



Bridging theory and grassroots insight: Assessing the capacity of local communities in evaluating cultural heritage significance

Muti'ah Rihul Jannah^{1,*}

¹ Department of Architecture and Planning Engineering, Faculty of Engineering, Universitas Gadjah Mada, Sleman, Special Region of Yogyakarta 55281, Indonesia.

*Correspondence: mutiahrhl@gmail.com

Received Date: October 19, 2025

Revised Date: January 24, 2026

Accepted Date: January 27, 2026

ABSTRACT

Background: The city of Yogyakarta as a special area that has a high historical value and a wealth of historical heritage is deemed necessary to pay more attention to these things. Moreover, the rapid development and massive development that is currently happening can threaten the sustainability of the existing cultural heritage areas. One of the Cultural Conservation Areas that may be threatened is the Kotagede area as a witness to the history of the glory of the Islamic Mataram Kingdom and the forerunner of the formation of the city of Yogyakarta. This area is currently and will continue to undergo several changes. The local community as one of the stakeholders has a very important role in harmonizing the changes that occur. Research to see the extent to which the assessment of the significance of cultural heritage both theoretically and through local community criteria becomes very significant to be carried out. **Methods:** This study uses a deductive-mix method approach and statistical analysis uses a Likert-scaled technique. The unit of observation of this study includes 6 objects of cultural heritage found in the Kotagede Cultural Heritage Area, namely Kotagede Market, Mataram Gedhe Mosque, Tomb Complex of the Founders of the Kingdom & Sendang Seliran, Kampung Alun-Alun ("Between Two Gates"), Kedhaton, and Ruins. Cepuri Fort. The analysis was carried out in three stages. The first stage is to assess the significance of cultural heritage based on literacy studies and secondary data. The second stage is to assess the significance of cultural heritage by involving the role of local communities through the development of criteria. The next stage is to analyze the significance of each proposed criterion based on public perception. **Findings:** Summarize the main findings, including specific effect sizes and their statistical significance, if possible. The result of this research is that all research objects have important significance values, where there is only a slight difference between the assessment based on literature study and based on public perception. **Conclusion:** In conclusion, this study highlights that all cultural heritage sites in the Kotagede area hold significant value, with only minor differences between theoretical assessments and local community perceptions. It also emphasizes that local communities possess comparable capacity and insight to other stakeholders in evaluating the significance of cultural heritage. **Novelty/Originality of this article:** Another finding from this study is that local communities also have the same capacity and capability as other stakeholders to assess the significance of cultural heritage.

KEYWORDS: criteria development; cultural heritage significance value; Kotagede Yogyakarta; local community assessment; multi-aspect.

1. Introduction

The phenomena of globalization and modernization sweeping across the world present major challenges to preserving cultural heritage areas amid the rapid expansion of modern

Cite This Article:

Jannah, M. R. (2026). Bridging theory and grassroots insight: Assessing the capacity of local communities in evaluating cultural heritage significance. *Journal of Socio-Cultural Sustainability and Resilience*, 3(2), 152-170. <https://doi.org/10.61511/jscsr.v3i2.2026.2437>

Copyright: © 2026 by the authors. This article is distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



urban development. The widespread demolition and replacement of historic buildings with new architectural styles risk erasing local cultural identities. Awareness of the importance of protecting cultural heritage first emerged during the 1931 Athens Conference organized by the League of Nations (Aurelia, 2020) and has continued to evolve through global initiatives such as UNESCO's 2011 Historic Urban Landscape and Heritage Impact Assessment approaches. These frameworks have been adapted worldwide, including through the 2003 Burra Charter, which established best-practice standards for conserving historic environments (Fitri et al., 2020).

Cultural heritage preservation requires high sensitivity and the involvement of multiple stakeholders, including local communities. The concept of integrated conservation was introduced in the 1975 Amsterdam Declaration (Fitri, 2015) and reaffirmed in UNESCO's 1976 Nairobi Recommendation. This approach emphasizes the active participation of local communities as the front line in safeguarding cultural heritage. Scholars such as Cheung and Chirikure & Gilbert Pwiti (Fitri, 2015) have underscored the crucial role of communities in planning and decision-making processes related to preservation. However, participatory-based heritage significance assessments remain limited in Indonesia, including in Yogyakarta.

As a special region with deep historical value, Yogyakarta faces growing pressures from modernization and urban development that threaten its cultural heritage areas. Nevertheless, several historic sites—such as Kotagede—have managed to endure and retain rich cultural significance. Under the Governor's Decree No. 186 of 2011, Kotagede was designated a Cultural Heritage Area for its historical role as the administrative center of the Islamic Mataram Kingdom and the origin of Yogyakarta City (Suryanti et al., 2014). This legacy remains alive through traditional architecture, cultural rituals, and the silver craftsmanship industry that forms the backbone of the local economy (Fajri, 2016). Support from both local communities and institutions further strengthens the area's management.

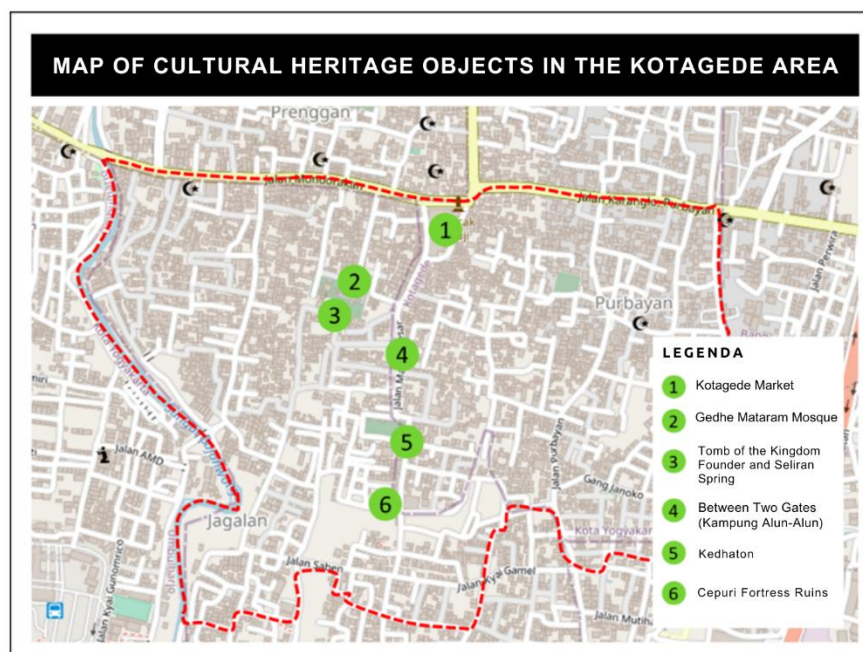


Fig. 1. Percentage of waste and leftover food produced in each stage of supply

Government commitment to preserving Kotagede is reflected in policies such as Law No. 11 of 2010 on Cultural Heritage and the Governor of DIY's Decree No. 224/KEP/2015 establishing the Kotagede Cultural Heritage Management Forum. However, in recent years, the area has experienced a significant decline in its economic and tourism sectors. The silver artisans' revenues have dropped by up to 75% over the past decade, exacerbated by the Covid-19 pandemic. Furthermore, the rise of modern establishments such as cafés and restaurants has altered the area's traditional character.

These conditions indicate that the sustainability of the Kotagede Cultural Heritage Area is increasingly threatened by urban development pressures. Therefore, it is crucial to conduct heritage significance assessments that actively involve the local community to identify appropriate conservation strategies. This research focuses on analyzing the heritage significance of the Kotagede Area from both theoretical and community-based perspectives, aiming to develop assessment indicators, evaluate degrees of significance, and compare theoretical results with local perceptions. The study covers key heritage sites in both the Yogyakarta City and Bantul Regency parts of Kotagede, including Kotagede Market, Mataram Grand Mosque, and Kedhaton (Hakim, 2018).

Theoretically, this research is expected to contribute to developing community-based conservation strategies for historic urban areas such as Kotagede. Practically, the findings are anticipated to serve as a reference for policymakers in formulating culture-based tourism management that engages multiple stakeholders. Ultimately, preservation efforts are not only aimed at safeguarding historical heritage but also revitalizing the cultural values that define Yogyakarta's identity as a heritage city.

2. Methods

2.1 Research design and approach

The study entitled "Assessment of the Significance of Cultural Heritage Sites in the Kotagede Area Based on Local Community Criteria" employs a deductive approach using a mixed-methods design that combines qualitative and quantitative techniques. According to Yusuf (2016), a deductive approach is a system of reasoning that begins with general theories or concepts and applies them to specific phenomena. In this research, the variables are developed based on theoretical frameworks and literature related to the degree of cultural heritage significance, encompassing variables, indicators, and assessment parameters formulated by experts.

The qualitative method is used to examine phenomena in a natural, holistic, and comprehensive manner, as described by Sugiyono (2010). This approach allows the researcher to understand the research object as it is, explore deeper meanings behind observed phenomena, and interpret data in the form of words, images, and events (Yusuf, 2016). Accordingly, the qualitative deductive approach in this study is applied to explain the process of assessing the significance of cultural heritage in the Kotagede Area and to analyze community responses to this assessment based on theories of cultural heritage value and significance.

2.2 Units of observation and analysis

The unit of observation in this study is the Kotagede Cultural Heritage Area, focusing on six main objects: Kotagede Market, Mataram Grand Mosque, the Tomb Complex of the Kingdom's Founders and Sendang Seliran, traditional houses including Omah Kalang, Kedhaton, and the Ruins of the Fort. The selection of these sites is based on Hakim's (2018) findings, which identified Kotagede's heritage as comprising both tangible elements—such as buildings and structures—and intangible aspects, including art and Islamic traditions.

The unit of analysis is divided into two parts according to the research questions. The first concerns the variables for assessing cultural heritage significance, including historical, social, cultural, aesthetic, and scientific values. The second relates to the community's level of understanding and sensitivity toward the assessment results. The analysis integrates primary and secondary data collected from the Kotagede area.

2.3 Research variables and significance degrees

The research variables encompass four key aspects. Historical value refers to a site's connection with notable figures, events, or historical periods. Socio-cultural value includes

the site's role as a center for spiritual, political, or cultural activities within the community. Aesthetic value focuses on sensory perceptions of form, texture, color, style, and material quality. Lastly, scientific value highlights the site's contribution to knowledge development through the data and information it contains (Sugiyono, 2010). Together, these four variables provide the foundation for assessing the overall significance of cultural heritage objects in the Kotagede Area.

The analysis using the variables of historical, socio-cultural, aesthetic, and scientific values was subsequently applied to a second stage: determining the degree of significance of cultural heritage objects (Makkelo, 2017). This degree of significance reflects the importance or value of an object in relation to the overall cultural heritage of the Kotagede Area. Objects with exceptional significance are rare items or structures with the highest levels of authenticity and integrity, forming an integral part of understanding the area's cultural potential. The loss of such components would have a serious and irreplaceable impact on the cultural heritage's overall significance. Conservation efforts for these objects focus on preserving the key characteristics that make them unique and highly valuable. Objects with high significance still retain dominant original elements with minimal alterations, so their cultural meaning remains largely intact. Losing these objects would affect the cultural understanding of the heritage as a whole, making it essential that conservation efforts maintain the key elements supporting their cultural value. Objects of moderate significance have generally undergone some changes or modifications, but still contribute to the character and cultural identity of the area (Banda et al., 2025). The loss of these elements may reduce the overall cultural meaning, particularly in relation to objects with exceptional or high significance. Objects of low significance provide a minor contribution to the site's cultural character and identity; their loss would only minimally affect the overall value of the heritage. Objects with neutral significance neither enhance nor detract from the site's cultural character, and their presence or absence does not influence the overall importance of the area. Finally, non-contributory objects are considered detrimental to the cultural character and value of the area. Their removal or replacement would not diminish cultural significance and may even improve the integrity of the site by eliminating negative impacts on the surrounding environment.

Research tools and instruments are essential components that support all stages of a study, from preparation and data collection to analysis. In this research, the hardware used included notebooks and writing instruments, interview drafts as guides for information collection, a laptop for data storage and analysis, a camera for visual documentation during field observations, a voice recorder for capturing oral data, and transportation in the form of motorcycles and bicycles for fieldwork mobility. The software used consisted of Microsoft Office for data processing, ArcGIS for map creation, and Mendeley for storing and managing research documents.

This study collected two types of data: primary and secondary. Primary data were obtained directly from original sources through several methods. Observations were conducted in the field to comprehensively examine the conditions and phenomena of cultural heritage objects and areas, using all senses to gain a holistic understanding. Semi-structured interviews were conducted to obtain in-depth interpretations of the observed phenomena, involving respondents related to the cultural heritage objects. This semi-structured approach allows for open-ended questions within certain thematic boundaries, offering flexibility while remaining controlled, with the goal of achieving a deep understanding of the phenomena (Kusuma, 2020). Documentation, including photographs, audio recordings, and notes, complemented the observation and interview processes.

Secondary data were obtained from documents or literature previously collected by other parties and reused in this study (Junianto, 2019). Secondary data collection was conducted through document studies, including books, journals, previous research, websites, government documents, and other publications such as news articles. Information was further explored using keywords related to the assessment of cultural heritage significance, particularly from the community perspective. The primary sources of secondary data were UNESCO documents on heritage that have been publicly published.

The research sample consisted of individuals interviewed to obtain information regarding the variables and indicators for assessing the significance of cultural heritage in the Kotagede Area from the perspective of the local community (Nasruddin et al., 2019). For the interviews, purposive sampling was employed, meaning that respondents were deliberately selected because they were considered capable of representing the broader voice of the Kotagede community. This approach ensured that the information collected was both in-depth and relevant.

The results of these interviews were then used as the basis for developing a questionnaire, which was distributed using accidental sampling to residents or individuals active within a 100-meter radius of the cultural heritage objects under study. This method allowed the research to gather data from a broader range of respondents regarding community perceptions of cultural heritage significance in the Kotagede Area. To determine the sample size, the Slovin formula was applied to ensure representativeness relative to the population, as follows:

$$n = \frac{N}{1+N(e^2)} \quad (\text{Eq. 1})$$

The population of this study consisted of residents living in the Kotagede Cultural Heritage Area, including Purbayan and Prenggan Subdistricts in Kotagede District, as well as Jagalan Village, which is part of Banguntapan District. According to data from the Yogyakarta Central Statistics Agency, the population numbers are as follows in Table 1. Based on the data above, the total population of the Kotagede Cultural Heritage Area is 24,578 inhabitants, which was used as the study population. Using the previously mentioned formula, the required sample size was calculated to be 99.59 individuals, which was then rounded up to 100. However, because the study focuses on six cultural heritage objects, the number of respondents was adjusted to 120 individuals.

Table 1. Research population

Village/Subdistrict	Population (2020)
Jagalan Village	2.994
Prenggan Subdisrict	10.238
Purbayan Subdistrict	11.355
Total Population: 24.578	

Data analysis in this study was carried out based on the established research variables, with each indicator described using a qualitative descriptive method, presented through narrative explanations and excerpts from interview results. To address the first research question concerning the level of significance, the analysis involved identifying data from each research object related to the criteria of cultural value and assessment indicators. A scoring process was then conducted to determine the significance points, which were further explained descriptively to identify the degree of significance of each cultural heritage object based on literature review and the completeness of the criteria.

$$\text{Criterion Score} = \text{Scale Value} \times \text{Number of Respondents} \quad (\text{Eq. 2})$$

To address the second research question—the level of significance based on community perceptions—the analysis was conducted by processing interview transcripts to extract information units relevant to the variables of cultural heritage assessment in the Kotagede Cultural Heritage Area. These variables were then used to develop a questionnaire to evaluate the degree of significance of each heritage object from the perspective of the local community. In addition, an ideal score calculation was applied to determine the rating scale and compute the total scores from all criteria used in analyzing the significance levels. The obtained values were then entered into a rating scale to determine the overall results of the questionnaire and interview data based on the respondents' assessments.

Table 2. Ideal sores and rating scale for public perception assessment on historical, socio-cultural, aesthetic, and scientific aspects

Range	Scale
Formula	
5x20 respondents = 100	Strongly Agree (SA)
4x20 respondents = 80	Agree (A)
3x20 respondents = 60	Neutral (N)
2x20 respondents = 40	Disagree (D)
1x20 respondents = 20	Strongly Disagree (SD)
Score	
100-80	100-80
61-80	61-80
41-60	41-60
21-40	21-40
0-20	0-20

(Sugiyono, 2010)

The results of the rating scale assessment in Table 3 still need to be converted into an assessment index to produce a new rating Table 4, using the following equation 3. After obtaining the results of community perceptions using the Likert scale technique, the importance value of each indicator could be determined. Once the community perception values were established, the degree of importance of each aspect for the sustainability of the historical landscape was then determined

$$\text{Index} = \frac{\sum \text{score of each category}}{\sum \text{maximum score of category (120)}} \quad (\text{Eq. 3})$$

This study was conducted through six interrelated stages. The preparation stage served as the initial step, involving a literature review to develop the theoretical framework, the determination of research indicators and parameters, a preliminary study on the types of data required, the data collection methods, and the preparation of interview guides. The data collection stage involved gathering both primary and secondary data, including interviews with respondents, field observations, and the compilation of available secondary data.

Table 3. Index of public perception responses on historical, socio-cultural, aesthetic, and scientific aspects

Response Index	Scale
0.85 – 1.00	Exceptional
0.68 – 0.84	Important
0.51 – 0.67	Moderate
0.34 – 0.50	Low
0.17 – 0.33	Neutral
0.00 – 0.16	Non-Contributory

Next, the data processing stage focused on transcribing interview data as the primary source, which was then compiled with observation results and secondary data to facilitate analysis. During the data analysis stage, all data were analyzed descriptively by comparing variable conditions across locations and examining the relationships between variables to answer the research questions. The discussion stage centered on presenting the findings to address the research questions, while the conclusion stage served as the final step, summarizing the study’s conclusions and providing critiques and recommendations based on the analysis results.

3. Results and Discussion

3.1 Degree of significance of cultural heritage in the Kotagede area

Based on the findings from the previous analysis of cultural heritage significance assessment criteria derived from the literature review, four assessment aspects were identified: historical, socio-cultural, aesthetic, and scientific aspects. The following presents the results of the significance assessment of cultural heritage in the Kotagede Area based on these four aspects.

3.1.1 Assessment of Kotagede market significance based on literature review

Kotagede Market is a cultural heritage site that remains actively used and holds significant value for the local community. From a historical perspective, the market predates other heritage objects and is one of the four core elements of the city according to the Catur Gatra Tunggal philosophy during the era of Panembahan Senopati, establishing a close connection with historical events and figures (Albiladiyah & Suratmin, 1997). From a socio-cultural perspective, Kotagede Market continues to serve as an economic center while preserving local traditions, such as the *pasar legi*, and functions as a site where cultural exchange occurs among diverse ethnic and cultural groups.

In terms of aesthetics, although some architectural elements have been altered due to restoration, the internal and external spatial organization of the market remains orderly (Hanunnindya, 2016). Meanwhile, from a scientific perspective, Kotagede Market provides informative value and serves as a representation of knowledge and the distinctive characteristics of the Kotagede Area during a particular historical period.

3.1.2 Assessment of Mataram Grand Mosque significance based on literature review

Mataram Grand Mosque is the first building established by Panembahan Senopati together with the community immediately after the founding of the Islamic Mataram Kingdom, estimated to have been constructed between 1575 and 1601 AD (Kementrian Pendidikan dan Kebudayaan, 2007). From a historical perspective, the mosque holds high value due to its age and its close association with significant events and historical figures of the Islamic Mataram Kingdom. From a socio-cultural perspective, Mataram Grand Mosque remains a central hub for community activities, particularly religious and social events, while preserving local wisdom that imparts strong emotional significance (Pramesti, 2019).

The mosque also serves important political and religious functions as a place of worship for the majority of the community. In terms of aesthetics, the mosque has been carefully preserved, with architectural elements still intact, such as the crowned roof (*palaka*), gateways and gates featuring Hindu-Buddhist motifs, the *kelir* building, *paseban*, and commemorative monuments. The historical style of the Islamic Mataram Kingdom remains visible in both the interior and exterior, with organized spatial arrangements that clearly demonstrate inter-space relationships.

3.1.3 Assessment of the Kingdom Tomb complex and Sendang Seliran significance based on literature review

The Kingdom Tomb Complex and Sendang Seliran, located adjacent to Mataram Grand Mosque, holds high value across nearly all assessment aspects. From a historical perspective, the tomb complex is nearly as old as the mosque and serves as the resting place for key figures of the Islamic Mataram Kingdom, establishing a close connection with significant historical events and personalities.

From a socio-cultural perspective, local traditions and wisdom at the complex are still maintained, reflecting the community's respect for the site. Preserved architectural elements create a historical atmosphere that enhances its emotional value for both the local

community and visitors. The enduring historical style and clearly organized spatial layout further contribute to the importance of the complex. From a scientific perspective, the Kingdom Tomb Complex and Sendang Seliran play a significant role in education and knowledge development as a unique cultural heritage site exclusive to the Kotagede Area, representing the knowledge and achievements of the Mataram Kingdom period.

3.1.4 Assessment of Kedhaton significance based on literature review

The Watu Gilang and Watu Gatheng sites in Kedhaton Village are remnants of the Islamic Mataram Kingdom that still exist today. Unlike other cultural heritage objects, these sites are rarely open to the public and are not actively used by the community or as tourist attractions. From a historical perspective, these artifacts are ancient and closely linked to historical figures such as Panembahan Senopati, as well as significant events, for example, the Ki Ageng Mangir incident, recorded on the stone inscription “AD AETERNAM 3 MEMORIAM SORTIS INFELICIS” (Larasati, 2013).

From a socio-cultural perspective, traditions associated with the sites, such as placing one’s head into the watu genthong, are rarely practiced, and the sites hold limited emotional value for the community. While they symbolize the area’s identity, the Kedhaton sites do not enhance the physical or economic image of the Kotagede Area. In terms of aesthetics, the sites have lost many original architectural elements and details, although restoration efforts have been made to protect the heritage objects (Muftiadi et al., 2025). The historical style of the Sultanate era is not apparent, and the spatial arrangement of the objects lacks clear relationships or organization. From a scientific perspective, although these sites are unique and not found elsewhere, their contribution to education and knowledge development is relatively limited and does not constitute a defining characteristic of the Kotagede Area.

3.1.5 Assessment of “Between Two Gates” significance based on literature review

“Between Two Gates” or Kampung Alun-Alun is a traditional Javanese residential area that formed as a result of the historical shift of Kotagede’s town square (Destiadi, 2020). From a historical perspective, although it is younger than other heritage objects, the traditional houses remain closely linked to historical events and are inhabited by relatives of the royal family who reside in Kotagede. The uniqueness of this village is evident in the south-facing orientation of the houses, which do not face each other, and the presence of the jalan rukunan (Paramitha et al., 2017). The preservation of local wisdom continues to be relevant for contemporary community life, providing high emotional value, symbolizing the area’s identity, and enhancing its physical and economic image through tourism potential.

From an aesthetic perspective, the traditional houses in Between Two Gates retain original architectural elements and details from the Islamic Mataram Kingdom era, including the layout with key components such as the dalem, pendopo, and central courtyard. This preservation demonstrates historical patterns and clear spatial organization, reflecting cultural values and traditional philosophies (Mundher et al., 2022; Destiadi, 2020). From a scientific perspective, the traditional houses in Between Two Gates play an important role in education and knowledge development. These objects are unique, with no parallels elsewhere, and represent the knowledge achieved during the Islamic Mataram Kingdom period, making them a distinctive feature of the Kotagede Area.

3.1.6 Assessment of Cepuri Fort ruins significance based on literature review

The Cepuri Fort ruins are one of Kotagede’s physical remnants from the Islamic Mataram Kingdom era, serving as a defensive and security facility (Balai Pelestarian Cagar Budaya Provinsi DIY, 2017). From a historical perspective, the fort holds significant value due to its age, its connection to historical events, and the role of key historical figures, as Cepuri Fort acted as a boundary between the common people and the royal family at the

time.

From a socio-cultural perspective, although traditions associated with the fort no longer exist, the community still uses the site for activities in the morning and evening. Cepuri Fort is still respected, creating emotional value and symbolizing the area's identity, even though it does not enhance the physical or economic image of the region. In terms of aesthetics, several restorations have altered the original materials and style, and the current spatial organization is unclear (Heriawan, 2004). However, from a scientific perspective, Cepuri Fort remains an informative site that contributes to education and knowledge development. It represents the knowledge attained during the Islamic Mataram Kingdom period and is a distinctive feature of the Kotagede Area.

3.1.7 Assessment of cultural heritage significance in the Kotagede area based on literature review

Based on the literature review, the significance assessment of six cultural heritage objects in the Kotagede Area was conducted by considering four main variables: historical value, socio-cultural value, aesthetic value, and scientific value (Han et al., 2024). Each object was evaluated in terms of age, association with historical events and figures, presence of traditions and local wisdom, emotional value, contribution to area identity, architectural elements, historical style, spatial layout, and role in education as well as rarity as cultural heritage.

The results indicate that Kotagede Market, Mataram Grand Mosque, and the Kingdom Tomb Complex and Sendang Seliran scored the highest across nearly all variables, placing them in the exceptional category. Between Two Gates is also classified as exceptional due to its significant preservation of historical, socio-cultural, aesthetic, and scientific values. Meanwhile, Kedhaton and the Cepuri Fort ruins received lower scores, placing them in the important category, although they still hold significance in certain aspects. These overall results provide a foundation for determining strategies for the preservation and management of cultural heritage in the Kotagede Area.

3.2 Assessment of cultural heritage significance based on local community criteria

Since the era of the Islamic Mataram Kingdom, the people of Kotagede have been known for their strong social spirit, establishing settlements around the royal center and forming a culture that produced various historical relics. Kotagede, rich in historical heritage, holds an important responsibility to preserve these assets to continue reinforcing the area's identity. Currently, the existing heritage assets primarily date from the period of Panembahan Senopati and subsequent eras, yet knowledge and information about these assets remain limited.

Table 4. Assessment based on community perception

No	Statement	Score					Total Score
		5	4	3	2	1	
Assessment of Kotagede							
1	The age of Kotagede Market affects the importance of the object (the older/younger, the more/less important).	14	5	1	0	0	93
2	Association with historical events makes Kotagede Market important.	12	6	1	1	0	89
3	Association with historical figures makes Kotagede Market important.	14	3	3	0	0	91
4	Presence of traditions/local wisdom related to Kotagede Market increases the object's importance.	10	8	1	0	1	86
5	Emotional value attached to Kotagede Market increases its importance.	8	6	5	0	1	80

6	Kotagede Market's relation to political and/or spiritual focus increases its importance.	2	6	7	2	3	62
7	The condition of architectural elements in Kotagede Market affects the object's importance.	9	9	1	1	0	86
8	The presence, alteration, or preservation of historical style in Kotagede Market affects its importance.	10	10	0	0	0	90
9	Clear spatial layout (relations and organization between spaces) in Kotagede Market affects its importance.	8	8	3	1	0	83
10	The more informative/representative a heritage object is, the more important it becomes.	10	10	0	0	0	90
11	Scarcity or unique characteristics of a heritage object increase its importance.	8	7	3	2	0	81
12	The uniqueness of an object in terms of construction, materials, techniques, technology, and achieved knowledge affects its importance.	12	4	4	0	0	88

Assessment of Between Two Gates (Kampung Alun-Alun)

1	The age of Between Two Gates (Kampung Alun-Alun) affects the importance of the object (the older/younger, the more/less important).	11	9	0	0	0	91
2	Association with historical events makes Between Two Gates (Kampung Alun-Alun) important.	10	8	2	0	0	88
3	Association with historical figures makes Between Two Gates (Kampung Alun-Alun) important.	7	6	6	1	0	79
4	Presence of traditions/local wisdom related to Between Two Gates (Kampung Alun-Alun) increases the object's importance.	7	10	3	0	0	84
5	Emotional value attached to Between Two Gates (Kampung Alun-Alun) increases its importance.	0	14	4	0	2	70
6	Between Two Gates (Kampung Alun-Alun)'s relation to political and/or spiritual focus increases its importance.	2	7	3	7	1	62
7	The condition of architectural elements in Between Two Gates (Kampung Alun-Alun) affects the object's importance.	6	13	1	0	0	85
8	The presence, alteration, or preservation of historical style in Between Two Gates (Kampung Alun-Alun) affects its importance.	10	10	0	0	0	90
9	Clear spatial layout (relations and organization between spaces) in Between Two Gates (Kampung Alun-Alun) affects its importance.	4	11	5	0	0	79
10	The more informative/representative a heritage object is, the more important it becomes.	5	13	2	0	0	83
11	Scarcity or unique characteristics of a heritage object increase its importance.	5	7	6	2	0	75
12	The uniqueness of an object in terms of construction, materials, techniques, technology, and achieved knowledge affects its importance.	7	9	4	0	0	83

Assessment of Benteng Cepuri

1	The age of Benteng Cepuri affects the importance of the object (the older/younger, the more/less important).	16	4	0	0	0	96
2	Association with historical events makes Benteng Cepuri important.	13	7	0	0	0	93
3	Association with historical figures makes Benteng Cepuri important.	14	6	0	0	0	94
4	Presence of traditions/local wisdom related to Benteng Cepuri increases the object's importance.	3	9	5	0	3	69
5	Emotional value attached to Benteng Cepuri increases its importance.	3	13	1	0	3	73
6	Benteng Cepuri's relation to political and/or spiritual focus increases its importance.	1	7	4	2	6	55
7	The condition of architectural elements in Benteng Cepuri affects the object's importance.	10	10	0	0	0	90
8	The presence, alteration, or preservation of historical style in Benteng Cepuri affects its importance.	12	6	2	0	0	90
9	Clear spatial layout (relations and organization between spaces) in Benteng Cepuri affects its importance.	3	10	4	2	1	72
10	The more informative/representative a heritage object is, the more important it becomes.	9	11	0	0	0	89
11	Scarcity or unique characteristics of a heritage object increase its importance.	5	7	7	1	0	76
12	The uniqueness of an object in terms of construction, materials, techniques, technology, and achieved knowledge affects its importance.	9	8	3	0	0	86

Assessment of the Tombs of the Mataram Kings in Kotagede

1	The age of the Tombs of the Mataram Kings in Kotagede affects the importance of the object (the older/younger, the more/less important).	13	7	0	0	0	93
2	Association with historical events makes the Tombs of the Mataram Kings in Kotagede important.	12	7	1	0	0	91
3	Association with historical figures makes the Tombs of the Mataram Kings in Kotagede important.	11	8	1	0	0	90
4	Presence of traditions/local wisdom related to the Tombs of the Mataram Kings in Kotagede increases the object's importance.	12	7	1	0	0	91
5	Emotional value attached to the Tombs of the Mataram Kings in Kotagede increases its importance.	3	13	4	0	0	79
6	the Tombs of the Mataram Kings in Kotagede's relation to political and/or spiritual focus increases its importance.	6	10	2	2	0	80
7	The condition of architectural elements in the Tombs of the Mataram Kings in Kotagede affects the object's importance.	8	10	1	1	0	85
8	The presence, alteration, or preservation of historical style in the Tombs of the Mataram Kings in Kotagede affects its importance.	9	10	1	0	0	88
9	Clear spatial layout (relations and organization between spaces) in the Tombs of the Mataram Kings in Kotagede affects its importance.	7	9	4	0	0	83

10	The more informative/representative a heritage object is, the more important it becomes.	12	7	0	1	0	90
11	Scarcity or unique characteristics of a heritage object increase its importance.	6	7	4	2	1	75
12	The uniqueness of an object in terms of construction, materials, techniques, technology, and achieved knowledge affects its importance.	8	9	2	1	0	84

Assessment of Masjid Gedhe Mataram

1	The age of Masjid Gedhe Mataram affects the importance of the object (the older/younger, the more/less important).	15	2	3	0	0	92
2	Association with historical events makes Masjid Gedhe Mataram important.	16	4	0	0	0	96
3	Association with historical figures makes Masjid Gedhe Mataram important.	14	5	1	0	0	93
4	Presence of traditions/local wisdom related to Masjid Gedhe Mataram increases the object's importance.	11	7	2	0	0	89
5	Emotional value attached to Masjid Gedhe Mataram increases its importance.	3	9	7	0	1	73
6	Masjid Gedhe Mataram's relation to political and/or spiritual focus increases its importance.	4	3	4	6	3	59
7	The condition of architectural elements in Masjid Gedhe Mataram affects the object's importance.	15	5	0	0	0	95
8	The presence, alteration, or preservation of historical style in Masjid Gedhe Mataram affects its importance.	11	8	1	0	0	90
9	Clear spatial layout (relations and organization between spaces) in Masjid Gedhe Mataram affects its importance.	7	8	5	0	0	82
10	The more informative/representative a heritage object is, the more important it becomes.	6	13	1	0	0	85
11	Scarcity or unique characteristics of a heritage object increase its importance.	4	8	5	2	1	72
12	The uniqueness of an object in terms of construction, materials, techniques, technology, and achieved knowledge affects its importance.	10	8	2	0	0	88

Assessment of Kedhaton

1	The age of Kedhaton affects the importance of the object (the older/younger, the more/less important).	7	10	3	0	0	84
2	Association with historical events makes Kedhaton important.	11	9	0	0	0	91
3	Association with historical figures makes Kedhaton important.	11	8	0	1	0	89
4	Presence of traditions/local wisdom related to Kedhaton increases the object's importance.	2	17	1	0	0	81
5	Emotional value attached to Kedhaton increases its importance.	0	9	10	0	1	67
6	Kedhaton's relation to political and/or spiritual focus increases its importance.	1	6	6	2	5	56
7	The condition of architectural elements in Kedhaton affects the object's importance.	4	13	0	2	1	77

8	The presence, alteration, or preservation of historical style in Kedhaton affects its importance.	6	12	2	0	0	84
9	Clear spatial layout (relations and organization between spaces) in Kedhaton affects its importance.	0	7	11	1	1	64
10	The more informative/representative a heritage object is, the more important it becomes.	8	12	0	0	0	88
11	Scarcity or unique characteristics of a heritage object increase its importance.	3	6	8	1	2	67
12	The uniqueness of an object in terms of construction, materials, techniques, technology, and achieved knowledge affects its importance.	6	14	0	0	0	86

Note: 5 = Strongly Agree; 4 = Agree; 3 = Neutral; 2 = Disagree; 1 = Strongly Disagree

The significance of cultural heritage objects is assessed based on the perceptions of the local community, who have historically been underrepresented in preservation efforts, particularly in the Kotagede Area. This assessment employs a Likert-scale scoring method involving 120 respondents across six heritage objects, focusing on four main aspects: historical value, socio-cultural value, aesthetic value, and scientific value. The results reflect the community’s perceptions of each aspect of the cultural heritage in Kotagede.

Tab. 5. Overall significance assessment of cultural heritage objects in Kotagede based on community perception

Assessment Component	Cultural Heritage Object					
	Pasar Kotagede	Masjid Gedhe Mataram	Makam Kerajaan dan Sendang Seliran	Kedhaton	Between Two Gates	Reruntuhan Benteng Cepuri
Age	93	92	93	84	91	96
Historical Event	89	96	91	91	88	93
Association						
Historical Figure	91	93	90	89	79	94
Association						
Tradition	86	89	91	81	84	69
Emotional Value	80	73	79	67	70	73
Political/Spiritual Focus	62	59	80	56	62	55
Architectural Elements	86	95	85	77	85	90
Historical Style	90	90	88	84	90	90
Spatial Organization	83	82	83	64	79	72
Informative	90	85	90	88	83	89
Rarity	81	72	75	67	75	76
Representativeness	88	88	84	86	83	86
Total Score	1019	1014	1029	934	969	983
Index	0,85	0,85	0,86	0,78	0,81	0,82
Significance Level	Exceptional	Exceptional	Exceptional	Important	Important	Important

Note Significance Level.

Index 0.85 – 1.00 = Exceptional; Index 0.68 – 0.84 = Important; Index 0.51 – 0.67 = Moderate; Index 0.34 – 0.50 = Low; Index 0.17 – 0.33 = Neutral; Index 0.00 – 0.16 = Non-Contributive

Based on the assessment of the six cultural heritage objects, the overall significance values of the cultural heritage sites were obtained, as presented in Table 11. Based on the combined assessment in Table 5.9, a total of three cultural heritage objects were classified as having exceptional significance, while three objects were classified as having important significance. These assessment results and analyses can serve as a reference for determining conservation actions for the cultural heritage sites in the Kotagede area.

3.3 Community perception of the criteria for assessing cultural heritage significance

The assessment of the significance of cultural heritage sites in the Kotagede area was conducted based on community perceptions using a Likert scale administered to 120 respondents. The purpose of this assessment was to determine the degree of importance of each category presented to the community. The assessment focused on four main aspects: historical value, sociocultural value, aesthetic value, and scientific value. The results of the community’s assessment of each aspect are presented in the following tables.

3.3.1 Community perception of the historical value criteria

Based on the community assessment of the historical value criteria, the majority of respondents rated the aspects of association with historical events and association with historical figures or actors as having exceptional importance, while the aspect of age was rated as having important significance (Feng et al., 2025) . Likert scale analysis shows that most respondents assigned the highest scores to the categories “Very Important” and “Important,” whereas the scores for “Neutral,” “Less Important,” and “Not Important” were relatively low. The evaluation chart indicates a significant gap between the highest and lowest scores, demonstrating that the majority of the community considers these three historical criteria as key indicators in assessing the significance of cultural heritage in the Kotagede area.

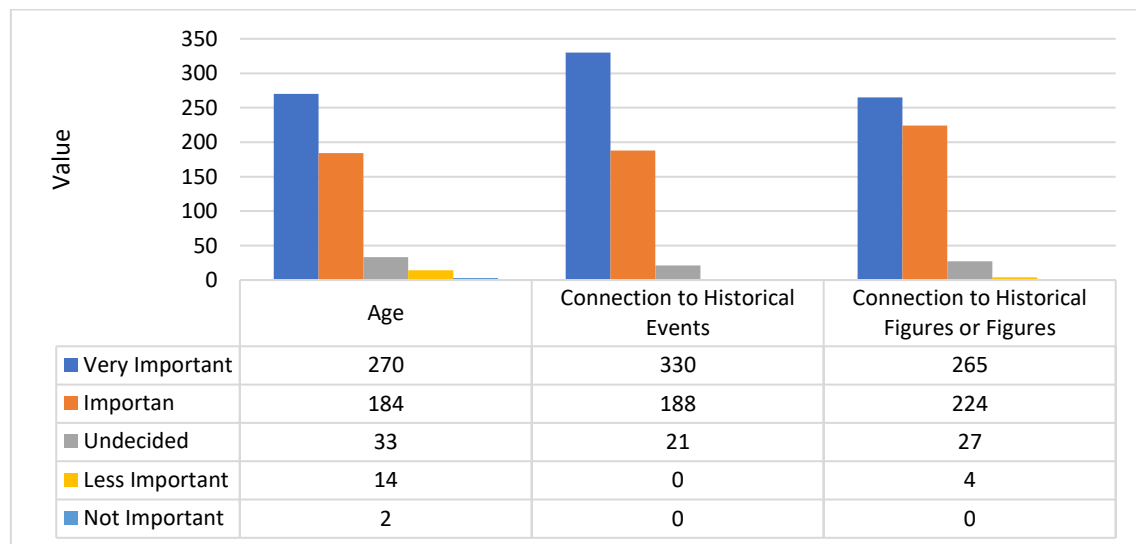


Fig. 2. Community perception assessment chart on historical value criteria

3.3.2 Community perception of socio-cultural value criteria

Based on the community assessment of the socio-cultural value criteria, the majority of respondents rated local traditions/wisdom and emotional value as having important significance, while political/spiritual focus was considered of moderate significance (Pontoh & Kustiwan, 2009). The evaluation chart shows that for local traditions/wisdom, the number of “Very Important” scores is almost equal to “Important” scores, whereas lower scores such as “Neutral,” “Less Important,” and “Not Important” were relatively few. For

emotional value, the “Important” score dominated, followed by “Neutral,” with only a small number of respondents choosing lower scores. Regarding political/spiritual focus, scores were more varied, with a higher proportion of respondents selecting “Less Important” and “Not Important” compared to the other criteria. This indicates that the community considers local traditions/wisdom and emotional value as highly relevant indicators, while political/spiritual focus is deemed moderately important in assessing the significance of cultural heritage in the Kotagede area.

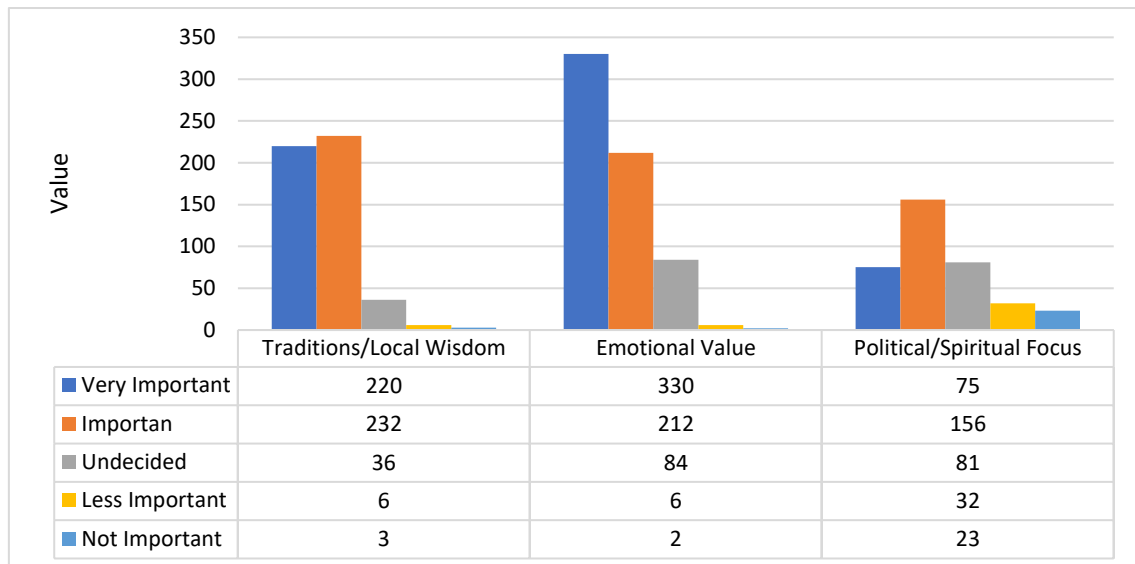


Fig. 3. Community perception assessment chart on socio-cultural value criteria

3.3.3 Community perception of aesthetic value criteria

Based on community assessments of aesthetic value criteria, the majority rated architectural elements as having an exceptional level of importance, while historical style and spatial layout (relations and organization of spaces) were considered important. The evaluation chart shows that for all three criteria, the number of “Very Important” scores is nearly equal to the “Important” scores, whereas lower scores such as “Neutral,” “Less Important,” and “Not Important” are much fewer. For historical style, only a few respondents chose “Less Important,” and none selected “Not Important,” while for spatial layout, a small number of respondents gave lower scores. This confirms that the community regards all three criteria as significant indicators in assessing the aesthetic value of cultural heritage in the Kotagede Area.

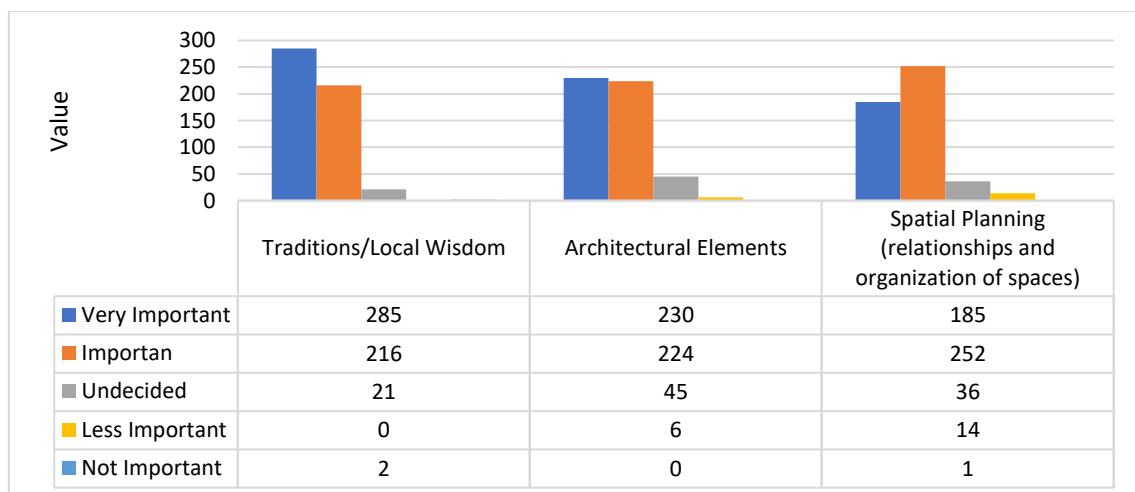


Fig. 4. Community perception assessment chart for aesthetic value criteria

3.3.4 Community perception of the knowledge value criteria

Based on community assessments of the knowledge value criteria, all categories—informative, rarity, and representativeness—were considered of exceptional importance. The evaluation chart shows that the number of “Very Important” scores is nearly equal to the “Important” scores, while the lower scores—“Neutral,” “Less Important,” and “Not Important”—are far fewer. Almost no respondents selected “Not Important,” and only a small number chose “Less Important,” such as 16 respondents for rarity and 4 respondents for representativeness. This indicates that the majority of the community considers all three categories as highly significant indicators in assessing the cultural heritage value in the Kotagede Area.

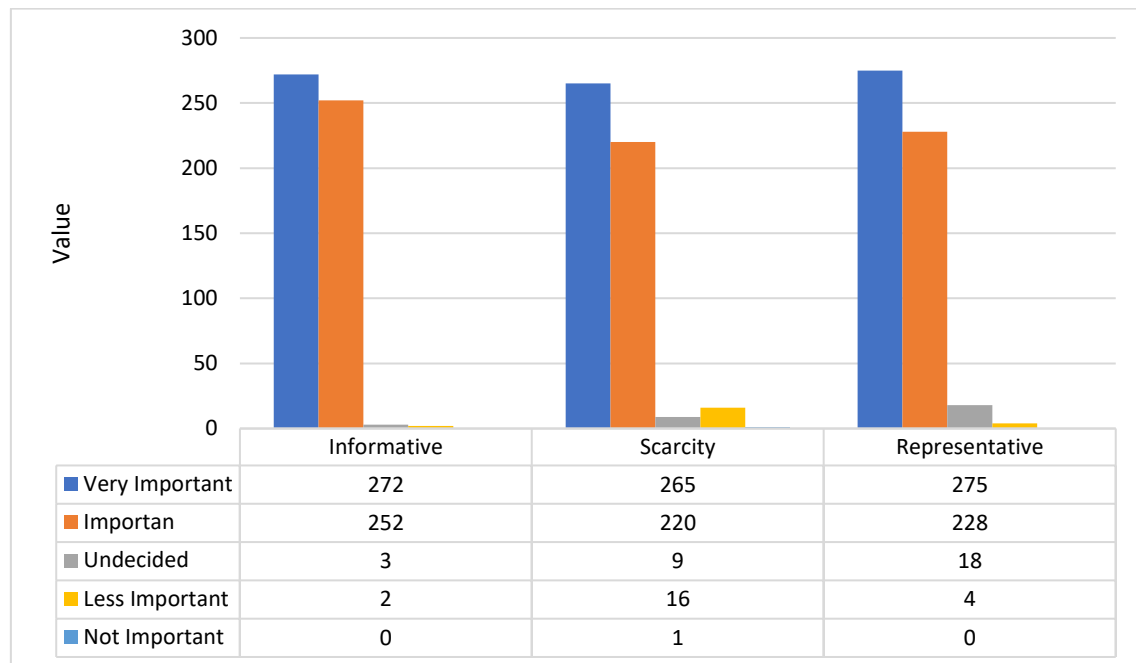


Fig. 5. Community perception rating chart on the knowledge value criteria

3.4 Discussion of findings and follow-up strategies

The first and second stages of analysis indicate that all heritage sites under study possess high significance. The similarity of results across both stages demonstrates that the local community has competencies and capabilities comparable to other stakeholders, making them suitable as evaluators of heritage significance. This aligns with the findings of Fitri (2015) and Paramitha et al. (2017), which emphasize the crucial role of local community participation in cultural heritage conservation. Furthermore, the study identified a categorization based on the physical condition and functional status of the objects. Four sites—Masjid Gedhe Mataram, Pasar Kotagede, Between Two Gates (Kampung Alun-Alun), and the Royal Mausoleum and Sendang Seliran Complex—remain well-preserved and actively used. In contrast, Benteng Cepuri and Kedhaton have experienced functional shifts and significant physical alterations.

Based on the analysis results, the strategy for preserving cultural heritage in the Kotagede Area should actively involve the local community, as their perceptions align with normative assessments. Pasar Kotagede is recommended to be reconstructed in accordance with contemporary developments without erasing its historical style, so that its function, integrity, and intangible values remain preserved (Dharmasanti & Dewi, 2020). Masjid Gedhe Mataram and the Royal Founders’ Mausoleum Complex along with Sendang Seliran should be conserved with minimal intervention to maintain authenticity, facade, and structural stability, while also safeguarding the continuity of their inherent cultural heritage values. Kampung Alun-Alun, or Between Two Gates, requires preservation to maintain the

historical style of traditional houses, accompanied by careful management of tourism potential to prevent damage to the site (Leiper, 1995). The Kedhaton site needs adaptive measures, such as introducing new functions or services to protect the objects, alongside historical education for the surrounding community to enhance emotional value, with minimal changes to preserve cultural significance. The ruins of Benteng Cepuri, which have shifted in function to a public area, are recommended to be adapted with new functional uses and restored to repair physical damage, retaining original materials and based on identification and analysis evidence to recover and highlight the site's cultural heritage value.

4. Conclusions

Based on the analysis of cultural heritage significance in the Kotagede Area according to the local community, it can be concluded that all research objects hold high significance when viewed across the four assessment aspects. Significant differences are observed in the aesthetic aspect, where not all objects retain their original architectural elements or building styles, and spatial organization varies across sites. Differences are also evident in the socio-cultural aspect; traditions and local wisdom remain preserved in some objects, such as Masjid Gedhe Mataram, the Royal Mausoleum, Pasar Kotagede, and Between Two Gates, but are rarely or no longer practiced in other sites, affecting the community's emotional sensitivity toward these objects.

Furthermore, local community assessments via questionnaires show slight deviations from the literature-based study results. Some objects, such as Kedhaton and the ruins of Benteng Cepuri, are perceived as less important by the community, likely due to uneven preservation efforts and limited dissemination of information about the cultural heritage. According to the community, most evaluation criteria are relevant, except for the political/spiritual focus, which is considered less important as culture should not be associated with political matters. Overall, the community regards the remaining criteria as significant indicators in assessing the cultural heritage significance in Kotagede.

Acknowledgement

The author gratefully acknowledges all forms of support and assistance received throughout the completion of this research.

Author Contribution

The sole author was responsible for all aspects of the study, including the design, data collection, analysis, and writing of the manuscript.

Funding

This research received no external funding.

Ethical Review Board Statement

Not available.

Informed Consent Statement

Not available.

Data Availability Statement

Not available.

Conflicts of Interest

The authors declare no conflict of interest.

Open Access

©2026. The author(s). This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit: <http://creativecommons.org/licenses/by/4.0/>

References

- Aurelia, S. (2020). *Penerapan World Heritage Cities pada Kota Tua Jakarta*. Universitas Gadjah Mada.
- Albiladiyah, I., & Suratmin. (1997). *Kotagede dan Dinamika Sejarahnya*. Yogyakarta: Lembaga Studi Jawa.
- Balai Pelestarian Cagar Budaya Provinsi DIY. (2017). *Benteng Cepuri Kotagede*. Retrieved from Situs Web Balai Pelestarian Cagar Budaya Provinsi. Balai Pelestarian Cagar Budaya Provinsi DIY. <http://kebudayaan.kemdikbud.go.id/bpchyogyakarta/benteng-cepuri-kotagede/>
- Banda, L. O. L., Banda, C. V., Banda, J. T., & Singini, T. (2024). Preserving cultural heritage: A community-centric approach to safeguarding the Khulubvi Traditional Temple, Malawi. *Heliyon*, 10(18), e37610. <https://doi.org/10.1016/j.heliyon.2024.e37610>
- Destiadi, R. (2020). Kampung Alun-Alun (Between Two Gates) Identitas Kearifan Lokal Masyarakat Kotagede. *POLIMEDIA*, 23(3)1. <https://ojs.polmed.ac.id/index.php/polimedia/article/view/355/89>
- Dharmasanti, R., & Dewi, S. P. (2020). The awareness level of building owners to conserve cultural heritage area in Kotagede, Yogyakarta. *IOP Conference Series: Earth and Environmental Science*, 409, 012025. <https://doi.org/10.1088/1755-1315/409/1/012025>
- Fajri, C. (2016). Dinamika Komunikasi Organisasi Forum Joglo (Studi Kasus Dinamika Komunikasi Internal dan Eksternal Organisasi Forum Joglo Kotagede Yogyakarta). *Kom & Realitas Sosial*, 12(12), 41-52. <https://jurnal.ubl.ac.id/index.php/IJK/article/view/654/629>
- Feng, H., Li, X., Chen, J., Xu, B., Zhou, X., & Zhu, R. (2025). Value identification of celebrities' former residences: An exploration using cultural triad theory and the contingent valuation method. *Buildings*, 15(21), 3940. <https://doi.org/10.3390/buildings15213940>
- Fitri, I. (2015). Partisipasi Masyarakat Lokal Medan: Sebuah Tinjauan Atas Kriteria Nasional Pada Proses Penetapan Sebagai Cagar Budaya. *Berkala Arkeologi SANGKHAKALA*, 18(2), 110-127. <http://sangkhakala.kemdikbud.go.id/index.php/SBA/article/view/12>
- Fitri, I., Marisa, A., & Sitorus, R. (2020). Understanding the Historic Center of Merdeka-Kesawan: Heritage Significance Assessment in Planning and Development Context. *IOP Conference Series: Earth and Environmental Science*, 012048. <https://doi.org/10.1088/1755-1315/452/1/012048>
- Hakim, M. F. (2018). Pelestarian Kotagede sebagai Pusat Pariwisata Heritage Kota Tua di Yogyakarta. *Jurnal Khasanah Ilmu*, 10-17. <https://doi.org/10.31294/khi.v9i1.2805>
- Hanunnindya, R. P. (2016). *Revitalisasi Pasar Kotagede: Optimalisasi Kebutuhan Ruang Pasar dan Pengembangan Fungsi Pasar yang*. Universitas Islam Indonesia.
- Heriawan, R. (2004). *Peranan dan Dampak Pariwisata pada Perekonomian Indonesia: Suatu Pendekatan Model I-O dan SAM*. Doktorat Institut Pertanian Bogor.
- Junianto. (2019). Konsep Mancapat-Mancalima dalam Struktur Kota Kerajaan Mataram Islam: Periode Kerajaan Surakarta. *MINTAKAT-Jurnal Arsitektur*, 107-131. <https://doi.org/10.26905/mj.v20i2.3987>

- Kementrian Pendidikan dan Kebudayaan. (2007). *Kompleks Masjid Gedhe Mataram di Kotagede*. Sistem Registrasi Nasional Cagar Budaya. <http://cagarbudaya.kemdikbud.go.id/cagarbudaya/detail/PO2016040400002/kompleks-masjid-gede-mataram-di-kotagede>
- Kusuma, A. (2020). Kajian Makna Saka Guru di Masjid Gedhe Mataram Kotagede Yogyakarta (Sebuah Tinjauan Arsitektur). *Lintas Ruang: Jurnal Pengetahuan & Perancangan Desain Interior*, 8(2), 1-10. <https://journal.isi.ac.id/index.php/lintas/article/download/5198/2105>
- Larasati, T. A. (2013). *Watu Gilang dan Watu Gatheng*. Dinas Perpustakaan dan Arsip Daerah DIY.
- Leiper, N. (1995). *Tourism Management*. RMIT.
- Makkelo, I. D. (2017). Sejarah Perkotaan: Sebuah Tinjauan Historiografis dan Tematis. *Lensa Budaya*, 83-101. <https://journal.unhas.ac.id/index.php/jlb/article/view/3052>
- Muftiadi, M., Hasan, M., Dewi, C., & Irwansyah, M. (2025). Preserving the past: Analyzing structural damage, policy implementation, and conservation efforts for 19th-century heritage buildings in Peunayong, Aceh. *Sustainability*, 17(19), 8594. <https://doi.org/10.3390/su17198594>
- Mundher, R., Abu Bakar, S., Maulan, S., Mohd Yusof, M. J., Al-Sharaa, A., Aziz, A., & Gao, H. (2022). Aesthetic quality assessment of landscapes as a model for urban forest areas: A systematic literature review. *Forests*, 13(7), 991. <https://doi.org/10.3390/f13070991>
- Nasruddin, E., Rosilawati, Y., Bustami, M. R., & Mulawarman, K. (2019). Culture heritage and local community engagement: Analyses of Kotagede and George Town heritage sites. *International Journal of Multicultural and Multireligious Understanding*, 6(5), 120-130. <https://doi.org/10.18415/ijmmu.v6i5.1075>
- Paramitha, I. A., Kastawan, I. W., & Widiastuti. (2017). Nilai Signifikansi Cagar Budaya Hotel Inna Bali, Jalan Veteran, Denpasar. *RUANG: Jurnal Lingkungan Binaan (SPACE: Journal of the Built Environment)*, 113-128. <https://ojs.unud.ac.id/index.php/ruang/article/view/39667/24055>
- Pontoh, N. K., & Kustiwan, I. (2009). *Pengantar Perencanaan Perkotaan*. Penerbit ITB.
- Pramesti, N. A. (2019). *Guide Book Nilai-Nilai Religius Ornamen Masjid Gedhe Mataram Kotagede*. Universitas Negeri Yogyakarta.
- Sugiyono. (2010). *Memahami Penelitian Kualitatif*. Alfabeta.
- Suryanti, E., Sumartono, S., & Hermawan, H. (2014). Culture development planning in the Special Region of Yogyakarta (Management planning of cultural heritage in Kotagede District based on community empowerment conservation model). *Journal of Indonesian Tourism and Development Studies*, 2(3), 120-127. <https://doi.org/10.21776/ub.jitode.2014.002.03.05>
- Yusuf, D. M. (2016). *Metode Penelitian Kuantitatif, Kualitatif & Penelitian Gabungan*. Prenada Media.

Biographies of Author

Muti'ah Rihul Jannah, Department of Architecture and Planning Engineering, Faculty of Engineering, Universitas Gadjah Mada.

- Email: mutiahrhl@gmail.com
- ORCID: N/A
- Web of Science ResearcherID: N/A
- Scopus Author ID: N/A
- Homepage: N/A