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Exploring the Impact of Built Environment Development on Activity Patterns of Public Open Space: The Case of Alun-alun Batu

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Abstract: The redesign implemented at Alun-alun Batu in 2011 can be categorized as successful, not only for transforming it into a new social activity space but also as a driver of economic growth significantly impacting the lives of Batu City residents. This success has made Alun-alun Batu a benchmark project for similar projects. Over a decade, the built environment surrounding Alun-alun Batu has significantly transformed. The built environment's consistent development influences individual and community experiences, influenced by variations in spatial functions and designs within the area. This has also affected the quality of urban space, particularly in Alun-alun Batu, where shifts in social activities can alter community interactions and the utilization of its space. This research aims to provide an understanding of the impact of the built environment's development on the utilization of public open spaces at Alun-alun Batu. This study used data collected in 2013 and 2023 to analyze changes in activity patterns at Alun-alun Batu, with the 2013 data sourced from a prior study. The analysis focuses on the impact of built environment developments in the surrounding area and the effects of the pre- and post-COVID-19 periods on both the intangible and spatial aspects of space usage. Data collection in both years involved behavior mapping based on predetermined variables: person, milieu, and temporal aspects. Along with observations and interviews. The data were then qualitatively analyzed using a descriptive-comparative method. This study aims to provide valuable insights for future planning and design of Alun-alun Batu's development.
Keywords: Public Open Space, Built Environment, Behaviour Mapping

INTRODUCTION

Cities, as dynamic entities, continually undergo transformation and development across various aspects of life, including social, economic, and cultural dimensions. These changes are not only reflected in the overall evolution of cities but are also manifested through spatial structure and pattern alterations within urban spaces. The transformations in the built environment are closely interlinked with the utilization of public spaces (Pradani & Nurini, 2020). The location and characteristics of public spaces play a crucial role in shaping social structures and activities within these spaces (Muqueeth, 2021; Vidal et al., 2022). As highlighted in the previous studies, there are intricate relationships among physical characteristics, activities, and the sense of place within public spaces such as Alun-alun Batu. Each of these aspects mutually influences one another, creating distinctive identities and experiences for visitors and local communities (Dea & Kusuma, 2021).

Alun-alun Batu, a public open space in Kota Wisata Batu, East Java, Indonesia, not only serves the local community but also attracts tourism both at the local and international levels. Alun-alun in Kota Batu has significant historical importance as a public open space.

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Established in 1983 following a major fire incident in the Batu sub-districts market area the year before, the location subsequently became the site for Alun-alun Batu. The development of Alun-alun Batu at that time was supported by the Bentoel Cigarette Factory in Malang, which contributed a monument in the form of a Bentoel cigarette, which became a focal point at the center of Alun-alun. Around 1994, a total renovation took place at Alun-alun Batu, resulting in the replacement of the Bentoel monument with the Apple Monument situated on top of a cabbage, which remains a distinctive symbol of Kota Batu to this day (Arbianto, 2022). Alun-alun Batu is among the strategic areas for economic growth in Kota Batu, especially in developing the city's prominent tourism sector. In 2018, a centralized informal trading center was established at Alun-alun Batu as part of efforts to manage the area as a strategic economic growth zone (Pemerintahan Kota Batu, 2011). By relocating the street vendors who previously operated around the alun-alun area to designated spaces, the region can be kept tidy and clean while also boosting communal sales. Despite facing challenges during its construction phase, it was finished with an open-concept structure using a steel framework measuring 20m x 15m (Farkhan et al., 2022). This location accommodates approximately 460 merchants engaged in various commercial activities (Rahma, 2020).

Over the past decade, Kota Batu has witnessed consistent growth in the tourism industry for the first seven years. However, in 2020, the situation dramatically changed due to the global Covid-19 pandemic. The pandemic significantly impacted tourism activities in Kota Batu, leading to the closure of Alun-alun Batu to the public to mitigate virus transmission. The regulation on public space usage placed by the Indonesian government on managing the Covid-19 pandemic, particularly concerning the policies governing the use of public spaces during the Period of Community Activities Restrictions (PPKM) had a big impact since nearly all public spaces in urban areas of Indonesia had their usage restricted, ranging from 25% capacity limitations to complete closures, depending on the level of PPKM imposed at the time (Kementerian Dalam Negeri, 2022). As a result, the use of Alun-alun Batu was also significantly impacted.

Despite this challenging period, the tourism sector in Kota Batu has seen a rapid recovery, particularly at Alun-alun Batu. The number of visitors to the Alun-alun Kota Wisata Batu tourist attraction surged, with visits doubling from 2021 to 2022. The most recent data, recorded on August 28, 2023, indicates a total of 2,054,048 visitors (BPS Kota Batu, 2023). However, it is important to note that the situation has not fully returned to pre-pandemic levels, as some regulations remain in place three years after the onset of the Covid-19 pandemic.

This research aims to explore the impact of the built environment's development in the Alun-alun Batu area on the patterns of activities within the space. The study focuses on changes in how space has been used at Alun-alun Batu over the past decade. A key method used in this study was behaviour mapping, which was selected for its ability to efficiently capture how people used public space and the patterns of their activities in real-time within these environments (Mu et al., 2021). This method offers measurable evidence of community engagement with public spaces, providing important insights into how spaces are used. Such information is essential for planners to understand user needs better and to design spaces that effectively meet those needs (Bishop et al., 2024). The findings of this research are expected to serve as a vital reference for future planning and development of the Alun-alun Batu area, aiming to enhance spatial utilization, improve visitor experiences, and preserve local cultural and environmental values.

METHODS

The study is geographically situated within the Alun-alun Batu, located in the Sisir sub-district of East Java, Indonesia. Specifically, it encompasses the Alun-alun Batu area, bordered by several main roads: Jalan Gajahmada to the north, Jalan Diponegoro to the east, Jalan Munif to the south, and Jalan Sudiro to the west. The approximate area of Alun-alun covers about 8987 square meters (Farkhan et al., 2022).

This research uses a data collection method containing primary and secondary data sources. Primary data were obtained through direct field observations, primarily within Alun-alun Batu and its surrounding areas. Meanwhile, secondary data collection involved accessing previously published information from literature, government documents, and similar research studies. This method allows researchers to attain comprehensive data from various relevant sources.

The primary method utilized in this study is behaviour mapping, selected for its objective, unobtrusive, and observational nature, enabling the observation of activities in a natural setting without external interference. Through behaviour mapping, the study measures the actual usage of space. Implementation of this method considers aspects such as person, milieu, and temporal factors. The observed object involves visitor activity patterns in the Alun-alun Batu area. Milieu observations are conducted based on predefined dimensions, including the study area delineation, observation sessions, and issue control (Moore & Cosco, 2010). The study area's delineation is set within Alun-alun Batu, with behavior-setting determination encompassing the surrounding single-layered buildings. Observation sessions occur on weekdays, prayer days (Friday), and weekends three times daily during the following time frames: in the morning between 6.00 - 8.00 WIB, in the afternoon between 12.00 - 14.00 WIB, and in the evening between 18.00 - 20.00 WIB. Data collection requires approximately 15-20 minutes per observation. The selection of prayer day or Fridays is based on the presence of the An-Nur Great Mosque situated north of Alun-alun Batu. Secondary data collection involves planning documents from the Batu city government and news articles related to the development of Alun-alun Batu over the past decade. Additionally, this study includes data from earlier research on activity patterns at Alun-alun Batu conducted in 2013 (Marhendra et al., 2014). The data were collected using the same methods, including behaviour mapping and observational results, to allow for effective comparison with the current findings.

This research adopts a qualitative approach and uses a comparative descriptive approach. This approach focuses on providing in-depth explanations regarding the characteristics, context, or nature of the phenomenon under investigation. The analysis process involves categorizing, organizing, and interpreting data to identify differences, similarities, or specific patterns among observed variables or cases. In the context of this study, the focus is on Alun-alun Batu in 2013 and 2023, which experienced changes in the built environment in its vicinity. The main objective is to observe and analyze the interrelationships between the physical characteristics, activities, and sense of place within Alun-alun Batu during these two distinct periods.

FINDINGS AND RESULT

Over the past decade, the urban environment surrounding Alun-alun Batu, a public open space, has significantly shaped community perceptions. When communities perceive aspects like safety, comfort, and environmental aesthetics positively, it tends to encourage both active and passive community engagement. Consideration of travel-related and socio-economic variables can influence these community perceptions (Koohsari et al., 2012).

Within the last ten years, Kota Batu has experienced remarkable development, particularly in the tourism sector, with Alun-alun Batu emerging as a major attraction. There have been notable changes in the structure and spatial arrangement within Alun-alun Batu, including the establishment of a centralized informal trade center to the east of Alun-alun Batu. This center not only offers various food items but also sells a range of products from toys to clothing. Trading activities are mostly limited during the daytime, as not all stalls operate during these hours. However, the atmosphere becomes livelier towards the late afternoon and evening, when the variety of affordable food options becomes a significant draw. A rapid growth in this sector can be observed when compared to conditions a decade ago when the primary attractions in the area were limited to the purchase of milk at KUD Batu and Pos Ketan Legenda-1967.

Source: Adaptation from Google Earth, with Modification

Figure 1. Alun-alun Batu in 2013 and 2023

Observations of visitor activities at Alun-alun Batu between 2013 and 2023 depict a consistent pattern in spatial utilization (Marhendra et al., 2014). There has been a notable increase in activity during the evening hours, while surges in visits are observed during holidays. Morning activities remain minimal, particularly on weekdays and prayer days, as the majority of the populace is engaged in other commitments such as school and work. Limited activities prevail during the daytime due to high temperatures ranging from 28° to 32° Celsius and relatively high humidity levels of 75-98%. The impact of these weather conditions is reflected in the behavior map, where people predominantly engage in activities at locations with adequate shade—the design of Alun-alun Batu with a significant number of fountains aids in mitigating the high temperatures. This is consistent with previous research, which found that factors influencing various activities include the presence of service facilities and the microclimate environment, particularly in activities such as walking and sitting (Liu et al., 2023). Evening time marks the peak of visitor influx to Alun-alun Batu after their daily engagements. The surrounding environment also accommodates by opening stalls and vendors in the evening. This time is opportune for social gatherings and spending leisure time.

Observational findings also reveal an intriguing pattern in visitor numbers during weekday mornings and afternoons that are relatively similar. Notably, an interesting phenomenon occurs on weekday mornings when schoolchildren use Alun-alun Batu for physical activities. This phenomenon can be attributed to the presence of four educational institutions in the surrounding area: Pondok Pesantren Miftahul Huda Kauman, MTs Islam

Hasyim Asy'ari, SMA Islam Hasyim Asy'ari, and MI Miftahul Ulum. These educational establishments significantly influence the utilization of this open space during weekday mornings. However, without schoolchildren's utilization, Alun-alun Batu during weekday mornings tends to have fewer visitors. The addition of morning visitors on holidays is attributed to individuals cycling or jogging in the morning.

Moreover, this pattern of space utilization reflects the diverse social activities of the community surrounding Alun-alun Batu during this period. With a consistent trend in space usage, further analysis becomes imperative to comprehend the patterns of change and dynamics in visitor activities over an extended period. The observed development within the Alun-alun Batu exhibits minimal changes over the research period. Despite some areas experiencing functional alterations, no significant transformations are evident in terms of size or physical appearance.

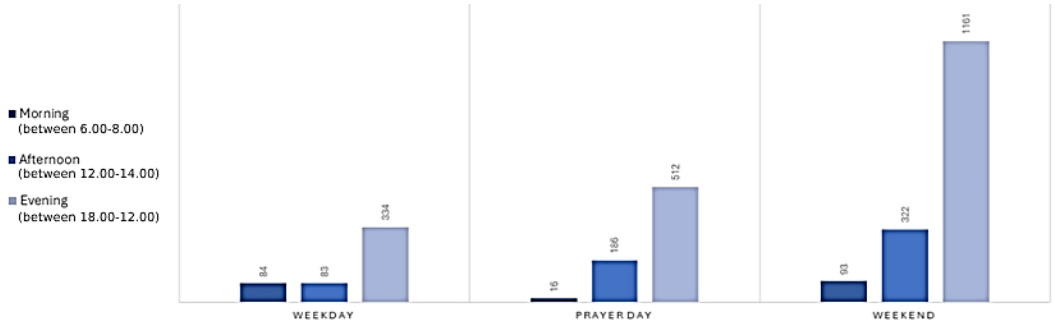


Figure 2. Number of Visitors at the Alun-alun Batu during Research Data Collection Period

In this research, Alun-alun was divided into six zones based on function and location to facilitate observation and analysis. The zones were delineated using physical circulation boundaries, such as pavements and curbs. The six primary zones within the Alun-alun Batu area are 1) the Central Fountain Plaza zone; 2) the Playground zone; 3) the Circuit Park zone; 4) the Octagon Fountain Plaza zone; 5) the Ferris Wheel Zone; 6) Pedestrian ways zone. The total area is divided into a percentage of soft elements covering 27.6% and hard elements accounting for 42.4%, while the remainder consists of water bodies in the form of ponds and water fountains (Zahra et al., 2014).

Zone 1 serves as the main central area within the Alun-alun Batu, located at its core, with the iconic fountain symbolizing Kota Batu. This zone provides seating areas for visitors to enjoy the scenery and relax within the Alun-alun Batu precinct. Zone 2 is renowned for its playground, making it a primary destination for families visiting the Alun-alun Batu. Adjacent to it is a fountain accompanied by an Alun-alun Batu sign, which stands out prominently from the main road. Zone 3 has undergone significant changes over time, transitioning from a circuit park without circuit to a water park that no longer contains water. Nevertheless, a small fountain remains in this area. Zone 4 features the Octagon Fountain Park, one of the most popular spots in Alun-alun Batu, which is consistently crowded with visitors. This zone showcases various facilities related to the management of Alun-alun Batu and is strategically positioned near the western entrance and the central street vendors' area. It serves as a focal point for organizing activities within the Alun-alun Batu Zone 5 consists of the Ferris wheel area, which, by 2023, is no longer operational. In its place, a merry-go-round has been added, which operates only in the evening. Zone 6 is for the pedestrian pathway that encircling the Alun-alun Batu, forming the outermost part of this area specifically designed for pedestrians.

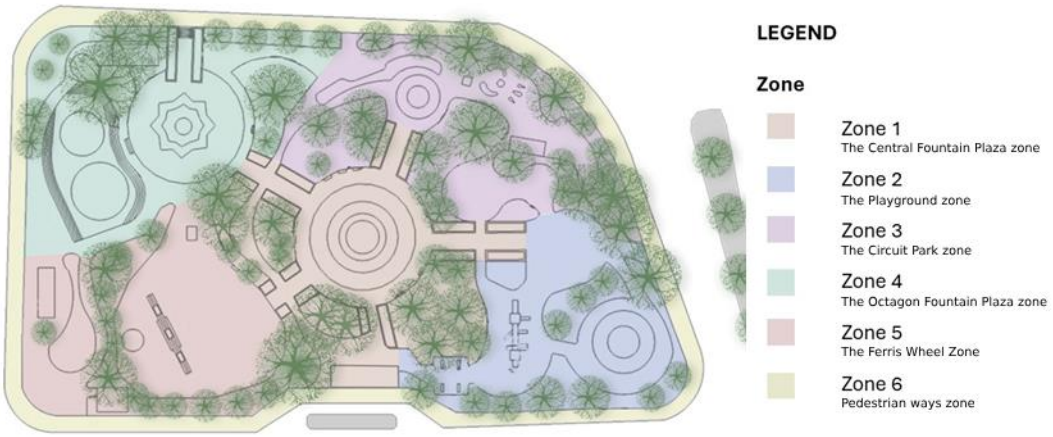


Figure 3. Alun-alun Batu Zoning Map

A previous study found that differences in activities occurring within a space are due to the specific characteristics of that space, which also contribute to gaps in its usage. Users of the space identified its elements through categories such as the natural environment, large open spaces, and equipment for physical activities (Do et al., 2019).

Over the course of 2013 to 2023, significant physical changes in Alun-alun Batu could be considered relatively minimal. Generally, the additions to the facilities included the placement of toilet facilities at the southern entrance, as well as the inclusion of a merry-go-round and a stage located on the southwest side of the Alun-alun. There was notably high interaction, particularly with the merry-go-round, which tended to attract children. However, this attraction often operated primarily during the evenings, especially on holidays.

Nevertheless, other visible differences could be observed, particularly concerning previously available facilities that no longer function optimally. Examples include the Ferris wheel, the circuit park, and the water park. In 2013, these attractions were the primary draw for crowds at Alun-alun Batu, especially among facilities catered to children. However, over time, the infrastructure conditions exhibited signs of requiring more intensive maintenance. Inconsistencies in the operating hours of these facilities led to a significant decrease in visitor interest, ultimately resulting in the termination of the operation of several of these facilities.

Table 1. Visitor Counts in Alun-alun Batu During Weekend Afternoon Observation

No	Zone	Visitors	%
1	Zone 1	70	21.74
2	Zone 2	65	20.19
3	Zone 3	7	2.17
4	Zone 4	56	17.39
5	Zone 5	41	12.73
6	Zone 6	83	25.78
	Total	322	100,00

A. The relation between activity pattern and effective capacity of public open space

When analyzing spaces, three key elements must be considered: space, activity, and people. Specifically, the aspect of space, which fundamentally would not increase, impacts how people and activities are accommodated within it (Doxiadis, 1968). In the context of Alun-alun Batu, capacity refers to the space's ability to accommodate visitors. Each space has a natural capacity to hold a certain number of individuals, and people tend to leave when

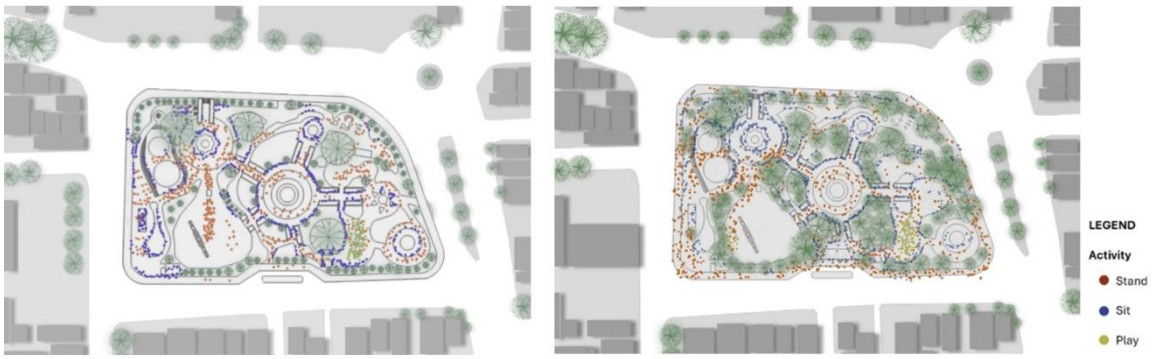
an area approaches its maximum capacity (Whyte, 1980). The limitation can affect activity patterns that are observed inside the observation space that has been defined, which the activities potentially happened outside the observation area. This is evident in the significant increase in activity observed in Zone 6, which serves as a circulation route connecting Alun-alun Batu with the surrounding built environment, primarily occupied by culinary tourism spots. This suggests that differences in activity between 2013 and 2023 may have occurred outside the immediate Alun-alun area. The lack of significant changes in the pattern of open space activity within Alun-alun Batu from 2013 to 2023 is likely due to the inherent capacity constraints of the area.

The data collected in 2013 and 2023 exhibit similar trends, particularly evident on weekend nights (see Figure 4). From the observations, zones 1, 2 and 4 were the most frequently used areas. Zone 1, surrounded by seating arrangements encircling a fountain and shaded by lush trees, offered a direct and comfortably spaced view of the fountain. This zone served as the primary thoroughfare for visitors exploring Alun-alun Batu. The playground in Zone 2 was the main attraction, filled with children using the play area while parents accompanied and supervised them nearby. Zone 4 displayed varied fluctuations in each observation, likely due to the sunlight's direction and resulting shadows. Behaviour mapping revealed uneven use of the fountain area for seating, especially in zone 4, as its design was conducive to seating, and drawing a crowd (Whyte, 1980). The positioning of the fountain away from trees significantly affected its daytime use due to sunlight and shadows.

Slight changes in activity patterns were observed due to modifications in the available facilities. Zone 3 experienced decreased usage as the circuit park and water park playground facilities were no longer fully functional. However, children's activities continued to sustain the area's vibrancy, with accompanying adults maintaining its liveliness. A similar situation occurred in Zone 5, where the Ferris wheel was no longer operational, but the introduction of the merry-go-round maintained the area's crowd levels.

Activities concentrated in specific areas, causing uneven distribution of people, who gathered in popular spots such as long trails, seating areas, and playing areas. As a result, these areas became increasingly crowded, particularly during evenings and holidays. The surrounding built environment developments have had minimal impact on changing activity patterns, as the capacity limitations within Alun-alun Batu itself have remained a more significant factor.

This warrants attention as studies indicate that the size of public spaces should be considered. When space feels too confined, its utilization tends to decline (Lo & Jim, 2010). Besides expanding the area, which might be challenging at Alun-alun Batu, an alternative solution is to connect Alun-alun Batu with other public open spaces. This initiative could create a conducive environment for community activities.



Source: Adapted from Marhendra et al., 2013 and Author, 2023

Figure 4. Map of Activities in Alun-alun Batu on Weekends in the Evening

B. Impact of Covid-19 Regulation on Public Space Usage

Post-pandemic regulations have significantly influenced changes in activity patterns at Alun-alun Batu, particularly in comparison to the rapid development of its surrounding environment. The closure of public spaces, though regrettable, was a necessary response to pandemic conditions that required appropriate policy measures. Case studies highlight that well-designed public spaces demonstrate resilience during crises, with flexibility being a key characteristic that allows them to adapt effectively during the pandemic. Public spaces that possess this flexibility do not require specific alterations, as they are inherently equipped to handle large numbers of visitors (Sepe, 2021).

Public spaces play a crucial role in fulfilling the social needs and psychological well-being of modern communities (Mehta, 2014). Areas such as parks and fields serve not only as venues for various activities but also as destinations that encourage walking and other physical activities (Sugiyama et al., 2010). Increased activity in public spaces is associated with significant health benefits, including reduced risks of heart disease, obesity, poor overall health, and mental health issues. (Setiowati & Koestoer, 2022) A case study in New Zealand highlighted the positive correlation between open public spaces and community activities, which proved especially important during the pandemic (Richardson et al., 2013).

Over the past decade, a significant change observed at Alun-alun Batu has been its usage in the mornings, on weekdays, on prayer days, and at weekends. Following the Covid-19 pandemic, the Batu City Government imposed restrictions on space usage as part of virus containment efforts. During the morning period, the pattern of space utilization by the public became more apparent due to reduced crowds. Entrances to Alun-alun Batu were closed, restricting access to the area. These activity limitations persisted during the data collection period; Alun-alun Batu was only accessible after 8 a.m. This resulted in restricted space usage limited only to pedestrian pathways surrounding Alun-alun Batu for walking activities. Despite the closure of Alun-alun Batu, activities were still apparent in the area, primarily with food outlets and stores opening early around the area. Many individuals were seen cycling around the surrounding area. Morning activities at Alun-alun Batu were dominated by jogging or walking in the surrounding area. Few gatherings were observed in the morning.

Source: Adapted from Marhendra et al., 2013 and Author, 2023

Figure 5. Map of Activities in Alun-alun Batu in the Morning on Weekdays

The study of behavior mapping at Alun-alun Batu linked to the changes in its surrounding built environment, aims to serve as an evaluative tool for future planning and design of the area. Despite initial hypotheses suggesting that the effects of the built environment would influence activities and locations where people behave in public open spaces, observations did not reveal significant differences or outcomes consistent with the initial hypotheses. However, this outcome provides insights indicating alternative aspects beyond the anticipated ones. In studies comparing activity patterns over a decade, the most significant impacts were the regulations and effective capacity rather than the developments in the built environment at Alun-alun Batu.

This observation underlines the complexity of understanding how alterations in the built environment directly influence the behavioral dynamics within public open spaces. It suggests the necessity of incorporating various elements like regulations, effective capacity, and other social and environmental factors into future planning to ensure a comprehensive understanding and efficient utilization of public spaces. Further research or comprehensive analyses may be essential to gain deeper insights and substantiate these observations for more effective planning and design strategies.

CONCLUSIONS

In this study, a close relationship between the tangible and intangible value in built environment development has been unveiled. Several crucial aspects emerged from the analysis. The first one is the impact of spatial changes in built-environmental on activity patterns. Surrounding environmental alterations significantly influence the activity patterns observed at Alun-alun Batu. However, beyond these changes, the spatial size also stands as a crucial factor impacting these patterns. The relatively minimal change in the utilization pattern of Alun-alun Batu over the past decade suggests the likelihood that the space has neared its effective capacity, it is affecting how it is utilized by visitors and indicating a need for strategic intervention or expansion.

The next one is Alun-alun Batu's usage patterns post-pandemic. Following the pandemic, there is a critical need for a reassessment of the time restrictions placed on the usage of Alun-alun Batu. This review aims to ensure that the benefits derived from the presence of public open spaces can be optimally received. Ensuring that Alun-alun Batu and similar open spaces are accessible and inviting during conducive hours, particularly in the mornings, will likely encourage increased utilization by the community. This increased usage

not only fosters physical well-being but also positively impacts mental health, creating a conducive environment for various social and recreational activities. Therefore, a thoughtful reconsideration and potential modifications in the time regulations for Alun-alun Batu usage post-pandemic could notably contribute to fostering a healthier and more engaging community life.

The addition of space within the Alun-alun Batu area presents a strategic move to meet the need for more efficient and optimal spatial utilization for visitors. By expanding or adding connections to the other existing public open spaces, the aim is to offer an enhanced experience for visitors while improving the comfort and amenities accessible to all Alun-alun Batu visitors.

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