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The Influence of Cultural, Religious, and Health Factors on Recreational Facility Design Preferences in Lau Debuk-debuk, Karo Regency

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ABSTRACT
Lau Debuk-debuk is one of the tourist destinations for hot springs recreation located in Karo Regency, North Sumatra. Despite being popular among both local and international tourists, the existing hot spring facilities in the region still fall short of accommodating the cultural norms and religious practices of their diverse visitors, especially with regard to gender separation in bathing areas. This situation underscores the need for a deeper understanding of how cultural expectations and religious obligations affect spatial preferences. To address this issue, this study aims to investigate the influence of cultural and religious values on visitor preferences in designing gender-segregated hot spring facilities in Lau Debuk-Debuk, using a quantitative approach. It was employed by distributing structured questionnaires to 114 individuals who had previously visited the Lau Debuk-Debuk hot spring area. Given the increasing diversity of visitors to Lau Debuk-Debuk, understanding the link between cultural and religious values and facility design has become essential for creating inclusive tourism spaces. The responses were analyzed using descriptive and inferential statistical methods, including the Spearman correlation test, to explore the strength of relationships between cultural, religious, and health factors in facility design preferences. The results indicate that both cultural values and religious beliefs significantly affect visitor expectations, particularly regarding the need for gender-segregated spaces. The majority of respondents—both local and international—expressed a strong preference for facilities that uphold privacy, modesty, and respect for religious or traditional customs. These results emphasize the significance of incorporating culturally sensitive and Sharia-compliant design approaches in developing hot spring resorts. Taking these aspects into account not only improves visitor comfort and satisfaction but also contributes to creating inclusive and respectful tourism infrastructure that reflects the values of its intended users.

Keywords: Tourist Behavior, Hot springs Recreation Facility, Gender Sensitivity, Local Bathing Traditions, Cultural Tourism Infrastructure

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INTRODUCTION
Karo Highlands, commonly known as Karo Regency, is located in a highland area not far from the capital city of North Sumatra, Medan. Karo Regency is well known for its natural tourism sector, due to its elevation ranging from 200 to 1,500 meters above sea level. Lau Debuk-Debuk is one of the prominent tourist areas in Karo Regency (Rencana Tata Ruang Wilayah Kabupaten Karo 2022-2042, 2022), offering therapeutic tourism in the form of natural hot spring baths. Located at the foot of Mount Sibayak, this area is rich in geothermal activity, with many natural hot spring sources. This geographical feature has been acknowledged by the Karo Regency Government, leading to a focus on the development of nature-based tourism as part of its strategic plan to boost regional economic income (BPPDPP, 2023). However, active community participation through social capital

and kinship systems plays a crucial role in the management and development of tourism in the area (Arisya, 2018).

Currently, Lau Debuk-Debuk is home to several hot spring bathing facilities, complemented by accommodation services. These hot spring attractions draw visitors at the local, national, and even international levels. Based on available data, the highest number of visits to the Lau Debuk-Debuk hot springs in the past seven years reached 237.250 visitors, occurring in 2018. International tourist arrivals to Karo Regency are dominated by visitors from Malaysia, the Netherlands, Singapore, India, Australia, Germany, France, Italy, Spain, and the United States (Dinas Pariwisata Kabupaten Karo, 2024).



Figure 1. Location of the Lau Debuk-Debuk Hot Spring Area, Karo Regency

In designing a tourism area, it is important to understand visitors' expectations and the target groups who will frequent the site. The existing hot springs in Lau Debuk-Debuk can be classified as Hot Spring Resorts and Spas (Erfurt, 2021). The primary target visitors for the planned hot spring design are local residents of North Sumatra, the majority of whom are Muslims (BPS Sumatera Utara, 2022), as well as tourists from countries with strong hot spring bathing traditions such as those in East Asia (Erfurt, 2021) and the Middle East, who travel to North Sumatra. According to the book The Geoheritage of Hot Spring, Hot Spring Resorts and Spas generally cater to visitors from outside the region, including repeat visitors. With the growing trend of halal tourism demanding facilities that are accommodating to Muslim tourists, the need for gender-segregated bathing areas has become increasingly urgent. This is especially important in light of the rapid development of the sharia-based tourism industry, both in Indonesia and globally, particularly considering the influx of tourists from countries with strong religious and cultural values regarding gender separation—such as those in the Middle East—who also travel to Indonesia (Faidah et al., 2021). Therefore, gender-separated bathing facilities are essential to support this growing demand.



Figure 2. Aspek pertimbangan design untuk hot springs recreational facility

The current design of recreational facilities in Lau Debuk-debuk has not fully taken into account the cultural and religious aspects of its visitors, including both local communities and tourists from East Asian countries who uphold norms of modesty and prefer gender segregation.,This oversight may affect user comfort and satisfaction, as well as hinder the tourism potential of the region. Therefore, the research focus on finding to what extent do cultural, religious, and health factors partially and simultaneously have a significant influence on the design preferences for hot spring facilities in Lau Debuk-debuk tourism area, Karo Regency. Also, to identify which aspect is dominated influence on the design preferences for hot spring facilities in Lau Debuk-debuk.

Literature Review

Design of Hot-Spring Recreational Facilities

Recreational facilities are spaces or buildings designed to support enjoyable leisure activities—especially for young people—whose effectiveness depends on users' perceptions and satisfaction levels (Omar et al., 2017). Beyond entertainment, these facilities create opportunities for physical activity and inter-generational social interaction, such as parks, skate arenas, and senior centers (Cohen et al., 2009). More broadly, they function as hubs for social exchange and cultural interaction, directly enhancing community well-being and quality of life (De Souza, 2024). Hot-spring facilities fall under geothermal tourism that taps natural, mineral-rich hot water sources for recreation, relaxation, and health benefits (Erfurt, 2021; Lee et al., 2009). Besides soaking pools, they typically provide amenities such as changing rooms, showers, toilets, and supporting services like accommodation and entertainment (Lee et al., 2009; Rai et al., n.d.). Their infrastructure management also incorporates environmental-sustainability principles to preserve resources and surrounding areas (Liu et al., 2022). As a nature-based tourism form, hot-spring facilities contribute to local economic development and public health, forming part of tourism and wellness systems in many countries (Lee et al., 2009). In essence, recreational facilities supply venues for leisure, exercise, and social interaction across age groups. Their effectiveness—shaped by user satisfaction and perception—greatly aids community engagement, physical well-being, and overall quality of life.

Cultural Influence in Public Space Design

Culture plays a vital role in shaping the identity of urban public spaces, as the integration of local cultural elements in design can foster a sense of belonging, reflect the unique character of a place, and prevent homogenization across cities (Li & Sahari, 2022). When traditional and modern elements are harmonized, public spaces not only serve practical functions but also represent local heritage, enhancing the quality of life for urban communities (Li & Sahari, 2022). Additionally, public space design often mirrors the norms of social interaction within a culture; in societies that encourage communal activities, spaces such as parks and community centers are more prevalent, while more private and enclosed spaces emerge in cultures with limited social interaction (Jalalkamali & Doratli, 2022). Furthermore, culture significantly shapes public space design by influencing identity and interaction patterns in urban areas (Saghati, 2015). It also nurtures a collective sense of ownership, which is essential for improving the quality of urban life and reflecting community values (Saghati, 2015). Therefore, the relationship between culture and space must be emphasized to ensure that public areas are not only functional but also meaningful for their users. From an aesthetic perspective, the selection of materials, colors, and design elements is often inspired by local traditions and cultural narratives, making public spaces more accessible and visually engaging (Askarizad, 2018). Designs that reflect local customs, traditions, and values are more likely to be accepted and appreciated by communities, reinforcing local identity. A human-centered design approach ensures that public spaces function as cultural landmarks as well. The inclusion of regional visual elements—such as icons, murals, and interior decorations—plays a key role in shaping space identity, as these elements can communicate regional history and culture, thereby enriching the user experience and promoting cultural awareness (Yujue & Samsudin, 2023; Permen Kemenkraf No.3, 2022). To truly reflect local culture in public spaces, a collaborative governance approach is required, emphasizing the involvement of communities, including indigenous and cultural groups, in the design process (Sazaly, 2019). In summary, culture plays a crucial role in shaping public space

design that is not only functional but also expressive of a community's identity, values, and heritage. Through humanistic and participatory design, the integration of cultural elements can create meaningful, inclusive spaces that strengthen the sense of belonging within a society.

Religion and Gender Segregation in Recreational Facilities

Gender segregation refers to the practice of separating individuals based on sex in various public spaces, often rooted in cultural and religious norms aimed at preserving modesty—especially for women (Triger, 2013). In Saudi Arabia, gender segregation is deeply embedded in interpretations of Islamic teachings, resulting in designated public spaces for women to support their social participation (Geel, 2016). Practices vary elsewhere; for example, in some Orthodox synagogues and Coptic churches, women continue to sit separately from men during worship services (Dişli & Özcan, 2020). The Middle East, predominantly composed of Sunni (85–90%) and Shia (10–15%) Muslim populations, integrates Islamic teachings into its political, legal, and social frameworks (Aris, 2024). Islamic rules concerning male-female interaction include prohibitions on physical contact between non-mahram individuals and mandates for modest dress, which are intended to uphold individual dignity and purity (Hazim & Nazari, 2023; Hashim et al., 2019). Gender segregation is viewed as a preventive strategy to avoid temptation (fitnah), enhance productivity, and maintain moral integrity in social spaces (Ansari & Rahmany, 2020). This is evident in the design of public facilities such as baths, schools, and workplaces that prioritize privacy and modesty. Cultural and religious values significantly shape the design of public spaces to preserve privacy and minimize direct interaction between genders—especially in conservative societies. Such design often includes gender-specific areas aligned with behavioral expectations (Jalalkamali & Doratli, 2022). A study in Aceh revealed that public spaces should be designed in accordance with Islamic Sharia norms, using open layouts to avoid misuse and emphasizing women's privacy. Facilities must be usable while wearing Islamic attire, and tourism activities are directed toward family-friendly engagements aligned with local cultural and religious values (Wisdianti, 2023). Meanwhile, in Gresik, a religious design approach encompasses relationships between humans, God, others, and nature. This is expressed through educational galleries, Islamic art centers, community spaces, and the use of religious symbols and natural elements. The goal is to revive the city's Santri identity through public spaces that are both functional and meaningful (Amanda & Hayati, 2015). In conclusion, gender segregation in public spaces reflects a blend of religious and cultural norms aimed at maintaining modesty, privacy, and social harmony—tailored to the values and context of each community.

Hot Spring Design in Indonesia and Eastern Cultural Contexts

The hot spring bathing culture in East Asian countries such as Japan, South Korea, and China is deeply intertwined with tradition, social practices, and public health values (Erfurt, 2021). Bathing is not merely a hygienic activity but carries spiritual and social significance, as seen in Shinto and Buddhist rituals, as well as Confucian principles that emphasize cleanliness (Jaglarz, 2013; DuBois, 2011; Tierney, 2015). Bathing in a nude state—while sensitive in other cultures—is regarded in East Asia as a form of purification and social equality, exemplified by the Japanese concept of "naked brotherhood" (Jaglarz, 2013; Bauerle, 1996). Gender segregation in bathing facilities is a common norm across East Asia, shaped by cultural views of modesty and privacy, reinforced since the Meiji period (Jaglarz, 2013). Japan developed the concepts of *sento* (public baths) and onsen (natural hot springs) as both communal and therapeutic facilities. Meanwhile, Korea adopted *mogyoktang* systems, emphasizing pre-bath cleansing and strict gender separation (Vierthaler, n.d.). In the modern era, *jjimjilbang* emerged in Korea as more complex public bathhouses that combine bathing with saunas and entertainment features (Huh & Jones, 2023). In China, bathing traditions date back to 3000–4000 BC, originally as luxurious imperial practices linked to health maintenance (Erfurt, 2021; Ling, 2022). Overall, hot spring bathing culture in East Asia reflects a blend of traditional, religious, and social values that emphasize purity, equality, and modesty through gender-separated practices. Despite modern developments, these core values remain preserved and serve as the foundation for designing contemporary bathing facilities that are culturally sensitive and socially considerate.

Health Effects and Water Therapy in Hot Spring Baths

The habit of bathing in hot springs (spa) has a positive impact on both the mental and physical health of the Japanese population, particularly among the elderly. Mentally, a higher frequency of bathing is correlated with increased life satisfaction and reduced stress levels (Takeda et al., 2022). Physically, findings from the study titled "The Effects of Hot Spring Spa-Bathing Habits on Physical and Mental Health in Japan" show that regular hot spring bathing significantly reduces the risk of hypertension, both on a national level and specifically in Beppu City. In Beppu, spa bathing is also associated with a reduced risk of hyperlipidemia and depression. These differences in effects are believed to stem from variations in hot spring water composition and environmental factors across regions. Balneotherapy has also been proven to reduce cholesterol levels and inflammatory markers in the body (Takeda et al., 2022). Furthermore, hot spring water rich in carbonate ions (from Nagano) accelerates the wound healing process of the skin, as it increases blood vessel formation (angiogenesis), decreases the number of macrophages in the early stages, and speeds up collagen accumulation in the later stages (Liang et al., 2022). Hot spring water supports healing through improved blood circulation, antimicrobial effects, and the ability to retain skin moisture. The study titled "Carbonate Ion-Enriched Hot Spring Water Promotes Skin Wound Healing in Nude Rats" showed that hot spring water is more effective than regular hot water at the same temperature, indicating the significant role of mineral content—particularly carbonate ions (Liang et al., 2022). Hot spring baths also provide benefits for skin conditions such as eczematous dermatitis and non-specific skin diseases by improving symptoms through mineral absorption, reducing inflammation, and enhancing microcirculation. Noticeable improvement typically occurs after three or more days of treatment (Gebretsadik, 2023). Burn injuries can also be rehabilitated using hydrotherapy with mineral-rich hot water through a method known as Hydro-Pressure Therapy (HPT). This therapy effectively addresses issues like tissue hypertrophy, inflammation, abnormal pigmentation, and scarring, thereby improving skin structure and elasticity (Moufarrij et al., 2014). Bathing in hot water at temperatures between 38–40 °C significantly improves cardiovascular health by lowering blood pressure and pulse pressure while increasing cardiac output—indicating enhanced heart function. However, it is recommended not to bathe too long, especially during summer, to avoid excessive cardiac strain (Wang et al., 2023). As for its therapeutic effect on diabetes mellitus, hot spring therapy has shown significant increases in insulin levels, erythrocyte count, hemoglobin, and HDL levels, while markers of liver function and lipid profiles significantly decreased in the treatment group. Hot water therapy led to a substantial reduction in glucose levels and improvements in hematological parameters. Histopathological examinations confirmed healing effects on the pancreatic tissue of treated mice, suggesting that hot water may help in recovering from diabetes-related damage, as shown in the study "Investigation of Therapeutic Effects of Hot Spring Waters Sourced from Sureyya I (Turkey) on Experimentally-Induced Diabetes Mellitus in Mice". Hot spring water lowers LDL cholesterol and increases HDL, contributing to better metabolic health. These findings are consistent with current studies that highlight the effectiveness of hot spring baths in addressing complications associated with diabetes (Elitok & Caliskan, 2020). Bathing in natural hot springs, or balneotherapy, has been associated with numerous health benefits, particularly in supporting both physical and mental well-being. Research shows that regular hot spring bathing can significantly improve cardiovascular health, skin conditions, and overall life satisfaction.

Conceptual Framework and Hypotheses

The theoretical framework of this study is designed to understand the relationship between cultural values, religiosity, and health-related considerations with the design preferences for hot spring facilities—particularly in relation to the need for gender segregation. Understanding these variables is essential, as recreational space designs that align with users' cultural and religious values can enhance both comfort and satisfaction. Based on literature review and both local and global contexts, the following hypotheses have been formulated for empirical testing.

a. Independent Variables:

X1: Cultural Values (Includes private pools, indoor soaking areas, pre-bathing cleansing rooms, post-bath rinsing areas, locker and makeup zones, and meditation rooms)
X2: Religious Values (Includes prayer rooms and gender-separated ablution areas)
X3: Health Values (Includes relaxation therapy rooms, hydrotherapy facilities, and traditional massage therapy spaces)

b. Dependent Variable:
Y1: Design Preferences for Hot Spring Facilities (Includes gender-separated pools and separate circulation paths for men and women to bathing and rinsing areas)

c. Research Hypotheses:
H1: Cultural values (X1) have a significant partial effect on design preferences for hot spring facilities (Y1) in Lau Debuk-debuk.
H2: Religious values (X2) have a significant partial effect on design preferences for hot spring facilities (Y1) in Lau Debuk-debuk.
H3: Health factors (X3) have a significant partial effect on design preferences for hot spring facilities (Y1) in Lau Debuk-debuk.
H4: Cultural values, religious values, and health factors (X1, X2, X3) simultaneously have a significant effect on design preferences for hot spring facilities (Y1) in Lau Debuk-debuk.

METHOD

This study employs a descriptive quantitative approach to understand and analyze the extent to which cultural and religious values influence design preferences for hot spring facilities, particularly regarding the need for gender segregation in the Lau Debuk-Debuk tourism area, Karo Regency. This method was chosen to obtain measurable and representative data from local communities (including the Karo ethnic group and residents of Medan) as well as tourists from East Asia and the Middle East. A total of 114 respondents were involved in this research, selected through Stratified Random Sampling based on location (Karo Regency, Medan City, and outside Medan), and Purposive Sampling for East Asian and Muslim tourists, to explore how cultural and religious values shape design and facility preferences in hot springs. Data were collected via an online questionnaire consisting of questions related to respondents' preferences. The survey instrument was designed using a Likert scale to measure perceptions of facility-related and accessibility aspects associated with two main objectives: First, to analyze the influence of cultural and religious values on design preferences for hot spring facilities in the Lau Debuk-Debuk tourism area, Karo Regency; Second, to identify the need for gender segregation in recreational facilities based on the perceptions of both local and urban (external) communities. The scale used consists of five response level scale. The use of the Likert Scale allows for more in-depth quantitative analysis, enabling the researcher to objectively identify the importance level of each factor. The questionnaire was distributed online to 114 respondents, facilitating basic inferential statistical analysis and ensuring that each response could be statistically processed to support the validity of the research findings

Respondents were selected based on specific criteria aligned with the study's objective, which is to evaluate the influence of cultural and religious preferences on gender-segregated hot spring facility design in Lau Debuk-Debuk. The criteria include; Minimum age of 18 years, ensuring that participants are legally recognized adults capable of providing mature assessments of recreational experiences and cultural-religious values. Residents of Karo Regency or Medan City, as these two regions are closely linked to the Lau Debuk-Debuk area in terms of accessibility and local cultural relevance. Having visited the Lau Debuk-Debuk area at least once, to ensure that respondents have first-hand experience with or observation of the available facilities, enabling them to provide relevant and contextual responses. Diverse religious backgrounds, with a focus on Muslim respondents and East Asian communities (both Muslim and non-Muslim), considering the strong values of modesty and gender segregation upheld by both groups. For international respondents, priority was given to those from East Asian countries such as Japan, South Korea, and China, which are known for their strong hot spring bathing cultures and customary gender-separated bathing practices.

This study focuses on three independent variables, those are X1 (Cultural Factor). It is relates to the influence of cultural traditions (especially East Asian bathing practices) on the design of hot spring facilities. Then X2 (Religious Factor) which covers religious needs that influence the facilities provided, such as prayer rooms or gender-separated ablution spaces, and the last is X3 (Health Factor) included the need for health-supporting facilities such as relaxation therapy rooms, hydrotherapy, and traditional massage areas.

Table 1. Operationalization of Variables

Variable	Definition of Variable	Dimension	Indicator	Item
Cultural Factor (X1)	Cultural aspects that influence the design of hot spring facilities. Based on East Asian bathing traditions.	Bathing Culture	1. Private pools	$X1_1$
			2. Indoor soaking rooms	$X1_2$
			3. Pre-bathing cleansing area	$X1_3$
			4. Post-bathing rinsing area	$X1_4$
			5. Locker and makeup area	$X1_5$
		Meditation	6. Meditation room	$X1_6$
Religious Factor (X2)	Religious needs that influence bathing facilities (Based on sharia-compliant standards).	Worship Facilities	7. Prayer room and gender-separated ablution area	$X2_1$
Health Factor (X3)	Need for facilities that support physical health.	Water Therapy	8. Relaxation therapy and hydrotherapy room	$X3_1$
		Traditional Massage Therapy	9. Traditional massage therapy room	$X3_2$
Design Preference for Hot Spring Facilities (Y1)	Visitors' tendencies in choosing spatial forms and facility systems that suit their cultural values, comfort, and personal needs.	Gender Segregation	10. Separate pools for men and women	$Y1_1$
		Circulation Space	11. Separate pathways to shower and rinse areas for men and women	$Y1_2$

Data analysis is using the multiple linear regression analysis, which is a statistical method used to measure the relationship between one dependent variable and two or more independent variables. For the regression estimation results to be valid and yield reliable inferences, several assumptions—known as classical assumptions—must be fulfilled. These include normality, homoscedasticity, absence of autocorrelation (only applicable for time-series data), and no multicollinearity among independent variables. Violating any of these assumptions may lead to bias, inefficiency, or errors in decision-making based on the model. Therefore, before proceeding to interpret the regression results, it is essential to conduct classical assumption tests as an initial step to ensure the model's validity.

Also, the study implements the multiple linear regression analysis to evaluate how well the model explains the variation in the dependent variable. This evaluation is referred to as the goodness of fit, which indicates the degree of alignment between the predicted values generated by the model and the actual observed data. The primary measures commonly used to assess goodness of fit in multiple regression are the coefficient of determination (R^2) and the adjusted coefficient of determination (Adjusted R^2). R^2 reflects the proportion of total variance in the dependent variable that can be explained by the independent variables, while Adjusted R^2 adjusts for the number of predictors used to avoid overfitting. Thus, the goodness of fit analysis is crucial for understanding how effectively the model represents the relationships within the data.

Validity and Reliability Test

Item Validity Test

In quantitative research, the item validity test aims to ensure that the instrument used truly measures the intended construct. A valid instrument will produce relevant, accurate, and trustworthy data. Generally, the process of instrument validation includes two approaches: content validity, which is conducted through expert judgment, and empirical validity, which is carried out through field data testing. One of the most common techniques in empirical validity is item-total correlation using the Pearson Product Moment formula, where each item is correlated with the total score of the construct (Yusup, 2018).

In this study, the item validity test will be conducted using Pearson Correlation analysis in SPSS, namely by testing the relationship between each item in a variable and the total score of that variable. If the correlation result shows a significant and sufficiently strong relationship, the item is considered valid because it can represent the construct of the measured variable. The decision-making criteria for this validity test are as follows:

- If the calculated r value > r table and the significance value (Sig. 2-tailed) < 0.05, then the item is declared valid.
- Conversely, if the calculated r value ≤ r table or Sig. ≥ 0.05, then the item is declared invalid and may be considered for revision or removal.

Based on the number of respondents (114), the r table value at a 5% significance level (two-tailed) is 0.183, so an item is declared valid if its correlation value is greater than 0.183 and significant.

Table 2. Results of the Item Validity Test

Item (Indicator)	r-calculated Value	Significance Value	Remark
$X1_1$	0,604	0,000	Valid
$X1_2$	0,343	0,000	Valid
$X1_3$	0,703	0,000	Valid
$X1_4$	0,660	0,000	Valid
$X1_5$	0,583	0,000	Valid
$X1_6$	0,488	0,000	Valid
$X2_1$	Cannot be performed statistically	Cannot be performed statistically	Valid based on expert judgment
$X3_1$	0,918	0,000	Valid
$X3_2$	0,929	0,000	Valid
Y_1	0,869	0,000	Valid
Y_2	0,750	0,000	Valid

Based on the analysis results, all items show a calculated r value greater than the r table (0.183) and a significance value below 0.05, thus it can be concluded that these items are statistically valid. One item, namely $X2_1$, could not be tested for validity statistically because it is a variable with only a single indicator, and therefore does not have a total score for comparison. Consequently, the validity assessment for this item was carried out using a content validity approach through expert judgment and was declared valid based on theoretical considerations. Therefore, all items in this research instrument have met the validity requirements and are suitable for further analysis.

Reliability Test

After validity was established, the researcher conducted a reliability test to assess the internal consistency of the instrument—generally using Cronbach's Alpha coefficient, split-half, KR-20, or KR-21, depending on the type of data and measurement scale applied (Yusup, 2018). This study employed Cronbach's Alpha, which is the most common and recommended method for Likert

scales. The decision-making criteria are based on the interpretation of Cronbach's Alpha values as follows:

- $\alpha \geq 0.9$ indicates very high reliability,
- $0.8 \leq \alpha < 0.9$ high reliability,
- $0.7 \leq \alpha < 0.8$ acceptable reliability,
- $0.6 \leq \alpha < 0.7$ low reliability, and
- $\alpha < 0.6$ considered unreliable.

The results of the reliability test show that all constructs have Cronbach's Alpha values above 0.7, which means the instrument is reliable and appropriate for use in data collection. Tavakol and Dennick (2011), as cited in Yusup (2018), state that if the Cronbach's Alpha reliability coefficient is less than 0.70 (ri < 0.70), then the items in the instrument should be evaluated, such as by revising item wording or eliminating inconsistent items.

Tabel 3. Hasil Uji Reliabilitas Item

Item (Indicator)	*Cronbach's Alpha Value*	Remark
$X1_1$	0,726	Reliable
$X1_2$	0,774	Reliable
$X1_3$	0,719	Reliable
$X1_4$	0,723	Reliable
$X1_5$	0,741	Reliable
$X1_6$	0,733	Reliable
$X2_1$	Statistical testing cannot be performed because it only has a single indicator.	-
$X3_1$	0,719	Reliable
$X3_2$	0,702	Reliable
Y_1	0,738	Reliable
Y_2	0,720	Reliable

The analysis results show that all variables with more than one indicator have Cronbach's Alpha values of ≥ 0.70, which indicates that they fall into the reliable category. The only variable that could not be tested for reliability statistically is X2, as it consists of only a single indicator ($X2_1$). In such cases, Cronbach's Alpha cannot be calculated because the method requires more than one item within a construct. Therefore, the reliability of X2 was not analyzed quantitatively but can still be assessed in terms of content validity based on expert judgment, as previously explained. Thus, overall, the instrument in this study can be declared reliable and suitable for further data collection.

RESULT AND DISCUSSION

In Karo Regency, there exists a traditional bathing culture known as "Rebu Tapin", which prohibits bathing together with the opposite sex (Karo Simbisa Watch, 2014). When designing hot spring facilities aimed at attracting international tourists, it is essential to incorporate local cultural preservation goals (Peraturan Menteri Parekraf, 2022), such as "Rebu Tapin," by providing gender-segregated bathing areas. This also aligns with the preferences of tourists from East Asian countries like Japan, where hot spring baths are commonly separated by gender (Erfurt, 2021). The convergence of traditional Karo values such as "Rebu Tapin," the bathing culture of East Asian countries, and Islamic religious norms highlights the relevance of designing gender-segregated hot spring recreational facilities in the Lau Debuk-Debuk area. Such a design responds to the cultural and religious needs of diverse visitor groups. While there have been many studies on recreational and tourism facility design, there is still a lack of quantitative research specifically examining the

integration of cultural and religious values, particularly in the context of hot spring facilities in Indonesia. Furthermore, the concept of gender segregation, which is commonly practiced in East Asian countries, is rarely explored in local facility design contexts such as Karo Regency. This is evident in the table below, which presents the results of field observations on the availability of gender-segregated hot spring facilities in the Lau Debuk-Debuk area:

Table 4. Comparison of Facilities and Availability of Gender-Segregated Natural Hot Spring Pools in the Lau Debuk-Debuk Area

Hot Spring Name	Facilities	Availability of Gender-Segregated Pools (Available / Not Available)
Ribu Resort and Hotspring	Available facilities: Accommodation (lodging), hot spring pools (with varying temperatures), children's hot spring pool, one multipurpose hall, canteen, gallery, performance stage, bathing rinse rooms, gazebos, parking area, and prayer room (mushola). Not available: Water therapy area, traditional massage, indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	Not Available
Pemandian Air Panas Ginting	Available facilities: 17 lodging accommodations, hot spring pools (with varying temperatures), 4 children's hot spring pools, one multipurpose hall, canteen, gazebos, parking area, and prayer room (mushola). Not available: Water therapy area, traditional massage, indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	Not Available
Pemandian Air Panas Alam Sibayak	Available facilities: 19 lodging accommodations, hot spring pools (with varying temperatures), children's hot spring pool, private hot spring pool, therapy pool, multipurpose hall, canteen, waterpark, rinse area, bathing area, gazebos, parking area, and prayer room (mushola). Not available: Water therapy zone, traditional massage, indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	Not Available
Pemandian Alam Pesona	Available facilities: 14 lodging accommodations, hot spring pools (uniform temperature), children's hot spring pool, one multipurpose hall, canteen, bathing rinse rooms, gazebos, parking area, and prayer room (mushola). Not available: Water therapy area, traditional massage, indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	Not Available
Pemandian Alam Ncole	Available facilities: 16 lodging accommodations, hot spring pools (with varying temperatures), 2 private pools, children's hot spring pool, 3 multipurpose halls, canteen, restaurant, bathing rinse rooms, gazebos, and prayer room (mushola). Not available: Water therapy area, traditional massage, indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	Not Available
Pemandian Air Panas Pariban	Available facilities: 50 lodging accommodations, hot spring pools (85 cm depth, varying temperatures), children's hot spring pool, 3 multipurpose halls, café, bar, canteen, restaurant, playground, bathing rinse rooms, gazebos, performance stage, parking area, and prayer room (mushola). Not available: Water therapy area, traditional massage,	Not Available

	indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	
Pemandian Air Panas Karona	Available facilities: Lodging accommodations, hot spring pools (with varying temperatures), children's hot spring pool, therapy pool, one multipurpose hall, canteen, bathing rinse rooms, gazebos, parking area, and prayer room (mushola). Not available: Water therapy area, traditional massage, indoor bathing area, cleansing area before entering the pool, lockers, meditation area, and gender-separated circulation for certain facilities.	Not Available

The demographic characteristics of respondents in this study were dominated by the younger age group, with 86.84% aged 18–25 years and only 4.38% aged over 45. The majority of respondents were male (56.14%) and originated from Medan (64.91%), while the percentage of respondents from outside North Sumatra was relatively small (9.65%). Almost all respondents (98.25%) had previous experience visiting hot spring tourist sites, indicating that the sample was generally familiar with the subject of the study.

Table 5. Demographic Variables

Variable	Frequency	Percentage (%)
Age		
< 18 years	4	3.51
18–25 years	99	86.84
26-35 years	4	3.51
36-45 years	2	1.75
> 45 years	5	4.38
Gender		
Male	64	56.14
Female	50	43.86
Place of Residence		
Karo Regency	2	1.75
Medan	74	64.91
North Sumatera (Outside Medan)	27	23.68
Outside North Sumatera	11	9.65
Hot Spring Travel Experience		
Have Visited	112	98.25
Never Visited	2	1.75

Based on respondents' data, it can be differentiated in design preferences between the Karo community and people from other regions, such as Medan, regarding facilities that are sensitive to cultural and religious norms. It is sufficient to calculate the mean and standard deviation without applying more complex statistical tests. This approach is aiming to measure the tendency of group responses rather than test hypotheses about differences or relationships. For instance, in comparing the preferences of the Karo community and Medan residents toward culturally sensitive facilities, the mean will indicate the average level of agreement in each group, while the standard deviation will reveal how homogeneous or varied the responses are within each group. In this study, four indicators were used to assess visitors' perceptions regarding culturally sensitive facilities. These indicators include: Separate pools for men and women (X11), Indoor soaking rooms (X12), Availability of pre-bathing cleansing rooms before entering the pool (X13), and Rinsing rooms after exiting the pool (X14). The results of the standard deviation test, in order, are 0.756, 1.107, and 1.162, with the mean values shown in the figure below.

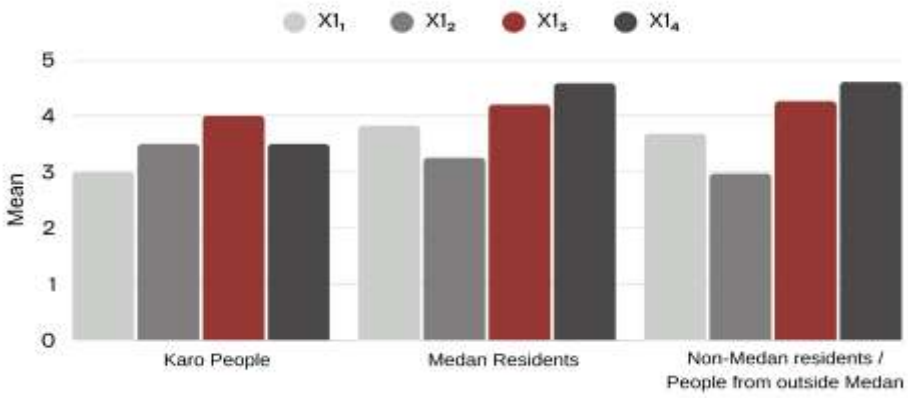


Figure 3. Mean and Standard Deviation of Perceptions on Culturally Sensitive Facilities by Group

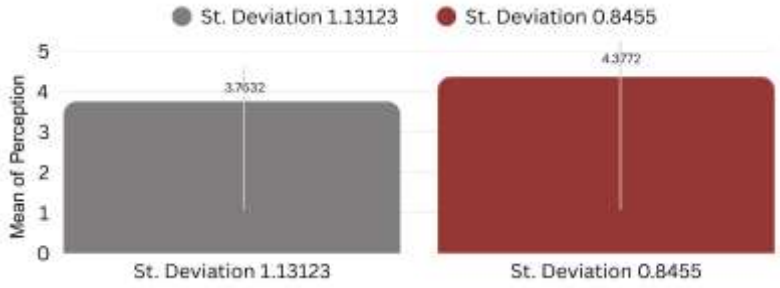


Figure 4. Mean and Standard Deviation of Tourists' Perceptions Toward Gender-Segregated Facilities

Similarly, for the third case concerning the perceptions of local and East Asian tourists, the mean provides a general overview of how important gender segregation is to them, while the standard deviation shows the variation of opinions within each group. The results of this data analysis are presented in Figure 3. The choice of this method is based on the consideration that the objective of the research is to map and compare general trends, rather than to prove statistically significant differences. Mean and standard deviation are sufficient to provide insights into data distribution and variability without the need to meet stricter statistical assumptions such as normality or homogeneity of variance required in parametric tests.

Factors Influencing Design Preferences for Hot Spring Facilities in Lau Debuk-debuk

In this study, the initial data were collected using questionnaires with an ordinal scale, which typically cannot be directly analyzed using parametric statistical methods such as multiple linear regression. Therefore, the data were transformed using the Method of Successive Interval (MSI) to convert the ordinal data into interval-scale data. This transformation allows for more appropriate and valid mathematical treatment in subsequent statistical analyses. Once the data were successfully converted to interval form, the mean score for each variable was calculated. These mean values were then used as inputs for the multiple linear regression model, allowing the relationships between variables to be analyzed quantitatively and with greater accuracy.

The results of the classical assumption tests indicate that the multiple linear regression model used in this study meets the eligibility criteria for analysis. The normality test using the Kolmogorov-Smirnov method yielded a significance value of 0.200, while the Shapiro-Wilk test produced a significance value of 0.428. Both values are greater than 0.05, indicating that the data are normally distributed. The heteroscedasticity test conducted on the three independent variables — Cultural Values (X_1), Religious Values (X_2), and Health Factors (X_3) — showed significance values of 0.556, 0.335, and 0.771, respectively. All of these are above 0.05, suggesting that the model is free from

heteroscedasticity. In addition, the multicollinearity test results show that the Variance Inflation Factor (VIF) values for all variables are below the critical threshold of 10, with values of 1.381 for X_1, 1.040 for X_2, and 1.336 for X_3. Therefore, it can be concluded that there are no multicollinearity issues in the model. Overall, the results of the classical assumption tests confirm that the multiple linear regression model is appropriate and feasible for further analysis.

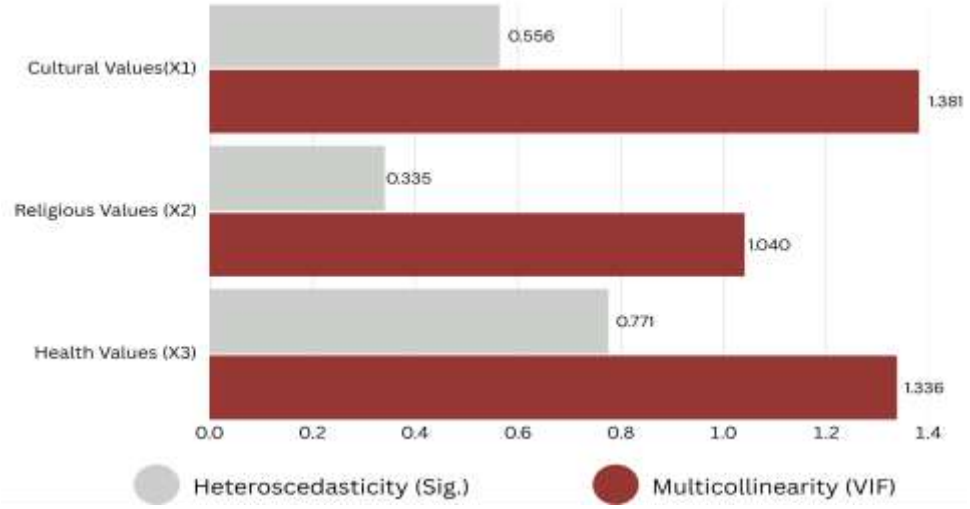


Figure 5. Normality Test Results Using Kolmogorov-Smirnov and Shapiro-Wilk

The results of the multiple linear regression analysis show that the independent variables — Cultural Values (X_1), Religious Values (X_2), and Health Factors (X_3) — simultaneously have a significant influence on the dependent variable. This is indicated by an F-value of 16.207 with a significance level of 0.000 ($p < 0.05$). The coefficient of determination (R-Squared) is 30.7%, indicating that the three independent variables collectively explain 30.7% of the variation in the dependent variable, while the remaining variation is explained by other factors outside the model.

Table 6. Results of Multiple Linear Regression Analysis

Variable/Construct	Regression Coefficient	t-value	Significance (p-value)
Constant	0.651	1.531	0.129
Cultural Values (X1)	0.767	5.604	0.000
Religious Values (X2)	0.074	1.087	0.279
Health Factor (X3)	0.013	0.167	0.868
R-Squared	30.7%	F-Count : 16.207	0.000

The Cultural Values variable has a significant partial effect on the dependent variable. The regression coefficient of 0.767 indicates that each one-unit increase in the interval score of Cultural Values (based on MSI transformation) results in an increase of 0.767 points in the dependent variable score, assuming all other variables remain constant. The t-value of 5.604 with a significance level of 0.000 ($p < 0.05$) confirms that this effect is statistically significant. This means that Cultural Values are a key factor that significantly contributes to changes in the dependent variable within this model.

The regression coefficient for the Religious Values variable is 0.074, indicating that a one-unit increase in the interval score of Religious Values is estimated to raise the dependent variable score by 0.074 points. However, the t-value of 1.087 and a significance level of 0.279 ($p > 0.05$) suggest that this effect is not statistically significant. Therefore, Religious Values, when considered individually, cannot be said to have a meaningful influence on the dependent variable in this model.

For the Health Factor variable, the regression coefficient is 0.013, indicating that a one-unit increase in the interval score of the Health Factor would only increase the dependent variable score by 0.013 points. The very low t-value of 0.167 and a significance level of 0.868 ($p > 0.05$) confirm that this effect is not statistically significant. Therefore, the Health Factor also does not show a meaningful partial contribution in explaining the variation in the dependent variable.

The results of the Spearman correlation analysis show a correlation coefficient of 0.177 between the variable of mushola (prayer room) importance and gender segregation, with a significance value of $p = 0.059$. Statistically, this finding indicates that although there is a weak positive relationship between the two variables, it is not significant at the 95% confidence level ($\alpha = 0.05$). The relatively low correlation coefficient suggests that perceptions regarding the importance of a prayer room contribute only minimally to predicting preferences for gender segregation in tourism facilities.

According to hypothesis testing criteria, since the p-value exceeds the 0.05 threshold, it can be concluded that there is insufficient evidence to support a statistically significant relationship between the two variables in the population. This finding is consistent with the non-normal distribution characteristics of the data, confirming that the use of the non-parametric Spearman test was appropriate. The result reinforces the assumption that the religious factor, as represented by the perceived importance of a mushola, may not be a primary determinant in shaping public perception regarding gender segregation in public facilities.

Preferences of Karo, Medan, and Non-Medan Residents Toward Culturally Sensitive Facilities

Based on Figure 3, where higher scores (closer to 5) indicate a higher level of importance, the analysis reveals an interesting pattern of perception among respondent groups. The Karo group recorded the lowest mean on indicator $X1_1$ (3.0) and the highest on $X1_3$ (4.0), with a relatively small standard deviation (0.756), indicating consistent evaluations within this group. Overall, Karo respondents rated all indicators between "moderately important" and "important." The Medan and Non-Medan groups demonstrated higher ratings, particularly on indicator $X1_4$ (with means of 4.581 and 4.605 respectively), approaching the "very important" category. However, the larger standard deviations (ranging from 1.107 to 1.162) suggest a broader variation in perceptions among respondents from these groups. These results indicate that:

1. Urban respondents (Medan and Non-Medan) tend to place greater importance on culturally sensitive facilities, especially for indicator $X1_4$.
2. Karo respondents, as a local group, show more moderate but consistent evaluations.
3. Differences in standard deviation suggest that urban respondents have more diverse perceptions, while the Karo group is more homogeneous in assessing the importance of these facilities.

Local Tourists' Perception of Gender-Segregated Facilities

Based on the analysis presented in Figure 4, tourist perceptions of gender-segregated facilities show an interesting variation between the two measured indicators. For the first indicator — separate pools for men and women — the mean score is 3.76 with a standard deviation of 1.13. This indicates that, on average, tourists consider gender-separated pools to be "important" (close to scale 4), but with relatively high variation in responses, as reflected in the standard deviation above 1. In contrast, the second indicator — separate pathways and cleansing areas for men and women — has a higher mean score of 4.38 and a smaller standard deviation of 0.85. This mean value, close to scale 5, indicates that tourists view separation of circulation routes and cleansing areas as "very important." The smaller standard deviation compared to the first indicator also shows stronger agreement among respondents on the importance of this facility. These differences suggest the following:

1. Tourists tend to place greater emphasis on the importance of separating pathways and cleansing areas than on separating the pools themselves.
2. The higher level of agreement (indicated by the lower standard deviation) regarding circulation and cleansing facilities implies that this aspect is more consistently considered crucial by respondents.
3. The greater variation in perceptions regarding pool separation may reflect personal preferences or diverse cultural backgrounds among tourists.

The study shows that cultural values significantly influence the design preferences for hot spring facilities in Lau Debuk-Debuk, particularly regarding gender segregation elements such as separate pools and circulation paths for men and women. This is reinforced by findings indicating that urban populations and East Asian tourists place high importance on facilities that support modesty and privacy norms, with high average scores for separate circulation and cleansing areas (mean = 4.38). Although religiosity and health factors were also examined, neither showed a significant partial influence on design preferences. However, when considered simultaneously, all three variables—culture, religiosity, and health—demonstrated a meaningful combined impact on facility design.

CONCLUSIONS

Conclusion and Recommendations

A design approach that incorporates both local cultural values and cross-cultural preferences is essential for developing inclusive, comfortable, and internationally competitive tourism facilities in the Lau Debuk-Debuk area. The strength of this research lies in its significance, as no previous studies have applied a quantitative approach to this topic. Therefore, this study can serve as a valuable reference for architects who wish to develop recreational facility designs in hot spring areas in North Sumatra, particularly Lau Debuk-Debuk. The findings call for more adaptive hot spring facility designs that reflect cultural norms and modesty values. This includes providing gender-segregated pools and circulation paths, private family spaces, and enclosed rinsing areas, all of which enhance user comfort and improve the experience for culturally diverse visitors. Then, the finding will support the formulation of cultural and Sharia-based tourism development policies in Lau Debuk-Debuk. The government is encouraged to promote investments in gender-friendly and inclusive recreational infrastructure, and position Lau Debuk-Debuk as a halal and health-focused international tourism destination. While the study provides valuable insights, there are several limitations to consider such as the sample was limited to tourists who had previously visited hot spring resorts, so the preferences of individuals unfamiliar with such facilities were not captured. Besides regional variations in tourist preferences were not the main focus, as the study emphasized East Asian and Middle Eastern visitors. Then, data collection was conducted over a short period (November–December 2024), so long-term shifts in tourism trends may not be reflected in the findings. Therefore, the next study is supposed to

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