent 6.82% of the structures, signifying that in certain cases, commercialization has fully taken hold, making these kiosks a lasting presence within the space.

The relationship between *telajakan* transformation and kiosk permanence is evident in the data. As *telajakan* spaces undergo more significant transformations, the permanence of kiosks increases correspondingly. For instance, a substantial number of respondents who reported significant changes in *telajakan* also indicated the presence of partially permanent kiosks, reflecting a direct correlation between the extent of transformation and the integration of more permanent commercial structures. Similarly, respondents who noted complete transformation of their *telajakan* spaces were also more likely to report the presence of fully permanent kiosks. This relationship highlights the progressive nature of commercialization, where initial temporary kiosks evolve into semi-permanent and eventually fully permanent fixtures as *telajakan* spaces are increasingly utilized for economic purposes.

These findings point to the increasing entrenchment of commercialization within *telajakan* spaces, driven largely by tourism-related activities. The predominance of significant and complete transformations, coupled with the presence of semi-permanent and fully permanent kiosks, suggests that these spaces are being fundamentally repurposed for commercial use. The absence of no change responses underscores the idea that commercialization is nearly universal in the studied areas, raising concerns about the long-term implications for both the cultural and environmental sustainability of these traditionally significant spaces. The transition from a primarily green and communal space to one dominated by commercial structures reflects the tension between preserving cultural heritage and meeting the economic demands of tourism. In conclusion, the data in Table 2 provides clear evidence of



the widespread commercialization of *telajakan* spaces in Ubud. The levels of transformation and the permanence of kiosks suggest that the traditional role of *telajakan* is being increasingly compromised. As these spaces continue to be repurposed for tourism and commercial activities, the presence of semi-permanent and permanent kiosks signals that these changes are becoming long-lasting and difficult to reverse. The findings highlight the need for sustainable urban planning to ensure that *telajakan* spaces can continue to serve their traditional cultural and environmental functions while accommodating the growing demands of tourism. It is crucial to develop strategies that balance economic development with the preservation of cultural identity and environmental value to prevent the complete erosion of these significant vernacular spaces.

#### *Regression Analysis: Factors Shaping the Commercialization of Telajakan*

Table 3 presents the results of a regression analysis, which examines how economic, social, environmental, and cultural factors affect the transformation of *telajakan* spaces. The R-squared value is 0.274, indicating that these four factors explain about 27.4% of the variation in *telajakan* transformation. While this suggests that the model has moderate explanatory power, it also implies that other factors not included in the analysis may be influencing the transformation process. Regarding economic factors, the positive coefficient of 0.2880 suggests that as economic pressures increase, the transformation of *telajakan* spaces becomes more likely. However, the p-value of 0.123 is higher than the standard threshold of 0.05, meaning this result is not statistically significant. This outcome is unexpected, given the common assumption that economic pressures, especially from tourism, would play a major role in driving the transformation of these traditional spaces. While economic factors may still influence decisions, their impact does not appear to be statistically strong in this case.

**Table 3.** Regression analysis: Significance of each aspect to the transformation of *telajakan*

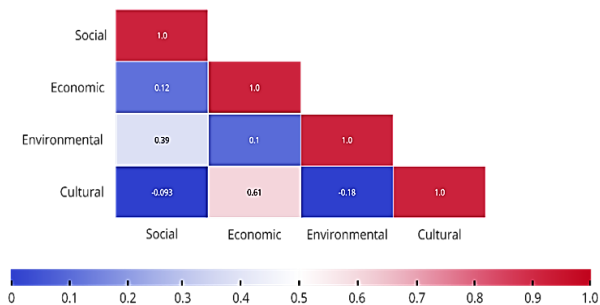
Aspect	Coefficient	p-value	Significance
Economic Factors	<b>0.2880</b>	<b>0.123</b>	Not Significant
Social Factors	<b>0.0976</b>	<b>0.522</b>	Not Significant
Environmental Factors	<b>0.1797</b>	<b>0.277</b>	Not Significant
Cultural Factors	<b>-0.2539</b>	<b>0.008</b>	Significant
<b>R-squared</b>	<b>0.274</b>		

Social factors show a positive coefficient of 0.0976, indicating a slight positive relationship with *telajakan* transformation. However, the p-value of 0.522 shows that this relationship is also not statistically significant. This result implies that social dynamics, such as community influence, do not strongly affect the decision to transform *telajakan* spaces. Even though social factors are often considered influential in communal decision-making, they appear to have a minimal role in this particular context. Environmental factors exhibit a positive coefficient of 0.1797, suggesting that environmental pressures, such as degradation or loss of green spaces, might be associated with increased *telajakan* transformation. Nevertheless, the p-value of 0.277 indicates that environmental factors are not statistically significant in this model. This is noteworthy because *telajakan* traditionally serve important environmental functions, such as improving air quality and reducing noise pollution. The insignificance of environmental factors suggests that these concerns may be overlooked in favor of other priorities, such as economic or cultural factors. In contrast, cultural factors show a statistically significant influence on *telajakan* transformation, with a negative coefficient of -0.2539 and a p-value of 0.008. This indicates that stronger cultural values are associated with a decrease in the likelihood of *telajakan* spaces being transformed into commercial areas. This finding underscores the importance of cultural preservation efforts in resisting commercialization. Communities that value their cultural heritage are more likely to retain the traditional functions of *telajakan*, using them as cultural and environmental buffers rather than converting them into commercial spaces.

In conclusion, the regression analysis indicates that cultural factors play the most significant role in preserving *telajakan* spaces, while economic, social, and environmental factors have less significant impacts. This highlights the critical importance of cultural values in resisting the pressures of commercialization, particularly in tourism-driven areas. Communities that prioritize cultural preservation are more likely to protect the traditional functions of *telajakan*, emphasizing the need for cultural sustainability amid rapid urbanization.

### Discussion: Insights from Correlation Analysis of *Telajakan* Transformation

Based on the correlation heatmap between social, economic, environmental, and cultural factors, several key relationships emerge that provide insights into the dynamics of *telajakan* transformation. The most notable observation is the moderate positive correlation (0.61) between economic and cultural factors. This suggests that as economic pressures increase, there may be a corresponding emphasis on cultural considerations, perhaps due to efforts to maintain a balance between commercialization and cultural preservation. It highlights the nuanced interaction where economic growth and tourism could potentially coexist with the safeguarding of traditional values. Similar findings have been observed in studies on cultural landscapes, where economic opportunities, such as tourism, often drive transformations but also incentivize communities to preserve cultural elements that attract visitors [15]. However, these studies also caution that while economic growth may foster cultural preservation initially, it can eventually lead to cultural commodification if not managed sustainably [16].



**Figure 2.** Correlation heatmap between aspects

The mild positive correlation (0.39) between social and environmental factors suggests that communities with stronger social cohesion are more likely to prioritize environmental impacts, such as preserving green spaces or reducing pollution during commercialization. However, in contrast, studies in other tourism-heavy regions, such as Chiang Mai in Thailand, have shown that social cohesion can weaken under intense economic pressures, leading to the neglect of environmental concerns. This suggests that while social cohesion may currently support environmental preservation in areas like Karna Street, it may diminish if economic drivers become too dominant [17].

The weak negative correlation (-0.18) between cultural and environmental factors suggests a potential trade-off between preserving cultural heritage and

promoting environmental sustainability. For example, efforts to maintain cultural rituals or aesthetic elements may sometimes conflict with environmental priorities, such as preserving green spaces. This tension is reflected in studies by Rapoport (2005), who argued that built environments often prioritize symbolic cultural meanings over ecological considerations, particularly in urbanized settings [18]. Additionally, the weak negative correlation (-0.093) between cultural and social factors suggests that efforts to preserve cultural traditions do not always align with strong social pressures or community influence. This finding aligns with previous research, which highlighted that cultural preservation in Bali often operates independently of social dynamics, especially when cultural values are institutionalized through policy or tourism-driven narratives rather than grassroots community initiatives [19,20].

In conclusion, the heatmap shows how different factors interact with each other in the process of *telajakan* transformation. Economic and cultural factors often work together, which suggests that economic growth might still respect cultural traditions. However, social and environmental factors don't always align perfectly with cultural preservation, meaning that efforts to protect green spaces can sometimes clash with maintaining cultural practices. This highlights the complex challenges in balancing tourism, economic growth, and cultural preservation when it comes to managing traditional green spaces like *telajakan* in Bali.

### IV. CONCLUSION

In this study, the transformation of *telajakan*—Bali's traditional green buffer spaces—was analyzed through both regression and correlation analyses, revealing the intricate interplay of economic, social, environmental, and cultural factors. The regression analysis indicated that cultural factors were the most significant in reducing *telajakan* transformation, with a negative coefficient (-0.2539) and a significant p-value (0.008). This means that stronger cultural values actively discourage the commercialization of *telajakan* spaces, demonstrating the role of cultural preservation in resisting change. Interestingly, social, economic, and environmental factors did not show statistically significant results in the regression analysis, contrary to what might be expected in a tourism-driven region.

The correlation analysis further revealed that economic and cultural factors have a moderate positive relationship (0.61), suggesting that as economic pressures

grow, there is a parallel emphasis on cultural considerations. This may indicate that economic development in Bali still respects cultural values, perhaps as a strategy to attract tourists by maintaining the area's cultural authenticity. However, the weaker and sometimes negative correlations between other factors, such as the weak alignment between social and cultural factors (-0.093), highlight the potential conflicts between community pressures and cultural preservation in the context of transformation.

Sharpening these findings through Amos Rapoport's theory of environmental behavior and meaning, we can better understand why cultural factors emerge as significant in *telajakan* transformation [18]. According to Rapoport, the physical environment, including elements like *telajakan*, serves not just functional needs but is deeply intertwined with meaning and cultural symbols. In this context, *telajakan* spaces are not merely green buffers; they are imbued with cultural significance that reflects the identity, rituals, and values of the Balinese community. Rapoport argues that people use the built environment to express and sustain their cultural identity, and thus, transformations that threaten this symbolic meaning—such as commercialization—are met with resistance, as shown by the significant role of cultural factors in the regression analysis.

In conclusion, the study supports the idea that while economic and social drivers are powerful forces in tourism-heavy regions, it is the cultural meaning of spaces—in line with Rapoport's theory—that plays the most critical role in resisting change. *Telajakan* spaces, as cultural artifacts, are preserved not merely for functional reasons but because they embody the core values of the community. Therefore, any future planning or development strategies should carefully balance economic development with cultural preservation to maintain the integrity and meaning of these traditional spaces.

#### ACKNOWLEDGMENT

The authors are grateful to *Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi* (Center for Higher Education Funding - BPPT) and Endowment Fund for Education Agency (LPDP) for supporting this study.

#### REFERENCES

- [1] Kato S, Hishiyama K, Darmadi A A K, Dwijendra N K A and Suprpta D N 2019 Open J. Ecol. 09 15–24
- [2] MacRae G 2016 Ann Tour Res. 59 16–29
- [3] Juniawati G R 2022 JP2WD. 06 276–286
- [4] Prajnawrdhi T A 2018 MATEC Web of Conferences, vol. 159, p. 01002
- [5] Aryadiva I G N A, Semarajaya C G A and Astawa I N G 2019 JAL. 05 133–140
- [6] Wijaya K M, Warnata I N and Mustika N W M 2022 ARTEKS. 07 289–300
- [7] Aboulnaga M and Mostafa M 2019 Sustainability Principles and Features Learned from Vernacular Architecture: Guidelines for Future Developments Globally and in Egypt (Cham: Springer)
- [8] Nasir O and Kamal A M 2021, Am. J. Civ. Eng. Archit. 09 219–231
- [9] Mayuzumi Y 2022 JSRSAL. 06 423–451
- [10] Kato S, Hishiyama K, Darmadi A A K and Suprpta D N 2017 Open J. Ecol. 07 1–11
- [11] Brata B, Seloka I B and Wartha I B N 2019 Open J. Ecol. 09 171–182
- [12] Hishiyama K 2018 jpasurban. 2018 39–56
- [13] Harianggara D N M, Sugianthara A A G and Krisnandika A A K 2023 JAL. 09 231–240
- [14] Slinker B K and Glantz S A 2008, Circ. 117 1732–1737
- [15] Singh K R and Priya C 2019 10th International Conf. on Digital Strategies for Organizational Success
- [16] Ruhanen L and Whitford M 2019, JHT. 14 179–191
- [17] Lo Y C and Janta P 2020 Front. Psychol. 11 1–14
- [18] Rapoport A 2005 Culture, Architecture, and Design (Chicago, IL: Locke Science Publishing Company)
- [19] Daging I G, Martiningsih I G A G E and Arnawa I K 2019 IJCRR. 10 21229–21236
- [20] Adhika I M and Putra I D G A D 2020 Geo J. Tourism Geosites. 33 1462–1469