



**RESIDENTS' PERCEPTION OF THE HABITABLE BUILT
ENVIRONMENT QUALITY IN INFORMAL RIVERBANK
SETTLEMENTS, CASE STUDY: JODIPAN COLORFUL VILLAGE,
INDONESIA**

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Abstract

The transformation of Jodipan Colorful Village (Kampung Warna Warni Jodipan) from slums into tourist locations is leading to new activities in public spaces. However, these areas are not fully optimized as tourist locations due to the physical environment and residents' conditions factors. Evaluating the quality of the environment is crucial to creating comfort for residents and visitors while ensuring sustainability. The behaviour of these residents also plays a critical role in determining the quality of the environment. Therefore, this study aimed to explore the perception of residents in assessing and classifying the quality of livable built environments in the riverside settlements of Jodipan Colorful Village. The exploration was carried out in District 2 which was divided into sub-districts 6, 7, and 9. The data was collected through a questionnaire distributed to 169 respondents who reside in Jodipan Colorful Village and aged 17 years. Furthermore, data analysis adopted mean score analysis and instrument testing with validity and reliability tests. The results showed that all three sub-districts had medium quality levels where sub-district 6 achieved a mean score of 3.06 and sub-districts 7 as well as 9 both recorded 3.03. Residents positively evaluated physical aspects such as road conditions and roof quality while aspects including the location of settlements and street widths were viewed negatively. Despite these observed differences, the perceptions were useful for assessing environmental quality attributes. Consequently, physical aspects that moderately or adversely affected the quality of the village should be reviewed to maintain environmental quality and sustainability.

Keywords: Residents' Perceptions, Livable Built Environments, Quality Assessment, Riverbank Settlement, Tourist Locations.

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INTRODUCTION

The Ministry of Public Works and Public Housing of Indonesia (PUPR) predicted that around 60% of Indonesian population will be living in the middle cities by 2025 (Ministry of PUPR, 2016). Due to the high demand for housing originating from urbanization, communities tend to create informal settlements which can impact the decrease of environmental quality. Other impacts of the urbanization phenomenon are slum settlements and poverty (Minnery et al., 2013) which will interfere with the sustainability of the city (Yuan et al., 1999). This urbanization impact prompts various mitigation actions focusing on sustainability, quality of life, and livability (Aliakbari et al., 2017; Pedro et al., 2021), specifically in developing countries (Yakob et al., 2012). Livability represents a critical component of Sustainable Development Goals (Kovacs-Györi et al., 2020) with indicators essential for assessing urban and housing quality (Ghasemi et al., 2018). Improving the quality of life in cities remains an important issue in urban planning (Mouratidis, 2021).

In this context, the “Kota Tanpa Kumuh” (KOTAKU/City without Slums) program has been found to reduce slum settlements in Malang City by 310.38 hectares since the inception in 2015. However, 72.37 hectares still require attention regarding the quality of the settlement. Uncontrolled urbanization has also caused unplanned growth and development in Jodipan Sub-district due to informal management (Wulandari et al., 2023). Residential areas without good management also have the potential to cause discomfort among residents (Yang et al., 2011). Furthermore, the position of the village which is lower than the surroundings possesses an impact on Malang City being perceived as a slum (Wulandari et al., 2023). This also impacts the quality of built environments in Jodipan Colorful Village which remains suboptimal.

The transformation of Jodipan Colorful Village (*Kampung Warna Warni Jodipan*) from slums to tourist locations has fostered new activities, particularly in public spaces such as road corridors frequented by tourists (Ratnawati et al., 2019). The transition of the Jodipan Colorful Village is shown in figure 1.

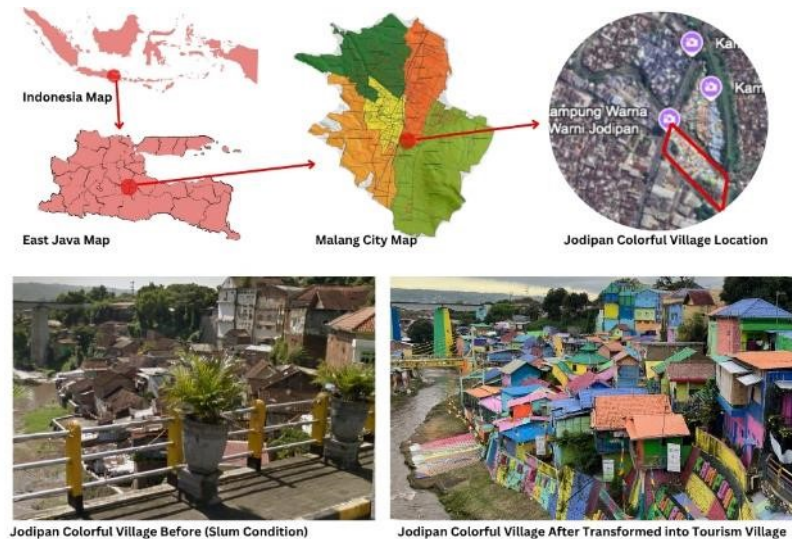


Figure 1: Location and Transformation of Jodipan Colorful Village

Due to forced conditions, Jodipan Colorful Village is not fully recognized as a tourist location, judging from the physical condition of the environment, infrastructure, and residents (Ningsih, T. R., 2017). Meanwhile, Tourist destinations must offer experiences aligned with market needs in order to maintain a competitive edge and thrive (Fan *et al.*, 2024). This phenomenon of the village changes and development underscores the importance of assessing the quality of livable built environments from both residents' perceptions and field conditions. Furthermore, cities evolving into tourist destinations significantly experience a process of mutual influence between residents and communal spaces (Wulandari *et al.*, 2023). This happened because the government made plans to improve residential conditions in inadequate settlements which is outlined in Law No. 4 of 1992 concerning housing and settlements. The Ministry of PURR initiated a program called KOTAKU to improve the quality of slum settlements, prevent the evolution of new slums, and support sustainable living (Ditjen PUPR, 2016). Therefore, continual evaluation of the initiatives is crucial to assess, uphold, and enhance residential environment quality in Jodipan Colorful Village, preserving the role as a tourist destination.

Unplanned growth of informal settlements fails to meet livable standards (Sabila *et al.*, 2021; Atika, 2020). The term "livability" can be defined as peoples' satisfaction with human and physical surroundings (Mulligan *et al.*, 2004), alongside the interactions with the environment (Campbell *et al.*, 1976; Stimson *et al.*, 2011). Physical (Ekartaji *et al.*, 2016), social, and economic factors (Krisandriyana, 2017) are fundamental aspects that influence the quality of livable built environments for residents. Environmental planning and the

provision of livable housing significantly impact residents living conditions (Kashef, 2016; Yakob et al., 2012).

The condition of residential environment in a location is greatly influenced by the interactions and relationships formed between residents. The habitable environment is very dependent on residents because every action taken by humans will affect the surroundings positively and negatively (Yuliastuti et al., 2011). Residents' perceptions can be used as a tool to assess the environmental quality attributes of settlements (Aslim et al., 2014). Environmental quality based on public perception can also be used as a method to persuasively explore the level of satisfaction and quality of environmental conditions. However, this will be with the limitation of results that are not isoform (equivalent) to all conditions in the world (Aslim et al., 2014). Based on this phenomenon, investigating residents' perceptions to assess and classify the quality of livable built environments based on physical aspects in the riverside settlement of Jodipan Colorful Village in Malang is essential.

LITERATURE REVIEW

Livability of Riverbank Settlement

The concept of adequate housing referred to the physical condition of the environment as assessed from the perspective of individuals in society, who evaluated housing quality (Heylen, 2006). According to Sari et al. (2014), informal settlements in riverside areas often evolved into uninhabitable slums. Decent housing also included the comfort level of the settlement as a suitable living environment for humans. Various factors could influence the settlements' comfort including building density, vegetation, air temperature, humidity, and building geometry (Maru et al, 2016). Furlan (2016) further explained that residential environment, specifically public open spaces, should be designed to promote social interaction between communities. Furthermore, Luhst (1997) emphasized that the quality of life including comfort and security in a home was greatly influenced by the location.

In this context, efforts to address uninhabitable or slum settlements were initiated by the Ministry of PUPR through KOTAKU which described livable settlements' indicators. The components of livable settlements consisted of physical environments that supported the social and economic activities in the community. This included not only livable housing but also well-designed environmental infrastructure, open spaces, and vegetation.

Physical Indicators that Formed the Quality of Livable Built Environments

Spatially, livable built environments included open and closed spaces comprising buildings and structures (built-up area/building coverage) (Pangarso, 2017). Informal settlements along riverbanks were included in the built environments category where urban villages often lacked adequate environmental quality conditions (Aslim et al., 2014).

Based on this context, the quality of a residential environment depended on environmental variables that influenced the overall quality including both location and physical variables (Rapoport, 1983). Physical aspects of buildings and the environment could be used as metrics for evaluating the quality of livable built environments (Cipta Karya PU, 2006). Assessing the quality of built environments included considering various physical indicators that contributed to the overall quality as presented in Table 1.

Table 1: Framework of Physical Indicators of Livable Built Environments' Quality

Physical Aspects	Indicators	References
Building Density	Open space and built-up/building coverage ratio	Soemarwoto, (1991); Cipta Karya PU, (2006)
	The distance between houses	Anugrah et al., (2021)
Settlement Location	Distance of settlements to activity centers, sources of pollution, and danger	Rapoport, (1983); Dursun et al, (2009); Cipta Karya PU, (2006)
Entry Road Width	Easy or not accessibility	Dursun et al, (2009); Atika, 2020; Fitri, (2021); Prabowo et al, (2021)
Road Surfaces Condition	Greater average road width led to better quality	Cipta Karya PU, (2006)
	Availability of adequate infrastructure	Anugrah et al, (2021).
Vegetation	The condition of the road surface from the type of road paving material	Cipta Karya PU, (2006).
	Vegetation as Environmental Comfort Management	Dursun et al, (2009).
Building Layouts	The existence of protective trees provides shade and absorbs pollutants	Cipta Karya PU, (2006).
	Spatial aspects: architectural characteristics, building dimensions, and building layout	Dursun et al, (2009)
Building Roof Quality	Building order, uniformity of facing direction, and building shape	Prasetyo et al., (2013); Cipta Karya PU, (2006).
	The quality of the building roof, and the physical appearance includes the quality of the building roof elements	Ekartaji, 2016; & Cipta Karya PU, (2006)

Residents Perceptions of the Physical Quality of Livable Built Environments

In perception, individual differences in experiences and frames of reference could lead to varying results despite the stimulus remaining the same (Sarwono., 1994; Schiffman et al., 2004; Kotler et al, 2001; & Robbin., 1996). Residents also play an important role in determining environmental quality, influencing both attitudes and behaviours that impact the quality of residential environments (Bwarlele et al., 2023; Simbang et al., 2019). Aslim et al. (2014) stated that residents' perceptions served as a tool to assess the environmental quality attributes in

settlements. Although public perception of environmental quality could effectively gauge satisfaction levels and environmental conditions, the results may not be universally applied (Aslim et al., 2014).

RESEARCH METHODOLOGY

This study used a quantitative method to explore residents' perceptions in assessing and classifying the quality of livable built environments in the riverside settlements of Jodipan Colorful Village focusing on the physical aspects. The selection of observation zones was segmented based on administrative sub-districts considering different locations and physical conditions.

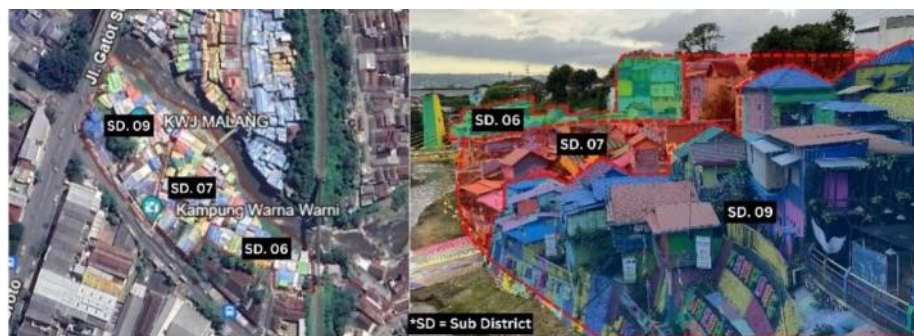


Figure 2: Location of Jodipan Colorful Village, Malang

The data collection included a questionnaire administered to 169 respondents aged a minimum of 17 years residing in Jodipan Colorful Village. The questionnaire comprised four parts including respondent characteristics (8), introductory questions (2), and quality assessment of livable built environments (10). The data analysis used mean score analysis and instrument testing including validity and reliability tests. This analysis aimed to show the quality of each sub-district and village based on residents' perceptions of physical aspects using a Likert scale depending on the mean score method. The Likert scale incorporated five levels of livable built environments quality satisfaction namely 1.00-1.79 (overly low quality), 1.80-2.59 (low quality), 2.60-3.39 (moderate), 3.40-4.19 (high quality), and 4.20-5.00 (very high quality). The analysis was expected to identify the most common and significant issues of physical aspects that possessed a moderate and bad influence on the quality of livable built environments in the village.

RESULTS AND DISCUSSION

Quality of Livable Built Environments in Jodipan Colorful Village Based on the Actual Physical Condition Assessments

Physical assessments were carried out using ArcGIS software to determine the scores for each physical parameter contributing to the quality of livable built environments. Weighting and calculation of values determined the classification of housing environment quality by adding up the value originating from the multiplication of the weights of each parameter which further influenced the value of the weight factor for each parameter.

Table 2: Analysis of Actual Conditions of Livable Built Environments' Quality

Variable	SD6		SD7		SD9		Summary
	Score	Weight	Score	Weight	Score	Weight	
Physical Aspects That Formed the Quality of Livable Built Environments							
Building Density	2.00	6.00	1.00	3.00	2.00	6.00	Moderate
Settlement Location	2.00	6.00	2.00	7.00	2.00	5.00	Moderate
Entry Road Width	1.00	2.00	1.00	2.00	1.00	2.00	Low
Road Surfaces Condition	3.00	6.00	3.00	6.00	3.00	6.00	Good
Vegetation	1.00	3.00	1.00	3.00	1.00	3.00	Low
Building Layout	1.00	1.00	1.00	1.00	1.00	1.00	Low
Building Roof Quality	3.00	3.00	3.00	3.00	3.00	3.00	Good
Livable Built-Environment Quality							
Sub-district Scale	27		25		26		Moderate
District Scale			26				Moderate

*Scoring test's interval value: (1.00) low; (2.00) moderate; (3.00) good

*Built-environment quality classification interval value: (15-25) low; (26-36) moderate; (37-45) good
SD6 (Sub-district 6), SD7 (Sub-district 7), SD9 (Sub-district 9)

Jodipan Colorful Village in general was classified as having moderate quality of livable built environments based on the physical condition assessments. Sub-district 7 had a lower score in the physical aspect assessment compared to other sub-districts, suggesting low quality of livable built environments in the area. Key aspects influencing built-environment quality included architectural conditions (Fitri, 2021; Atika, 2020; & Prabowo et al, 2021). Based on physical assessments using ArcGIS software, scoring, and weighting methods, positive influences were observed in road surface conditions and building roof quality (1.00), moderate influences in building density and residential location (2.00), and negative impacts in entry road width, shade trees, and building layout (3.00).

Residents' Perceptions of Livable Built Environments in Jodipan Colorful Village

Demographic profiling showed that 37.3% of respondents were aged 26-35 years with 30.2% aged 17-25 years. In terms of gender, female respondents accounted for 53.8% of the sample. In terms of domicile status and length of stay, 63.3% were native citizens, and 79.3% had resided in the village for over three years.

Table 3: Respondents' Profiling

Variables	Variables	SD6	SD7	SD9	Total	%
Age	17-25	11	20	20	51	30.2
	26-35	9	26	28	63	37.3
	36-46	5	5	20	31	18.3
	46-55	4	6	10	20	11.8
	>55	2	2	0	4	2.4
Gender	Male	18	20	39	78	46.2
	Female	13	39	39	91	53.8
Domicile Status	Local Natives	25	37	44	107	63.3
	Comers	6	22	34	62	36.7
	<1 years	0	4	1	5	3
Length of Stay	1-3 years	5	15	10	30	17.8
	>3 years	26	40	67	134	79.3

SD6 (Sub-district 6), SD7 (Sub-district 7), SD9 (Sub-district 9)

Understanding the physical characteristics of built environments was critical for effective village development planning programs. Furthermore, Table 4 presented results based on seven physical aspects influencing the quality of livable built environments across sub-districts of Jodipan Colorful Village.

Table 4: Analysis of Livable Built Environments Quality Based on Residents' Perceptions

Variable	Mean Score			Validity Test	Reliability Test	Summary
	SD6	SD7	SD9			
Physical Aspects that Form the Quality of Livable Built Environments						
Building Density	2.9	2.69	2.9	0.615	0.765	Moderate
Settlement Location	2.96	2.23	2.37	0.563	0.765	Low quality
Entry Road Widht	2.48	2.18	1.91	0.581	0.765	Low quality
Road Surfaces Condition	4.22	3.86	3.7	0.380	0.765	Good quality
Vegetations	2.83	3.43	3.37	0.425	0.765	Moderate
Building Layout	2.45	2.6	2.75	0.666	0.765	Moderate
Building Roof Quality	4.00	3.95	3.96	0.345	0.765	Good quality
Livable Built-Environment Quality						
Sub-district Scale	3.06	3.03	3.03	0.859	0.765	Moderate
District Scale	3.19	3.19	3.19	0.687	0.765	Moderate

*Validity test's significant value at 0.05

*Reliability test's Alpha Cronbach Coefficient >0.6

SD6 (Sub-district 6), SD7 (Sub-district 7), SD9 (Sub-district 9)

In this context, respondents agreed that the overall quality of livable built environments was in the neutral/moderate category with an overall mean score of 3.19. Based on the results of the questionnaire analysis, the three sub-districts were classified as neutral environmental quality, suggesting neither good nor bad based on residents' assessments. Environmental quality based on public perception could be used as a method to persuasively explore the level of satisfaction and quality of environmental conditions. However, this would be with the limitation of results that were not isoform (equivalent) to all conditions in the world (Aslim et al., 2014). Seven indicators were further identified to contribute to significant differences in the quality of livable built environments

in sub-districts of Jodipan Colorful Village. The following key discoveries were based on physical aspects that formed the quality of livable built environments.

a) Residents' Perceptions of Building Density in Jodipan Colorful Village

Residents assessed the density of residential buildings in the three sub-districts as moderate. Sub-districts 6, 7, and 8 received a total mean score of 2.9, 2.69, and 2.9 respectively. These perceptions were formed due to adaptations formed while living in densely populated riverbank settlements. Internal factors such as experience and adaptation processes also shaped residents' perceptions in the interactions with the local environment (Simamora, 2008).

b) Residents' Perceptions of Settlement Location in Jodipan Colorful Village

Residential location in this village was rated as low quality across sub-districts. This assessment was influenced by indicators measuring how close residential blocks were to activity centers that could pose pollution or risk (Anugrah et al., 2021). Sub-districts 9 and 7 were areas directly affected by the flash flood disaster from Batu City and settlements along Brantas watershed including Jodipan Colorful Village which occurred on Thursday, November 4, 2021. Furthermore, sub-district 6 had the worst conditions because the location was at the very edge compared to 7 and 9 (Aru et al., 2018). Sub-district also bordered directly on sources of pollution and danger in the form of rivers and railroads.

c) Residents' Perceptions of Street Width in Jodipan Colorful Village

The width of the entrance to Jodipan Colorful Village was assessed as low quality with a score of 2.11. Specifically, sub-districts 6, 7, and 9 scored 2.48, 2.18, and 1.91 respectively. This assessment arose from the challenges in accessibility due to narrow roads ranging from 1 m to 3 m wide. Jodipan Colorful Village's contoured topography necessitated ramp-like circulation paths, accessible only to two-wheeled vehicles but not wheelchairs or four-wheeled vehicles (Bahar et al., 2019).

d) Residents' Perceptions of Road Surface Condition in Jodipan Colorful Village

The condition of the road surface was considered to be of good quality due to changes in the conditions when the village was still a slum and the current conditions after it became a tourist location. Before the village became a tourist location, the surface of the road was still dirt with some patches of cement leading to water pooling issues instead of proper drainage (Aru et al.,

2018). Currently, 90% of road surfaces in sub-districts 6, 7, and 9 were paved or cemented. This improvement in road surface quality significantly influenced public perception of road attributes, shaped by internal factors such as experience, needs, and adaptation processes, as well as external elements including physical characteristics, color, or size (Simamora, 2008).

e) Residents' Perceptions of Vegetation in Jodipan Colorful Village

Residents possessed the perception that the shade trees in the village and sub-district were of moderate quality. Sub-district possessed a protective tree score of 3.43 which was in the good quality category. This was due to the availability of open spaces in the form of lush trees in sub-district 7. Furthermore, sub-districts 6 and 9 showed moderate quality assessments because the available vegetation was only filled with ornamental plants in the form of pots in each resident's house, which was considered sufficient.

f) Residents' Perceptions of Building Layout in Jodipan Colorful Village

Building layout showed a moderate quality rating in the village. Residents perceived the arrangement of houses as moderately orderly, influenced by the natural contours of riverside villages. Due to the absence of clear regulations governing settlement planning, residential areas along waterways often became congested and disorganized (Suprijanto, 2002). Residents' perceptions adapted to the arrangement of buildings which tended to be irregular, normalizing the local settlement patterns.

g) Residents' Perceptions of Building Roof Quality in Jodipan Colorful Village

The quality of building roofs was rated as a good quality category in all sub-districts. This was due to changes in the type of roof material before and after it became a tourist location. The quality of building roofs used permanent types of materials in the form of cast roofs or tile and galvalum roofs. The public feels safe regarding the change in the type of permanent roof covering, which influenced the perception in assessing the quality of the building roof. Self-defense was identified to be an internal factor shaping perceptions (Simamora, 2008).

Comparison of Livable Built Environments Quality Assessment Based on Actual Physical Condition and Residents' Perceptions

There were similarities and differences in quality assessments of physical aspects and overall settlement quality between actual conditions and residents' perceptions. This comparison was presented in Table 4 for proper understanding.

Table 5: Comparison of Livable Built Environments Quality

Variable	SD6		SD7		SD9		Summary
	PA	RP	PA	RP	PA	RP	
Physical Aspects that Form the Quality of Livable Built Environment							
Building Density	M	M	L	M	M	M	Gap
Settlement Location	M	M	M	L	M	L	Gap
Entry Road Width	L	L	L	L	L	L	Same
Road Surfaces Condition	G	VG	G	G	G	G	Same
Vegetations	L	M	L	G	L	M	Gap
Building Layout	L	L	L	M	L	M	Gap
Building Roof Quality	G	G	G	G	G	G	Same
Livable Built-Environment Quality							
Sub-district Scale	M	M	L	M	M	M	Gap
District Scale			M				Same

*PA (Physical Assessment), RP (Residents' Perception)

*M (Moderate Quality), L (Low Quality), G (Good Quality), VG (Very Good Quality)

*SD6 (Sub-district 6), SD7 (Sub-district 7), SD9 (Sub-district 9)

In this study, the aspects of building density, shade trees, and layout showed differences with residents rating these aspects as moderate to good. This was performed despite physical assessments classifying the aspects as moderate and poor. The aspect of residential location also showed different assessments where the people of sub-districts 7 and 9 rated the location as poor while physical assessments categorized the aspects as medium.

Many residents in sub-district 7 held a negative perception in assessing the quality. 90% classified the quality of residential environment as poor based on physical assessments while residents' perceptions rated it as medium quality. A discrepancy was evident in residential environment quality of sub-district 7 where residents assessed the quality as moderate. However, this was contrary to the results of the physical assessment where residents in sub-district 7 were classified as poor. The concept of adequate housing referred to the physical condition of the environment as evaluated by individuals, assessing housing conditions quality (Heylen, 2006).

Respondents' assessment of environmental quality based on physical aspects using the mean score method shows good quality in road surface condition and building roof quality (3.40-4.19). The physical aspects with a moderate rating are the variables building density, protective trees, and the layout ranging from 2.60 to 3.39. Furthermore, poor ratings are observed in the variables of residential location and entry road width with 1.80 to 2.59 scores. The quality of residential environment depends on environmental variables influencing the quality of the environment including physical and socio-cultural variables (Rapoport, 1983). These results implied that sub-districts with the highest level of quality comprised two essential physical aspects, namely road surface condition and building roof quality. However, the remaining sub-districts 7 and 9 both show relatively moderate performance levels of 3.03. The difference in assessment results in residents' perceptions and the quality of livable built

environments actual condition in Jodipan Colorful Village is due to the subjectivity of perception and each individual has a different point of view. Individual historical experience factors, attitudes, values, social norms, societal environmental conditions, culture, needs, hopes, and personality will influence residents' perceptions of the aspects (Notoatmodjo, 2005). Hence, the community concluded that environmental responsibility should play a central role in responsible tourism and consulted experts in conservation and environmental management for advice (Rasdi *et al.*, 2023)

CONCLUSION

In conclusion, livable built environments in Jodipan Colorful Village were classified as medium quality based on actual physical conditions assessed using ArcGIS software, scoring, and weighting methods. Sub-district 7 scored 25 showing low quality while sub-districts 6 and 9 were classified as moderate, scoring 27 and 26, respectively. Residents' perception assessments rated the quality of all three sub-districts as medium with sub-district 6 having the highest mean score of 3.06. Residents further evaluated road surface condition and building roof quality to be good while building density, protective trees, and building layout were observed to be moderate. Settlement location and driveway width also were perceived as poor. The perception influenced residents' perception in assessing each attribute of the physical aspects that formed the quality of livable built environments. Additionally, internal factors such as living experience and adaptation also influenced residents' perceptions in assessing the quality of the village. Changes in physical conditions from when it was a slum village to now being a tourist location also played a role in forming new perceptions to assess the quality of livable built environments in Jodipan Colorful Village.

The quality of livable built environments in this village showed different results between actual physical conditions and residents' perception assessments. Differences were noted in building density, residential location, protective trees, and building layout. This gap arose because perception was subjective, leading to different views despite seeing the same object. Differences in residential environment quality classifications based on actual physical conditions and residents' perceptions could serve as an evaluation to improve residential environment quality in Jodipan Colorful Village.

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DISCLOSURE STATEMENT

The author declares that there is no conflict of interest in this research.

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