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## Assessing Indonesia's Regulatory Framework for Cultural Heritage Preservation within Sustainable Tourism: A Systematic Analysis Using the Cosine Similarity Method

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### Keywords

Sustainable, Tourism, Regulation, Cosine Similarity.

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### Abstract

As a signatory to UNESCO's cultural heritage instruments, Indonesia has developed an extensive regulatory framework that links cultural heritage preservation to sustainable tourism. From an information management perspective, the coherence of policy communication across governance levels remains underexplored. This study examines regulatory alignment as lexical-thematic correspondence between central and regional tourism regulations, using TF-IDF-weighted cosine similarity and clustered heatmap analysis. Based on 591 tourism-related regulations, 144 documents explicitly address cultural heritage preservation and sustainable tourism. The results reveal uneven patterns of informational alignment, with only 37 regional regulations exhibiting strong lexical-thematic correspondence with central policy texts across five thematic clusters: Tourism Destinations, Creative Economy, Tourism Industry, Tourism Institutions, and Marketing. Rather than indicating legal conformity or policy effectiveness, these patterns reflect variation in how policy concepts are articulated within Indonesia's multilevel regulatory information system. By framing regulatory coherence as an information alignment issue, this study contributes to information management research on policy communication and multilevel governance in the context of sustainable tourism and cultural heritage preservation.

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## 1. Introduction

The concept of sustainable tourism development emerged as a response to the negative impacts of mass tourism observed over the last four decades. The Rio+20 document was the first important document that defined sustainable tourism. The document stated that "the only

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true way to develop a society is by eradicating poverty, working towards a just society, and conserving natural resources" (Department of Economic and Social Affairs, n.d.). Sustainable tourism aims to protect natural resources, reduce pollution, and conserve biodiversity through responsible practices such as energy efficiency and waste reduction (Hu et al., 2024; Liu et al., 2022; Swarbrooke, 2023). Sustainable tourism also respects local cultures, promotes cross-cultural understanding, and empowers local communities by involving them in decision-making and sharing economic benefits (Amin & Taghizadeh-Hesary, 2023; Apak & Gürbüz, 2023; Han et al., 2023; Szromek et al., 2021; X. Zhao et al., 2024). In addition, sustainable tourism creates economic opportunities, provides jobs, and supports sustainable livelihoods (Han et al., 2023; Hu et al., 2024; Liu et al., 2022; Swarbooke, 2023).

Sustainable tourism pays excellent attention to the preservation of cultural heritage (Szromek et al., 2021; Trišić et al., 2020), because the development of cultural heritage to boost tourist visits often has negative impacts. One of the big problems is the destruction of the socio-cultural order due to changes in lifestyle that lead to the loss of identity and even social disruption (Al Shawabkeh et al., 2023; Alamineh et al., 2023; Hosseini et al., 2021; Liu et al., 2022). In addition, the commodification of culture for commercial interests results in the loss of cultural authenticity to meet market demand (Al Shawabkeh et al., 2023; Liu et al., 2022; Tamakloe, 2011). According to Paiva (2023) research, the atmosphere of a tourist destination influences the feelings and experiences of tourists. Social and environmental practices shaped the atmosphere that developed over time. These practices create a unified perception of spaces and influence people's feelings and connections to a place. This process helps shape the unique identity of a place, culture, and community, contributing to a distinctive sense of uniqueness (Pink & Leder Mackley, 2016). However, interest in the atmosphere of a tourist spot can often impact the authenticity of the place itself (Paiva, 2023).

The Convention on World Heritage, published by UNESCO in 1972, is a global recognition of the importance of encouraging the identification, protection, and preservation of cultural and natural heritage worldwide, considered to be of outstanding value to humanity (UNESCO, n.d.). From this recognition, UNESCO created operational guidelines for implementing the World Heritage Convention in 1978. Successively, the Nara Convention (1994), Budapest Declaration on World Heritage (2002), and Warsaw Recommendation (2018) were adopted as an effort to protect world cultural heritage. Launched in 2011, UNESCO's *World Heritage and Sustainable Tourism Programme* promotes a collaborative approach to integrating tourism and cultural heritage management. It emphasizes stakeholder dialogue, protection of natural and cultural assets, responsible tourism development, and cross-sector cooperation to ensure heritage preservation and sustainable economic growth (Bitušíková, 2021; Cranmer et al., 2023; Han et al., 2023; Szromek et al., 2021). By including cultural heritage within the framework of sustainable tourism, UNESCO can implement regulations and best practices to protect historical sites and cultural traditions from damage and excessive commercialization. In this way, tourists become more responsible, minimize tourism's negative impacts, and contribute to the preservation of culture (DeBrine, n.d.).

Indonesia, a 1972 World Heritage Convention signatory, has received UNESCO recognition for 12 tangible and 10 intangible cultural heritages (Pusat Data dan Informasi, 2023; World Heritage Convention, 2024). Notable sites include Borobudur, Prambanan, Sangiran, Bali's

Subak System, Ombilin Coal Mining Heritage, Komodo, Ujung Kulon, and Lorentz National Park and also the Cosmological Axis of Yogyakarta. Recognized intangible heritages include Wayang Puppet Theatre, Keris, Batik, Angklung, Saman Dance, Noken, Pinisi Boat rafting art, and Pencak Silat. Interestingly, these cultural heritages are essential to the tourism industry (McKercher & Du Cros, 2002; World Heritage Convention, 2024).

However, as a consequence of UNESCO's recognition, it is mandatory for countries that receive recognition or World Cultural Heritage to manage it well. In 2023, UNESCO issued Operational Guidelines containing several essential elements for preserving cultural heritage (Falk & Hagsten, 2024). The guidelines outline the procedures and criteria for nominating properties for inclusion on the World Heritage List and the List of World Heritage in Danger. They include guidelines for protecting and conserving properties once inscribed on the World Heritage List, including measures to safeguard their Outstanding Universal Value. It organizes the procedures for providing international assistance under the World Heritage Fund and mechanisms for mobilizing national and international support in favour of the World Heritage Convention. The Operational Guidelines establish a format for periodic reporting on the application of the World Heritage Convention (2024).

Given UNESCO's stringent standards for maintaining world cultural heritage, this study will evaluate how Indonesia integrates cultural heritage preservation within its sustainable tourism policies. Utilizing the Cosine Similarity method, the research systematically identifies and analyses relevant national and regional regulations, assessing how effectively these policies support the preservation of Indonesia's cultural heritage in alignment with sustainable tourism principles.

From an information management perspective, this study contributes to understanding how regulatory information is structured, transmitted, and reproduced across multilevel governance systems. Regulations are treated not merely as legal instruments, but as interconnected policy texts whose coherence reflects the effectiveness of information alignment between central and regional authorities. In this context, regulatory alignment refers to the consistency of policy signals and thematic emphasis embedded within regulatory texts.

Methodologically, this study applies a text-as-data approach to regulatory analysis by integrating TF-IDF weighting, cosine similarity measurement, and clustered heatmap visualization to assess patterns of alignment between national and subnational regulations. While these techniques are well established individually, their combined application to multilevel regulatory texts enables a systematic examination of regulatory coherence that is rarely operationalized in studies of tourism governance and cultural heritage management. The approach provides an exploratory framework for monitoring regulatory alignment as an information management issue rather than solely a policy compliance problem.

## **2. Literature Review**

### **2.1. Cultural Heritage in Sustainable Tourism**

Referring to the 1972 UNESCO Convention, cultural and natural heritage encompass monuments, sites, and ecosystems of outstanding universal value. Integrating cultural heritage into sustainable tourism is essential to mitigate the industry's negative impacts. Sustainable

tourism fosters a balanced approach among stakeholders, reducing tensions and ensuring long-term preservation. Given UNESCO's strict heritage protection standards, this study examines Indonesia's commitment to cultural heritage within its sustainable tourism policies. Using the Cosine Similarity method, it identifies relevant regulations at both central and regional levels (Bramwell & Lane, 1993). Al Shawabkeh et al., (2023) and Koufodontis & Gaki, (2022) highlight that sustainable tourism minimizes damage to cultural sites, preventing degradation and ecosystem disturbances. Integrating cultural considerations into tourism planning ensures long-term heritage sustainability while promoting responsible development (Vu et al., 2024).

Sustainable tourism is a theoretical construct and a practical approach that inspires and motivates. It is a form of tourism that focuses on providing authentic and meaningful experiences for visitors while ensuring the preservation of cultural heritage sites and practices. As stated by Al-Ansi et al., (2021) and Timothy, (2018), Sustainable tourism offers visitors authentic and immersive experiences that reflect local cultures, traditions, and ways of life. It is not just about preserving physical sites but about telling the stories of a community's history, identity, and values through cultural heritage sites and practices. As Vu et al., 2024 suggest, this approach encourages travellers to engage in responsible travel practices, respecting local culture, traditions, and the environment. Hall (2011) and Park (2010) underline the role of cultural heritage tourism in encouraging cultural exchange and dialogue between visitors and local communities, fostering mutual understanding to break down stereotypes and build more empathetic relationships.

Preserving cultural heritage is not just a cultural endeavour but also an economic one. As shown by Zhang et al., (2022) Preserving cultural heritage can bridge efforts to protect cultural heritage and strengthen local economies. Sustainable tourism plays a vital role in this process by supporting the revival of traditional practices, crafts, and rituals. Sustainable tourism provides opportunities for local communities to showcase and preserve their cultural heritage, creating better economic opportunities without the risk of cultural erosion. Souvenirs and locally made products are evidence of indigenous culture providing economic benefits. As stated by Cranmer et al., (2023) This economic empowerment benefits artisans and their families living near cultural heritage sites and contributes to the community's overall economic development (Canale et al., 2019; Meško et al., 2021).

## **2.2. Sustainable Tourism Strategies for Preserving Cultural Heritage**

World Heritage Convention (n.d.) explained that UNESCO suggested, in the context of managing World Heritage properties, that preserving cultural heritage activities must cooperate with the tourism sector, get information from tourist experiences when visiting, and involve local communities in planning and managing all aspects of the property, including tourism. Meanwhile, in the 1972 World Heritage Convention, it is stated that to preserve world heritage, in addition to containing policies and guidelines, UNESCO needs always to monitor the impact of tourism activities on the OUV (Outstanding Universal Value) of registered sites. UNESCO must also continue to cooperate with other international organizations to integrate World Heritage considerations into their programs, provide support and advice on best practices to countries and site managers, and provide awards for those who maintain cultural heritage as well as examples of best practices from properties and businesses in the tourism sector related to World Heritage.

Meanwhile, the state is obliged to manage the impact of tourism on OUV properties, such as by implementing access restrictions and visiting schedules to protect properties and working with the tourism sector to protect properties. The state must also provide community and business for conservation and development. Conversely, the tourism sector must work with World Heritage property managers to protect OUV, be responsible for maintaining World Heritage properties, and ensure authentic presentation and quality experiences. Partnerships and collaborations are between the government and the tourism sector and established with non-governmental organizations, local communities, and academics. Flyen et al. (2023), Groizard & Santana-Gallego (2018), and McCarthy et al. (2022) believe that this collaborative approach can ensure that sustainable tourism provides good protection for cultural heritage. Capacity building for tourism stakeholders, including local guides, artisans, and hotel staff, is a skill and knowledge for ensuring the quality of tourism experiences and sustainable management of cultural heritage sites (Bitušíková, 2021; Schönherr et al., 2023).

Another strategy offered by sustainable tourism for cultural heritage preservation is tourism management. Management of visitor arrivals by limiting visits and encouraging responsible tourist behaviour in conservation efforts is important to protecting and preserving cultural heritage (Al Shawabkeh et al., 2023; Schönherr et al., 2023). Management of environmentally friendly transportation for visitors can also help reduce the carbon footprint that threatens cultural heritage sites (Bergantino et al., 2023; Flyen et al., 2023). Likewise, access management of cultural heritage sites can address the threats of commercialization to cultural authenticity (Falk & Hagsten, 2024) and physical damage to cultural sites (McCarthy et al., 2022).

According to Loulanskia & Loulanski, (2011), establishing regulations, guidelines, and monitoring mechanisms to ensure compliance is a mandatory standard for cultural heritage preservation in sustainable tourism. Groizard & Santana-Gallego (2018) emphasizes the importance of regulations at various international, national, and local levels. Regulations include the legal frameworks established by government authorities to govern the management and protection of cultural heritage sites. These include laws on conservation, zoning, building regulations, and tourism permits. By enforcing clear regulations, authorities ensure compliance with cultural heritage standards, prevent unauthorized construction, and encourage sustainable tourism practices. With local regulations, tourism can protect cultural heritage by damaging historical sites and artifacts and causing a loss of authenticity. Environmental damage is also a problem, as are habitat destruction and pollution from unsustainable tourism practices.

Moreover, external investors or large corporations often exploit local economies, resulting in economic leakage and undermining the economic potential of local communities. Social displacement occurs when land is converted for tourism facilities, disrupting local lifestyles and creating social tensions. Uneven benefits from tourism exacerbate inequalities, and increased conflict between tourists and locals can undermine the tourism experience. Furthermore, without regulation, there is no incentive for sustainable practices, which can favor short-term profits and negatively impact cultural heritage and the environment (Bergantino et al., 2023; Loulanskia & Loulanski, 2011).

Guidelines are non-binding recommendations that guide the effective management and conservation of cultural heritage sites. They cover visitor management, site maintenance,

interpretation strategies, and community engagement. Monitoring is the systematic collection of data to track tourism's impacts on cultural heritage sites. The activity includes monitoring visitor numbers, behaviour, asset condition, environmental impacts, and conservation effectiveness. Regulations on tourism management can reduce overcrowding that threatens cultural heritage sites (Chandra & Kumar, 2021), reduce negative effects on the environment (Dodds, 2007) and avoid the “Tragedy of the Commons.” Tragedy of the Commons is a concept introduced by Garrett Hardin in 1968 to describe the negative impacts of a situation where there is no regulation, cooperation, or collective management of a shared resource. This situation occurs because individuals with access to a shared resource tend to maximize their utility without considering the negative impacts of overuse. Although each individual may make only a tiny contribution to the resource's destruction or depletion, the cumulative effect of these actions can be severe, ultimately harming the entire group.

### **2.3. Regulatory Alignment and Text-as-Data Approaches in Information Management**

In information management and public administration research, regulatory alignment is commonly discussed in terms of policy coherence, coordination, and consistency across governance levels. Alignment does not necessarily imply identical legal formulations, but rather the extent to which regulatory texts communicate similar objectives, priorities, and conceptual framings. From this perspective, regulations function as information artifacts within a broader governance information system, where misalignment may signal fragmentation in policy communication.

Recent advances in text-as-data methods have enabled scholars to analyze large collections of policy and legal documents to identify thematic patterns, similarities, and divergences. Techniques such as TF-IDF weighting and cosine similarity have been applied to policy agendas, legislative debates, and strategic documents to examine policy convergence and institutional coordination. However, their application to central–local regulatory alignment in the context of cultural heritage and sustainable tourism remains limited. This study addresses this gap by operationalizing regulatory alignment as a measurable form of textual information coherence across governance levels.

### 3. Methodology

This study identified Indonesian regulations governing cultural heritage and sustainable tourism through a structured process involving data collection, keyword extraction, and text analysis, as shown in Figure 1.

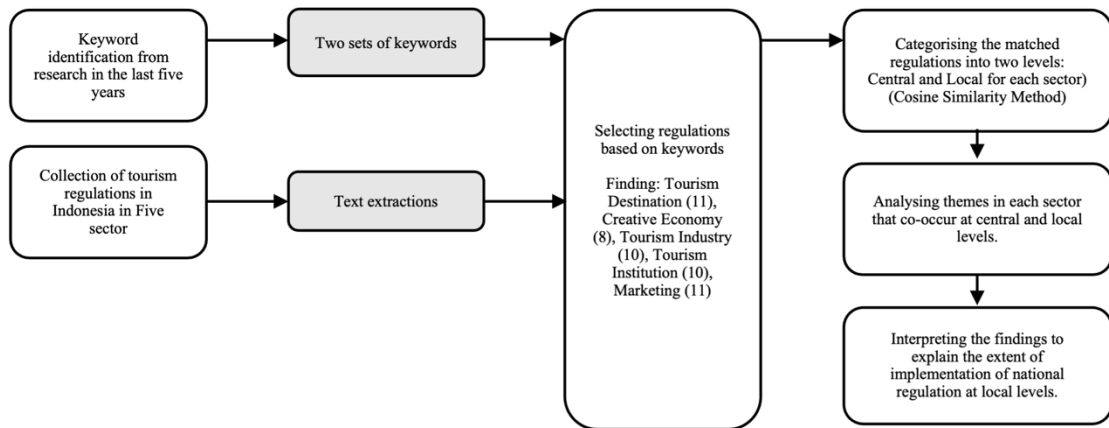


Figure 1 *Research Framework*

#### 3.1 Data Collection and Processing

The research process involved extracting relevant terms from recent research on cultural heritage and sustainable tourism. These studies were obtained from the dimensions.ai database, which was searched using “sustainable tourism” as the first set of keywords and “cultural heritage” as the second. Titles and abstracts of studies from the last five years were collected and merged into a single text column to create a comprehensive dataset. The dataset was cleaned by removing irrelevant content using a pre-defined list of filter words and stopwords. Pre-processing included converting the text to lowercase, removing punctuation and numbers, and removing standard and unique stop words. A Document Term Matrix (DTM) was created to measure term frequency, and the most common terms were analysed for relevance. The term-document matrix describes the relationship between terms and documents, where each row represents a term, each column represents a document, and entries are the number of term occurrences in a document (Y. Zhao, 2013). In DTM, rows correspond to documents in the corpus, columns correspond to terms in the papers, and cells correspond to the weights of terms.

The text data was split into bigrams (two-word phrases) and trigrams (three-word phrases) to capture common phrases. The top 30 bigrams and trigrams were identified and combined into a list of unique terms. Some keywords were added manually, especially regarding recent research that has gained popularity and needed to be determined in the bigram and trigram analysis. This process results in two sets of key phrases that will then be used to select relevant regulations.

The keyword selection process inevitably reflects terminology prevalent in recent academic literature, which may not fully capture all variations of legal or administrative language used in regulatory texts. To mitigate this limitation, keyword lists were iteratively refined through n-

gram analysis and manual review. The final set of keywords and filtering criteria is provided in Appendix A to enhance transparency and replicability from an information management perspective.

### 3.2 Regulatory Analysis Process

The regulatory analysis focused on identifying Indonesian regulations that integrate cultural heritage and sustainable tourism themes. Indonesian regulatory documents were collected in PDF format, and their texts were extracted. The regulations collected were divided into five themes according to the categorization made on the site <https://jdih.kemendparekraf.go.id/peraturan>, namely Tourism Destination, Tourism Industry, Tourism Marketing, Tourism Institutions, and Creative Economy. A set of key phrases from the research stage was used to select regulations relevant to cultural heritage and sustainable tourism. Only regulations that contained at least one keyword from each set were processed further; this was done to ensure that the regulations analyzed were indeed regulations that integrated the themes of cultural heritage and sustainable tourism.

The selected regulations are then separated based on the level of government that issued them: regional and central. Regulations issued by the President and the Ministry are central regulations, and Regulations of the Governor, Regent, and Region are regulations issued by the regions. Then, each central regulation in each theme is viewed for its similarity to each regional regulation on the same theme using the Cosine Similarity method, which assesses the similarity of two documents based on the appearance of the exact keywords in the two papers. The analysis results are presented with the help of a Clustered Heatmap, a chart that shows the relationship between data points and their features. Clustered heat maps can show which objects are similar or different from each other, with the same purpose for variables. Analysis tools that build Clustered heat maps usually apply clustering as part of their process.

### 3.3 Operational Definition of Regulatory Alignment

In this study, regulatory alignment is operationalized as lexical–thematic correspondence between central and regional regulatory texts. Alignment is measured through cosine similarity scores derived from TF–IDF–weighted document vectors, capturing the extent to which similar terms and phrases related to cultural heritage preservation and sustainable tourism appear across regulatory levels.

Importantly, alignment in this study does not imply legal conformity, policy effectiveness, or implementation success. Rather, it reflects informational alignment—namely, the degree to which regulatory texts articulate comparable policy concepts, priorities, and thematic emphases. This operationalization allows the study to identify patterns of regulatory coherence and fragmentation while avoiding normative claims about regulatory quality or enforcement outcomes.

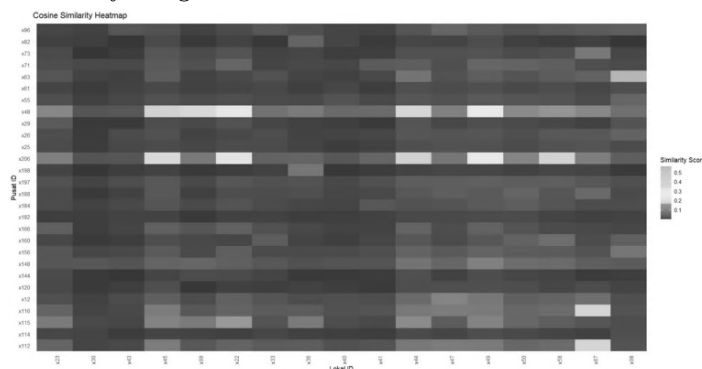
## 4. Result

Of the 591 regulations on the website, 144 were found to contain cultural heritage in sustainable tourism, which is divided into five sectors, namely Tourism Destinations, Tourism Industry, Creative Economy and Tourism Institutions, and Marketing. This division refers to the direction of national tourism development in Government Regulation of the Republic of

Indonesia Number 50 of 2011 concerning the National Tourism Development Master Plan for 2010 – 2025 (Badan Pariwisata dan Ekonomi Kreatif, 2009)

In the Tourism Destination sector, 45 regulations were found, consisting of 28 regulations issued by the government at the central level, both presidential and government regulations, and 17 at the local level, both at the provincial and district levels. Nine regulations were found in the Creative Economy sector, consisting of 3 at the central and 6 at the local levels. In the Tourism Industry sector, 29 regulations were found, consisting of 12 at the central level and 17 regulations at the local level. In the Tourism Institution sector, 29 regulations were found, consisting of 15 at the central level and 14 at the local level. In the Marketing sector, 32 regulations were found, consisting of 13 at the central and 19 at the local levels.

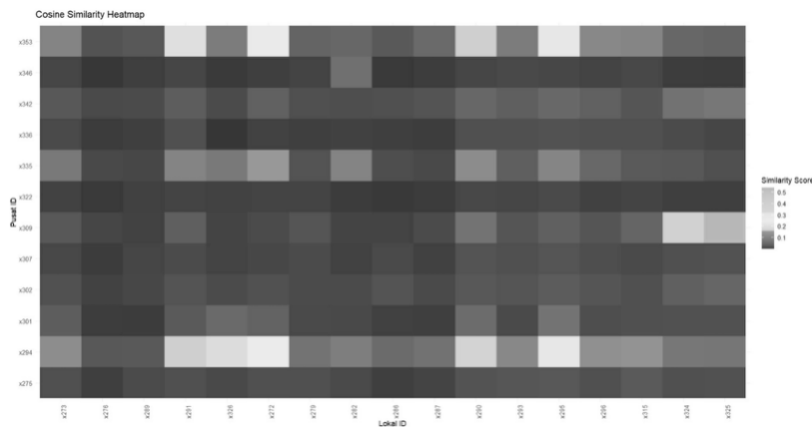
Considering the significant role of local government in ensuring cultural preservation in sustainable tourism, it is crucial to find several derivative rules from regulations at the central level regarding cultural heritage preservation in sustainable tourism. First, of the 45 regulations regarding tourist destinations, only 4 regulations at the central level intersect with cultural preservation and sustainable tourism, and 7 regulations at the local level. Figure 2 shows that the yellow and green colours refer to cultural heritage preservation and sustainable tourism. The color means that 4 regulations at the central level have regulated this matter related to tourism destinations. The four regulations at the central level are Law of the Republic of Indonesia Number 10 of 2009 concerning Tourism, Regulation of the Minister of Tourism and Creative Economy/Head of the Tourism and Creative Economy Agency of the Republic of Indonesia Number 9 of 2021 concerning Guidelines for Sustainable Tourism Destinations, Regulation of the Minister of Tourism and Creative Economy/Head of the Tourism and Creative Economy Agency of the Republic of Indonesia Number 11 of 2022 concerning the Strategic Plan of the Ministry of Tourism and Creative Economy/Tourism and Creative Economy Agency for 2020–2024, and government Regulation of the Republic of Indonesia Number 50 of 2011 concerning the National Tourism Development Master Plan for 2010–2025. The four regulations are recognition and legal umbrella for cultural heritage preservation in tourism destinations. The regulation regarding tourism destinations states that culture is one part of tourism objectives that must be protected in tourism development based on the principle of sustainability. Meanwhile, there are only 7 regulations at the local level.”



**Figure 2** *Central and Regional Regulations that have the same Rules Regarding Tourism Destinations*

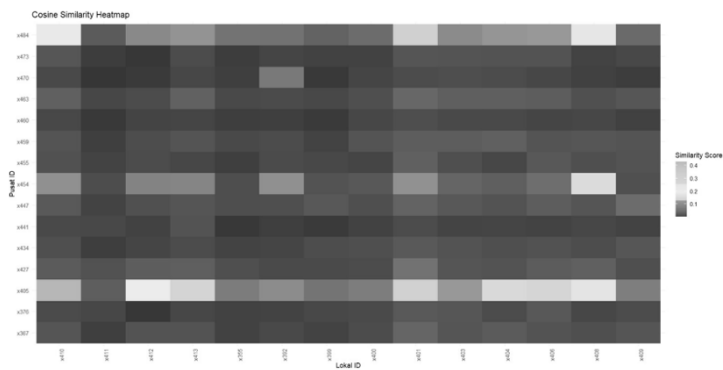
In the 29 regulations related to the tourism industry, the Cosine Similarity results show 2 regulations at the central level related to cultural preservation and sustainable tourism and 8 regulations at the regional level, as shown in Figure 3. The 2 regulations at the central level regarding the tourism industry are the Regulation of the Minister of Tourism and Creative Economy/Head of the Tourism and Creative Economy Agency of the Republic of Indonesia Number 11 of 2022 concerning the Strategic Plan of the Ministry of Tourism and Creative Economy/Tourism and Creative Economy Agency for 2020-2024 and Law of the Republic of Indonesia Number 10 of 2009 concerning Tourism. In this regulation, the central government acknowledges that tourism must respect the culture of the community. The regulations mean that the tourism industry must not harm the local community's culture. The regulation also states that the tourism industry must include local communities and encourage their skills in tourism. It is stated in the regulation that the Tourism Industry is a collection of interrelated tourism businesses in order to produce goods and services to meet the needs of tourists in organizing tourism.

Meanwhile, there are 8 regulations at the regional level that review the same thing or are derivatives of the central regulations at the regional level. Several regional regulations have referred to the obligation to organize tourism businesses by paying attention to the traditions and culture of the nation (Regulation of the Governor of the Special Capital Region of Jakarta Province Number 18 of 2018 concerning the Implementation of Tourism Businesses), the obligation for every entrepreneur to maintain and respect religious norms, customs, culture, and values that live in the local community (Regional Regulation of Kebumen Number 3 of 2021 concerning the Implementation of Tourism and Regional Regulation of Ogan Komering Ulu Timur Regency Number 5 of 2021 concerning the Master Plan for Tourism Development in Ogan Komering Ulu Timur Regency 2005-2025).



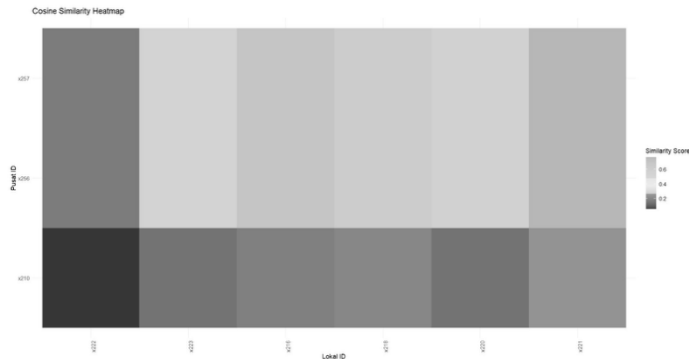
**Figure 3** *Central and Regional Regulations that have the same Rules Regarding the Tourism Industry*

Meanwhile, the analysis results using the Cosine Similarity method on 29 regulations regarding tourism institutions show that 2 regulations have attention to cultural preservation and sustainable tourism at the central level and 8 at the local level (Figure 4). Regulations related to institutions regulate the responsibility of institutions for organizing tourism and coordination between them. Regulations at the central level regulate the responsibility of ministers and coordination of tourism implementation at the central and regional levels, the formation of master plans, and tourism research and development (Law No. 10, 2009) Government Regulation of the President of the Republic of Indonesia Number 67 of 1996 even regulates the responsibilities that must be borne by various tourism services actors such as travel agencies and tourism consultants. Among the duties that each actor must bear is the responsibility to organize tourism by paying attention to the development of economic and socio-cultural life. At the local level, it is reiterated that every tourism organizing institution must be responsible for social and cultural values. The Regulation of the Governor of Bali No. 28 of 2020 states that Balinese tourism is based on the Tri Hita Karana philosophy, sourced from the local wisdom of *Sad Kerthi*.



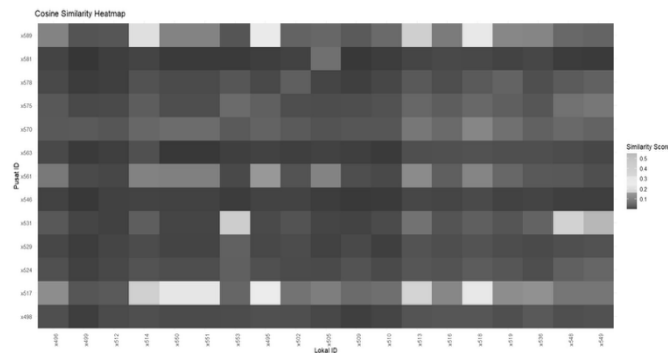
**Figure 4** Central and Regional Regulations that have the same Rules Regarding Tourism Institutions

The regulations on the Creative Economy related to cultural preservation and sustainable tourism show more interconnectedness between national and local regulations. Of the 9 existing regulations, 8 contain cultural preservation and sustainable tourism, with 3 regulations at the central level and five at the regional level. Law No. 25 of 2019 states that the creative economy embodies added value from intellectual property that comes from human creativity based on cultural heritage, science, and technology. Thus, all activities related to the creative economy must recognize cultural heritage. Activities related to the creative economy have also been included in regional regulations, such as the Regulation of the Governor of the Special Capital Region of Jakarta Number 84 of 2021 Concerning the Development of the Creative Economy and the Regional Regulation of the City of Mojokerto Number 4 of 2021 Concerning the Creative Economy and Entrepreneurship. The results of the Cosine Similarity analysis show more green areas, as shown in Figure 5. This figure shows that in the creative economy sector, there is more conformity between central and regional regulations.



**Figure 5** *Central and Regional Regulations that have the same Rules Regarding Tourism Institutions*

Of the 32 marketing-related regulations, the Cosine Similarity results show that only 11 central and regional regulations are similar in containing provisions on cultural preservation and sustainable tourism (Figure 6). 2 regulations are at the central level. The rest are at the regional level. Marketing in Law No. 10 of 2009 concerning Tourism is part of tourism development, which also refers to the principle of sustainable tourism. The law explicitly states that marketing development is joint, integrated, and sustainable tourism marketing involving all stakeholders and responsible marketing in building Indonesia's image as a competitive destination. Meanwhile, several regulations at the local level also regulate this. Kebumen Regency Regional Regulation Number 3 of 2021 concerning Tourism Implementation states that marketing development includes joint, integrated, and sustainable tourism marketing at the Regional, Provincial, and National levels, involving all stakeholders and responsible marketing, to build the image of the Region as a competitive tourism destination. Meanwhile, the Regulation of the Governor of the Special Capital Region of Jakarta Number 84 of 2021 concerning the Development of the Creative Economy claims that marketing and financing based on Intellectual Property Rights are aimed at exploring, utilizing, developing, managing, and conserving creativity and utilizing science and technology, art, and culture to develop local potential. Thus, it is clear that the tourism marketing sector also considers cultural values.



**Figure 6** *Central and Regional Regulations that have the same Rules Regarding Marketing*

#### 4. Discussion

From an information-alignment perspective, the findings indicate uneven transmission of policy themes from central to regional regulations, suggesting gaps in regulatory communication rather than deficiencies in policy intent alone. Viewed as an information system, Indonesia's regulatory framework for sustainable tourism and cultural heritage preservation demonstrates varying degrees of textual coherence across governance levels, which shapes how policy priorities are articulated, interpreted, and potentially enacted at the local level.

Indonesia's commitment to recognizing and protecting cultural heritage is clearly embedded in national regulatory texts developed since the early 1990s. Law of the Republic of Indonesia Number 5 of 1992, later updated through Law Number 11 of 2010 concerning Cultural Heritage, represents a fundamental effort to codify heritage protection within the national regulatory information system. From a harmonization perspective, this law serves as a primary reference text articulating core policy concepts — such as conservation, utilization, and community benefit — that are expected to resonate across sectoral and regional regulations. The existence of this law establishes a relatively stable information baseline at the national level. According to Rahmat (2021) the law, it also shows meaningful utilization aspects of efforts to utilize cultural heritage to benefit community welfare. The forms of cultural heritage are diverse; according to Article 85, paragraph 1, they include religious, social, educational, scientific, technological, cultural, and tourism interests.

Tourism-related regulations, particularly Law Number 10 of 2009 concerning Tourism and Minister of Tourism Regulation Number 14 of 2016 concerning Sustainable Tourism Destinations, further integrate cultural heritage considerations into sustainable tourism narratives (Damiasih, 2023; Rahmat, 2021; Widiati & Permatasari, 2022). While these instruments do not regulate heritage preservation in a highly technical manner, they promote responsible tourism principles intended to minimize negative impacts. In this study, such regulations are interpreted as key nodes in the regulatory communication structure through which sustainability and heritage-related concepts are transmitted to subnational governments, rather than as direct indicators of policy effectiveness or enforcement capacity.

The results reveal that information alignment between central and regional regulations varies significantly across sectors. In areas such as the creative economy, higher similarity scores indicate relatively strong thematic correspondence, suggesting that policy concepts related to culture-based economic development are more consistently articulated across levels of government. In contrast, sectors such as tourism destinations and marketing exhibit lower levels of similarity, suggesting fragmentation in the ways themes of cultural preservation and sustainability are embedded in regional regulatory texts. From an information management perspective, this pattern reflects differential absorption and reinterpretation of central policy narratives, rather than a complete absence of regulation.

Limited regional alignment does not necessarily imply a lack of policy commitment. Instead, it may indicate contextual adaptation, selective emphasis, or gaps in regulatory communication channels between central and regional authorities. Regional governments operate in different socio-economic and administrative contexts, which can influence how national policy concepts are translated into local regulatory language. Therefore, the observed fragmentation highlights

the challenges of maintaining a coherent policy message within a decentralized governance information system.

The uneven articulation of cultural heritage preservation themes at the regional level also highlights potential risks associated with information gaps. Where regulatory texts do not consistently reflect central policy priorities, ambiguities can arise regarding acceptable development practices, stakeholder roles, and the balance between tourism growth and heritage conservation. Such ambiguities can lead to conflicting interpretations among actors, particularly in contexts where competing economic and conservation interests are at play. From this perspective, this study understands the risks faced by some heritage sites in Indonesia not only as governance or implementation issues, but also as outcomes of fragmented regulatory information.

Cosine Similarity Analysis reveals gaps in local regulations on cultural preservation and sustainable tourism. Of the 73 regional regulations, only 38 align with central policies, spread across five sectors: Tourism Destinations (7), Creative Economy (5), Tourism Industry (8), Tourism Institutions (8), and Marketing (9). This lack of regulation risks over-commercialization, environmental degradation, rural gentrification, unequal distribution of resources, and the marginalization of local communities (Yanan et al., 2024).

The lack of regional-level regulations creates vulnerabilities to conflicts in the management of cultural heritage. Although some sites already have legal force, their inconsistency with other rules presents new problems. Mareku, Tidore Islands City, which is the forerunner of the zero point of the world's spice route, for example, is in danger of being displaced by the boat mooring project on the shore of Soempodo Beach, Mareku Village, Tidore Islands City (Karundeng, 2024). The Gampong Pande Site must construct a Wastewater Treatment Plant (Kontras Aceh, 2023) and the Kuto Besak Fort, which the expansion of AK Gani Hospital in Palembang must (Azhar, 2004).

Local governments occupy a critical intermediary position within this multilevel regulatory information system management (Mekonnen et al., 2022; Ramya & Senthil, 2016). Positioned between central authorities and local communities, they play a key role in translating national policy concepts into context-specific regulatory strategies. Prior research highlights local governments' potential to foster community participation, develop culturally grounded tourism initiatives, and facilitate collaboration among public, private, and civil society actors (Martynenko & Trofimova, 2019; Mekonnen et al., 2022; Pwiti, 1996). Such intermediary functions are central to enhancing informational coherence while accommodating local socio-cultural conditions (Karakul & Yıldız, 2020).

Importantly, readers must interpret these findings within the exploratory scope of this study. The use of lexical–thematic similarity as a proxy for alignment captures patterns of regulatory communication rather than normative assessments of regulatory quality or performance. The analysis highlights where policy narratives converge or diverge across governance levels, offering insights into the structure and coherence of Indonesia's regulatory information environment. By framing regulatory alignment as an information management issue, this study underscores the importance of coherent policy communication in multilevel governance systems. Strengthening alignment does not require uniform regulations, but more precise articulation, translation, and contextualization of policy concepts across administrative levels.

## 5. Conclusion

This study examined Indonesia's regulatory framework for cultural heritage preservation within sustainable tourism through an information management lens, focusing on how policy concepts are articulated and transmitted across governance levels. By operationalizing regulatory alignment as lexical–thematic correspondence between central and regional regulations, the analysis highlights patterns of informational coherence and fragmentation within Indonesia's multilevel regulatory system.

The findings indicate that, although Indonesia has established a relatively robust national regulatory baseline for cultural heritage preservation since the early 1990s, the transmission of these policy narratives to the regional level remains uneven. Higher levels of information alignment are observed in sectors such as the creative economy, where cultural heritage is closely linked to value creation and intellectual property. In contrast, lower alignment in sectors such as tourism destinations and marketing suggests fragmentation in how sustainability and heritage-related concepts are communicated and embedded in regional regulatory texts.

Importantly, these patterns should not be interpreted as direct indicators of legal compliance, policy effectiveness, or implementation success. Instead, they reflect variation in regulatory communication—how policy priorities, concepts, and emphases are selectively absorbed, reinterpreted, or under-articulated across administrative levels. From this perspective, the analysis understands risks faced by cultural heritage sites not only as governance or enforcement challenges, but also as consequences of fragmented regulatory information that generates ambiguity for policymakers and stakeholders at the local level.

By framing regulatory coherence as an information alignment issue, this study contributes to information management research on policy communication and multilevel governance. Methodologically, integrating TF–IDF weighting, cosine similarity analysis, and clustered heatmap visualization demonstrates the potential of text-as-data approaches for systematically examining regulatory information structures at scale. While exploratory, this approach offers a replicable framework for monitoring regulatory alignment without reducing complex governance dynamics to purely normative assessments.

Future research may build on this framework by incorporating semantic models, longitudinal analysis, or triangulation with institutional and implementation data to further refine the measurement of regulatory alignment. Strengthening informational coherence across governance levels does not require uniform regulations, but more precise articulation, contextual translation, and more consistent communication of policy concepts. From an information management standpoint, such efforts are essential for supporting sustainable tourism governance and the long-term preservation of cultural heritage in decentralized systems.

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