



LITERATURE REVIEW

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The Role of Local Wisdom in Disaster Mitigation: A Systematic Literature Review (SLR) Approach

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Abstract

This research analyzes the role and implementation of local wisdom in disaster management in Indonesia. The study focuses on the three stages of disaster management: pre-disaster, during the disaster, and post-disaster. The approach of "Disaster Management based on Local Wisdom" serves as the foundation, integrating cultural values, traditional knowledge, and communal practices with scientific methods. This study utilizes various literature sources and field data to illustrate how local communities apply local wisdom in facing potential disasters. The research findings highlight significant contributions from local values such as mutual assistance, understanding natural signs, and community involvement in disaster-aware communities. The synergistic collaboration between scientific knowledge and local wisdom proves to be an effective approach in disaster management. The research findings underscore the importance of integrating local values in a holistic disaster management strategy to enhance preparedness and mitigate risks within communities.

Keywords: disaster management; local wisdom; community resilience; risk mitigation

Introduction

Disasters are events that disrupt societal systems, causing economic losses, structural and social damages, and negative impacts on the environment. Disasters have existed alongside the natural world itself and typically do not pose a problem when they occur in uninhabited areas (Flanagan et al., 2011). However, when natural disasters occur in densely populated areas, they can become devastating. This underscores the importance of disaster mitigation, especially in vulnerable communities (Lesk et al., 2016).

The concept of local wisdom plays an integral role in disaster mitigation efforts. Local wisdom is often identified by the unique characteristics of a community and described in various contexts. It encompasses aspects such as values, norms, ethics, beliefs, traditions, and regulations accepted and passed down by the community (Pajarianto et al., 2022). Local wisdom is not only about the community's understanding of human beings and social interactions but also involves an understanding of the relationship between humans and nature and how to build sustainable relationships with the environment (Hidayati et al., 2020).

Through local wisdom, local communities can possess valuable knowledge about early signs of disasters, behaviors that can trigger or exacerbate disasters, and effective strategies to cope with them. Moreover, the values, norms, and practices embedded in local wisdom can also strengthen coordination and assistance in emergency situations, enhancing community resilience to future disasters. By understanding and integrating local wisdom into disaster mitigation efforts, communities can enhance their preparedness to face disaster threats and strengthen their capacity to respond effectively. This involves not only practical knowledge but also reinforces the connection between communities and their environment, laying a solid foundation for sustainable development and greater resilience to future disasters.



While local wisdom has been identified as a critical element in disaster mitigation, there are still several research gaps that require careful attention. Firstly, there is a need to expand deeper and more comprehensive research on local wisdom across various cultural, geographical, and social contexts. This research should consider variations in local wisdom, including unique values, norms, and practices for each community. Secondly, there is a need to further explore how local wisdom can be effectively integrated into disaster planning, mitigation, and response. This entails the development of strategies and methods that can blend local wisdom with scientific approaches and modern technology.

Conceptually, it is important to understand the differences between the concepts of "indigenous knowledge," "local knowledge," and "local practices." "Indigenous knowledge" refers to the knowledge held by indigenous or native communities of a region, while "local knowledge" encompasses the knowledge held by local communities from various ethnic and social backgrounds. On the other hand, "local practices" describe the concrete actions taken by communities in response to their surroundings. These three concepts complement each other in providing a deep understanding of the ways in which communities adapt and respond to disaster threats.

Furthermore, it is crucial to investigate the barriers and challenges that may be encountered in integrating local wisdom into the context of disaster mitigation. Factors such as resistance to change, lack of understanding, and structural constraints need to be identified and overcome to ensure successful implementation. Lastly, there is a need to focus on research that measures the effectiveness of using local wisdom in disaster mitigation. Such evaluations will provide a better understanding of the real benefits gained from the application of local wisdom in disaster management and can help formulate practical recommendations for further improvement. By addressing these gaps, future research can make a significant contribution to strengthening disaster preparedness and mitigation at both local and global levels.

This article aims to analyze the significant role of local wisdom in disaster management through a Systematic Literature Review (SLR) approach. In the context of SLR, we will examine and summarize existing scientific literature on this topic to delve into how local wisdom can be optimally utilized in disaster mitigation efforts. The urgency of this research is high given the significant potential of local wisdom in protecting communities from severe disaster impacts and supporting sustainable development. By understanding and applying this knowledge, we can more effectively protect and strengthen communities living in disaster-prone areas.

Methods

Research Method

In this study, the author employed the Systematic Literature Review (SLR) method. According to Yudi Agusta (2007) in the book "*Metode Penelitian*" (Research Methods), a Literature Review is a critical analysis of ongoing research on a specific topic or an investigation into a particular aspect of knowledge (Jones et al., 2020). The data sources for this research were obtained from literature found on the internet, such as scholarly journals, book chapters, and other scientific publications in the Scopus database using the Publish or Perish application. The research process involved data collecting, data analysis, and drawing conclusions.

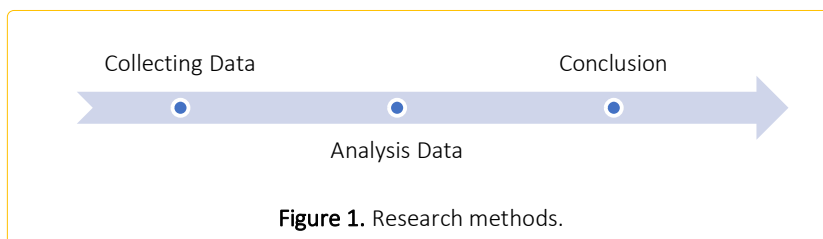


Figure 1. Research methods.

The Research Stages in the Systematic Literature Review (SLR) method consist of three main stages, as simplified by Adrian, Abdullah, Atan, & Jusoh (2016), as explained by Muhamad Idris Marbawi (2019) in his work. The first

stage is the planning stage, where the researcher formulates the research question (review question) and develops a structured research protocol according to the specific research context. The second stage is the conducting stage. In this stage, the researcher identifies relevant literature, filters titles and abstracts, and extracts data from the selected sources. The third stage is the reporting stage. In this stage, the researcher summarizes the research findings and directs the discussion process based on the findings.

Research Question (RQ)

The Research Question (RQ) is a key element in a study that aims to provide focus on the research subject. RQ typically consists of five elements known as PICOC, which stands for Population, Intervention, Comparison, Outcomes, and Context (Rethlefsen et al., 2021).

In the context of research on Local Wisdom in Disaster Management, the RQs can be formulated as follows:

- RQ1: What scholarly articles have published research related to Local Wisdom in disaster management?
- RQ2: In which years were the studies on Local Wisdom in disaster management published?
- RQ3: Who are the authors who have published the most on local wisdom in disasters?
- RQ4: From which networks or affiliations do the authors who publish research on Local Wisdom in disasters come from?
- RQ5: Which countries have published the most research on Local Wisdom in disasters?
- RQ6: What are the subjects or topics of research related to Local Wisdom in disaster management?
- RQ7: How is local wisdom applied in the pre-disaster phase?
- RQ8: How is local wisdom applied during the disaster phase?
- RQ9: How is local wisdom applied in the post-disaster phase?
- RQ10: What are the applications of Local Wisdom in disaster management?

The criteria determining the suitability of data as a research reference source include:

1. No specific time range limitations.
2. Data obtained from sources indexed in Scopus.

The data used in the research is limited to articles relevant to the topic "Local Wisdom on disasters." The search process is conducted through a series of stages, including:

1. Filtering the search based on the PICOC elements, especially Population and Intervention.
2. Identifying searches that align with the Research Questions.
3. Mapping based on relevant titles, abstracts, and keywords.
4. Identification through keyword matching, synonyms, or related concepts to the topic being searched.

The search strategy within the framework of the Systematic Literature Review (SLR) is based on several streams such as data source selection, research time range limitations, similar topics, research methods used, research outcomes, and weaknesses found in previous research.

Results

Initial Search Data

In the initial search stage, the researcher did not limit the search timeframe, allowing various terms related to "Local wisdom in disaster" to be identified. The search results indicate that the oldest journals using the term "Local wisdom in disaster" can be traced back to the year 2012. Here is a summary of the initial search results using the Scopus database related to the topic "Local wisdom in disaster."

Table 1. List of research articles on local wisdom on disaster in the Scopus database.

Name	Title	Publication Year	Journal Name and Publisher
B. Kusumasari, Q. Alam	Local wisdom-based disaster recovery model in Indonesia	(2012)	Disaster Prevention and Management: An International Journal, Emerald Group Publishing Ltd
I. Triastari, S.I.A. Dwiningrum, S.H. Rahmia	Developing Disaster Mitigation Education with Local Wisdom: Exemplified in Indonesia Schools	(2021)	IOP Conference Series: Earth and Environmental Science, IOP Publishing Ltd
Z. Zulfadrim, Y. Toyoda, H. Kanegae	The implementation of local wisdom in reducing natural disaster risk: A case study from West Sumatera	(2018)	IOP Conference Series: Earth and Environmental Science, Institute of Physics Publishing,
A.N. Gadeng, E. Maryani, D. Rohmat	The Value of Local Wisdom Smong in Tsunami Disaster Mitigation in Simeulue Regency, Aceh Province	(2018)	IOP Conference Series: Earth and Environmental Science, Institute of Physics Publishing
S.S. Hutagalung, H. Indrajat	Adoption of local wisdom in disaster management in Indonesia	(2020)	International Journal of Scientific and Technology Research, International Journal of Scientific and Technology Research
Z.A. Haris, A. Irianto, D. Hermon	Local wisdom of Aek Latong society for mitigation and adaptation of soil movement disaster in North Sumatra, Indonesia	(2019)	IOP Conference Series: Earth and Environmental, Institute of Physics Publishing
N. Fajarwati, M.S. Masruri	Role of local wisdom community Dayak Kanayatn in the fire disaster prevention (forest fires for the opening of farming fields in West Kalimantan)	(2019)	IOP Conference Series: Earth and Environmental Science, Institute of Physics Publishing
S. Rozi, A.R. Ritonga, J. Januar	'Local community-based disaster management' The transformation of religious and local wisdom values in preparation to deal with natural hazards in West Sumatra, Indonesia	(2021)	Jamba: Journal of Disaster Risk Studies, AOSIS (pty) Ltd
J. Hos, S. Roslan, R. Supiyah	Disaster mitigation based on local wisdom in shifting cultivators communities	(2021)	WSEAS Transactions on Environment and Development, World Scientific and Engineering Academy and Society
H. Naping, I. Musywirah	A strategy of local wisdom-based natural disaster management in coastal communities in Barru District	(2019)	IOP Conference Series: Earth and Environmental Science, Institute of Physics Publishing
D. Damsar, I. Indrayani	Local wisdom based disaster education in Minangkabau society	(2018)	MATEC Web of Conferences, EDP Sciences

N. Asriyani, H. Hastuti	Local Wisdom and Public Participation in Landslide Disasters in Girimulyo Kulon Progo	(2019)	IOP Conference Series: Earth and Environmental, Institute of Physics Publishing
E. Maryani, A. Yani	Local wisdom of kampung naga in mitigating disaster and its potencies for tourism education	(2016)	Man in India, Serials Publications
N. Naing, B.P. Iskandar	Model of settlements float management based on local wisdom for disaster mitigation in Tempe Lake – Indonesia	(2015)	International Journal of Applied Engineering Research, Research India Publications
K. Anwar	Disaster mitigation local wisdom in the tradition of the minangkabau community	(2021)	E3S Web of Conferences, EDP Sciences
P.F. Wialdi, R.E. Putera, R. Ariany, T.R. Valentina, R. Dermawan	Local wisdom of coastal communities in mitigating earthquake disaster risk reduction	(2021)	E3S Web of Conferences, EDP Sciences
Z. Alhadi, S. Sasmita, A. Yulfa, S. Fatimah, D. Syafrini, K.D. Maani, O. Riandini	The Coping Strategies Patterns Based on Local Wisdom and Resilience Capital in Facing Natural Disaster Risk in Nagari Mandeh, Indonesia	(2023)	International Journal of Sustainable Development and Planning, International Information and Engineering Technology Association
P. Lestari, E.T. Paripurna, C.C. Br Barus, D.W. Astari	Disaster communication management based on local wisdom offending Jawa in controlling the spread of covid-19	(2021)	AIP Conference Proceedings, American Institute of Physics Inc
H. Hayati, F.T. Waluyanti, D. Wanda	Local Wisdom Enriching Complementary Feeding Practices during Disaster Situations in Indonesia	(2022)	Kesmas, Faculty of public health - Universitas Indonesia
S.A.T. Cahyono, E. Kuntjorowati, I. Hermawati, C. Rusmiyati, A. Purnama	Disaster risk management based on local wisdom in handling natural disaster victims	(2022)	IOP Conference Series: Earth and Environmental, Institute of Physics
D. Ruslanjari	Role of local wisdom in rapidity of rehabilitation and reconstruction of earthquake disaster in multi religious and mono religious villages (a Case in Bantul)	(2012)	Proceedings of the 4th International Disaster and Risk Conference: Integrative Risk Management in a Changing World - Pathways to a Resilient Society, Global Risk Forum (GRF)
Z. Hidayat, R. Indra, L.W. Evelina, S. Supratid	Impact Of Information Technology, Leadership Communication, Protection Facility, And Local Wisdom Practice On Social Readiness For Disaster In Krakatoa	(2022)	Journal of Theoretical and Applied Information Technology, Little Lion Scientific

Document Types for Local Wisdom in Disasters Research (RQ1)

Based on the research findings presented in the figure 1, we have identified a total of 22 documents relevant to the topic of "Local Wisdom on Disaster." Among these documents, 40.9% are scholarly articles, while 59.1% are conference papers.

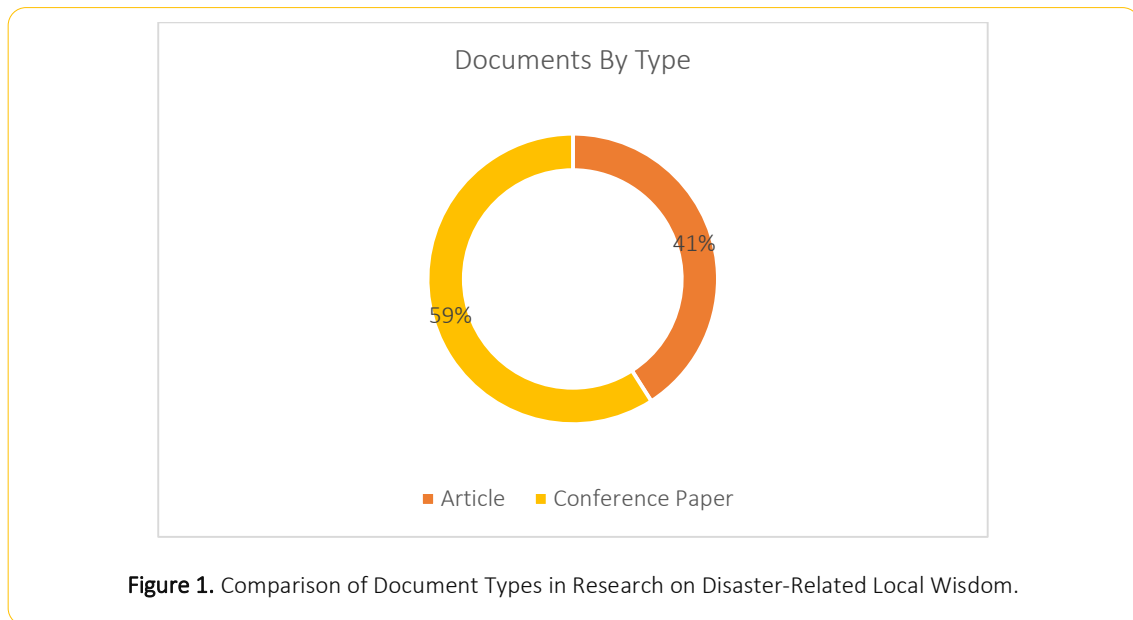


Figure 1. Comparison of Document Types in Research on Disaster-Related Local Wisdom.

The predominance of conference papers over scholarly articles in the realm of "Local Wisdom on Disaster" literature can be attributed to several factors. Conferences serve as vital platforms for researchers, practitioners, and policymakers to disseminate preliminary findings, exchange ideas, and receive feedback on their work. Consequently, conference papers offer a timely avenue for sharing research findings, particularly in dynamically evolving fields like disaster management.

Moreover, conference papers often encapsulate a diverse array of research methodologies and perspectives. Unlike scholarly articles, which typically undergo stringent peer review, conference papers may undergo varying levels of scrutiny before presentation. While this inclusivity allows for a broader spectrum of research to be shared, it also implies that the quality and reliability of conference papers may vary significantly.

Furthermore, the publication process for conference papers is generally less rigorous and time-consuming compared to that of scholarly articles. While this expedites the dissemination of research findings, it may compromise the depth of analysis and the thoroughness of the peer-review process.

Conversely, scholarly articles undergo meticulous peer review, where experts in the field critically evaluate the research methodology, analysis, and conclusions before publication. This rigorous scrutiny enhances the credibility and reliability of scholarly articles, making them invaluable sources of information for researchers and practitioners seeking comprehensive insights into the topic.

In summary, while conference papers contribute to the dissemination of research findings and foster academic discourse, their prevalence in the "Local Wisdom on Disaster" literature may raise concerns about the depth of analysis and the reliability of the information presented. Researchers and practitioners should judiciously evaluate the sources they utilize, balancing the timely dissemination of information with the imperative for rigorous scrutiny and reliability.

Year of Research Documents on Local Wisdom in Disasters (RQ2)

In the Figure 2, the distribution of articles based on their publication years is clearly depicted. The year 2012 witnessed the initial publication of two articles addressing the concept of local wisdom within the context of disaster management. However, it is noteworthy that this figure may reflect an emerging awareness of the significance of local wisdom in disaster mitigation.

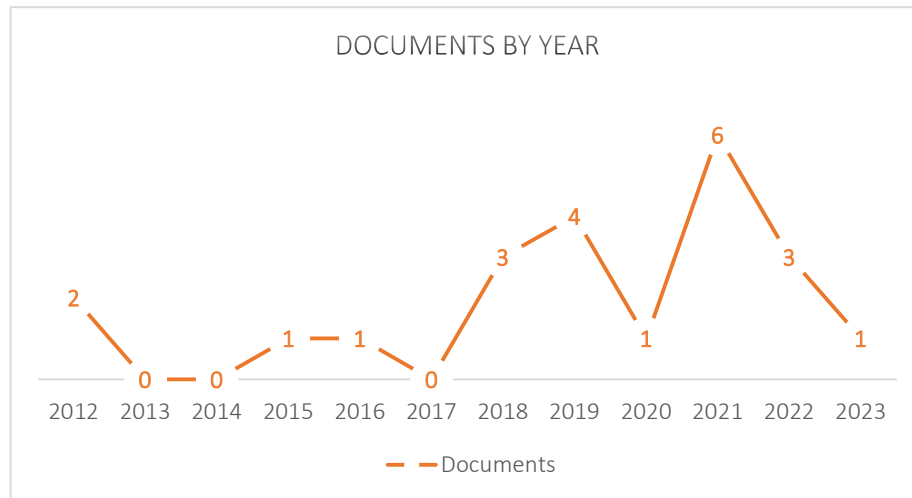


Figure 2. Comparison of Years in Documents in Research on Disaster-Related Local Wisdom.

Subsequent years, specifically from 2013 to 2017, indicate minimal or even absent publications related to this topic. This could imply a lack of attention or focus on local wisdom within disaster research during that period.

However, a significant surge in the number of publications occurred in 2018, with three documents being released. This upturn might signify an increasing recognition of the importance of local wisdom in disaster resilience efforts.

The upward trend in publication numbers continued in subsequent years, with four documents in 2019, one in 2020, and reaching its zenith in 2021 with six publications. Nonetheless, the decrease in the number of publications in 2020 could be attributed to the global spread of the COVID-19 pandemic. This unprecedented event disrupted various activities, including research and scholarly publishing, thereby diverting resources and attention towards more immediate concerns such as pandemic management.

The remarkable surge in 2021 could be attributed to various factors, including a growing awareness of the need for holistic approaches in disaster resilience efforts or increased financial support for research in this domain.

This graph not only reflects the quantitative aspect of publication numbers but also underscores the evolving research trends pertaining to local wisdom in disaster management over time. It delineates a shift in research interest, indicating that in 2021, scholarly attention towards this topic reached its zenith compared to previous years. This might underscore the broadening acknowledgment of the invaluable contribution of local wisdom in bolstering disaster resilience and enhancing community capacities to confront such challenges.

List of Authors Publishing Articles on Local Wisdom in Disaster Management (RQ3)

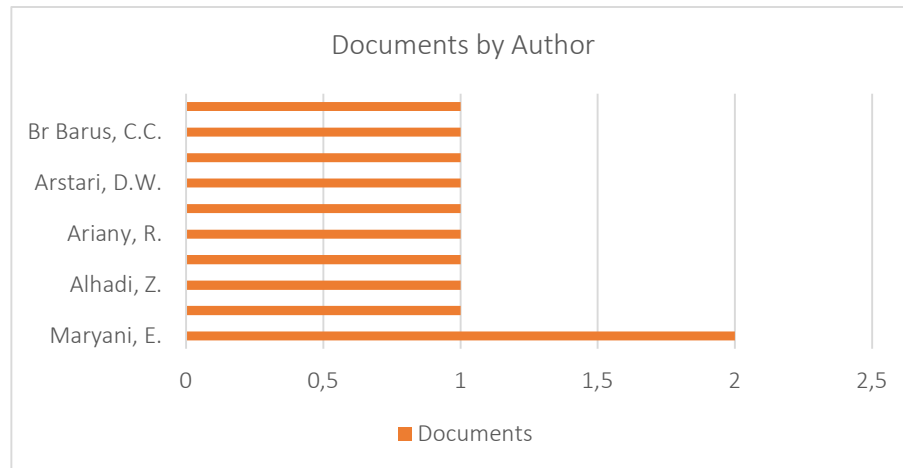


Figure 3. Comparison of Authors in Research Documents on Disaster-Related Local Wisdom.

In the illustration figure 3, it is found that Maryani is the author with the most number of articles listed in the Scopus database, with a total of two articles. Meanwhile, the other authors each have only one article listed.

There are several reasons that may explain why Maryani has a more significant contribution in scientific publications in the Scopus database compared to other authors who only have one article. One reason could be a deeper or broader research focus that Maryani possesses in topics relevant to the database. This provides Maryani with more opportunities to produce and publish research in various aspects of the topic.

Additionally, Maryani may also have better access to research resources, both physically and financially, allowing for more intensive and extensive research. Thus, the ability to access these resources can expand the scope of research and increase the likelihood of acceptance of her articles in journals indexed by Scopus.

Maryani's active role in the research community, collaboration with fellow researchers, or extensive professional networks may also be determining factors in her larger contribution to scientific publications. Through collaboration and teamwork, Maryani can be more productive in producing quality research and publications.

Therefore, Maryani's more significant contribution in scientific publications in the Scopus database may reflect a combination of a strong research focus, good access to resources, and an active role in the research community or collaboration with fellow researchers.

Author Network Publishing Articles on Local Wisdom in Disasters (RQ4)

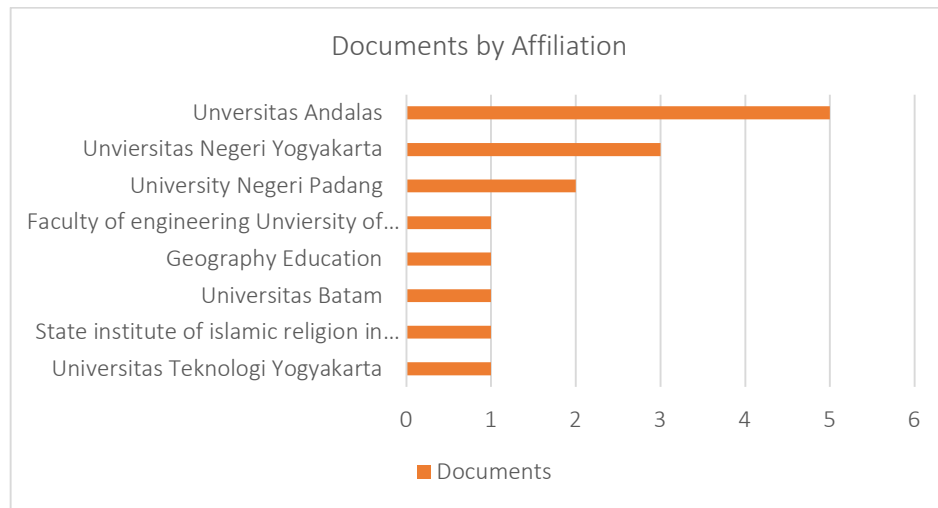


Figure 4. Comparison of Affiliations in Research Documents on Disaster-Related Local Wisdom.

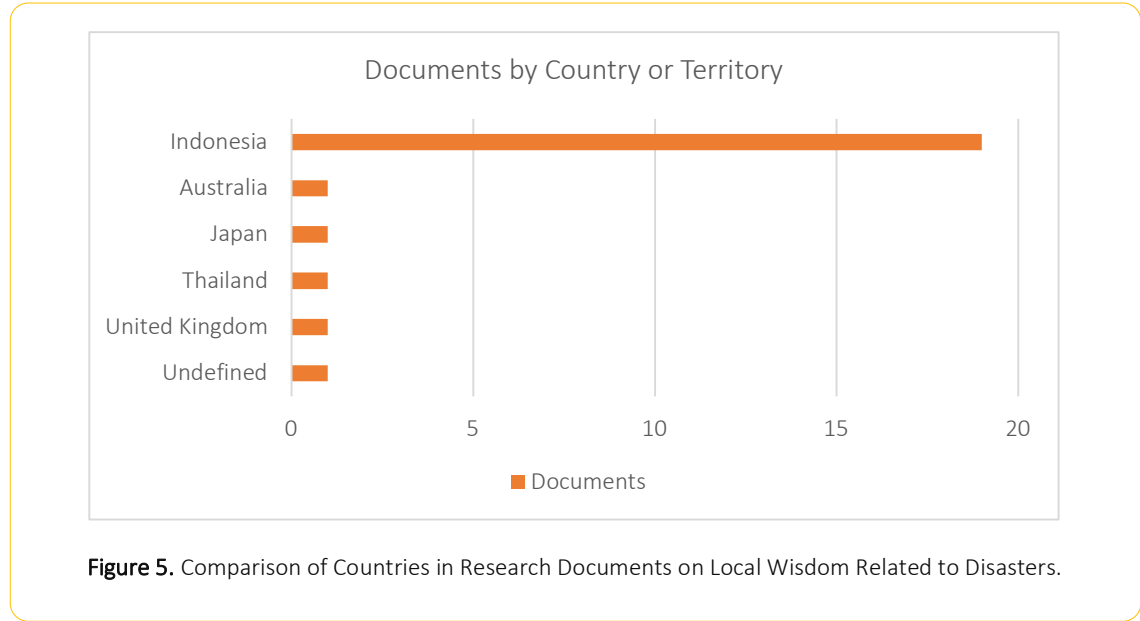
In the author network diagram shown in the figure 4, it is evident that Andalas University boasts the highest number of associated articles with its affiliation, totaling five. In comparison, Universitas Negeri Yogyakarta and Universitas Negeri Padang contribute three and two articles respectively, while other affiliations are linked to only one article each.

This pattern elucidates the distribution of contributions across various affiliations in article publications, with Andalas University assuming the most dominant role in terms of the number of articles associated with their institution. While Yogyakarta State University and Padang State University also make substantial contributions, their numbers are comparatively lower than those of Andalas University. Other affiliations exhibit more restricted involvement in scientific article composition within this context.

Several factors may contribute to Andalas University greater number of associated articles. Firstly, the university might possess a more pronounced research focus or be engaged in a greater number of research projects pertinent to the investigated topics. Moreover, robust partnerships with external organizations or institutions may facilitate increased article production. Additionally, Andalas University could boast highly proficient and experienced research teams in the relevant fields, coupled with superior access to research resources. Lastly, a pervasive publication culture within the university likely stimulates heightened output from affiliated researchers.

Countries of Authors Publishing Articles on Local Wisdom in Disasters (RQ5)

In the figure 5, Indonesia emerges as the dominant force in the number of published articles concerning the concept of local wisdom in disaster management. With 19 articles attributed to Indonesia, other countries are represented by only one article each.



This outcome underscores Indonesia's pivotal role in research and scholarly publications pertaining to local wisdom within the context of disasters. It reflects an active interest and substantial contribution from Indonesia's research community in both uncovering and disseminating knowledge on this subject to the global audience through scholarly articles. Meanwhile, other nations exhibit a comparatively limited presence in this academic discourse.

Several factors may account for Indonesia's prominence in this field:

Firstly, Indonesia's susceptibility to a diverse range of natural disasters, including earthquakes, tsunamis, volcanic eruptions, and floods, likely amplifies research endeavors aimed at mitigating their impact. Consequently, there is heightened attention within the country towards exploring disaster management strategies, particularly those grounded in local wisdom.

Secondly, Indonesia's rich cultural diversity offers fertile ground for the exploration and documentation of indigenous knowledge and practices related to disaster management. Researchers are drawn to studying these unique approaches, thereby contributing to a robust literature base.

Moreover, government initiatives and funding support for disaster research and resilience-building efforts could play a significant role. Increased financial backing can incentivize researchers to delve deeper into topics surrounding disaster management, including the utilization of local wisdom.

Strong academic collaboration and networks within Indonesia, coupled with partnerships with international institutions, further facilitate research initiatives and the sharing of knowledge in this domain.

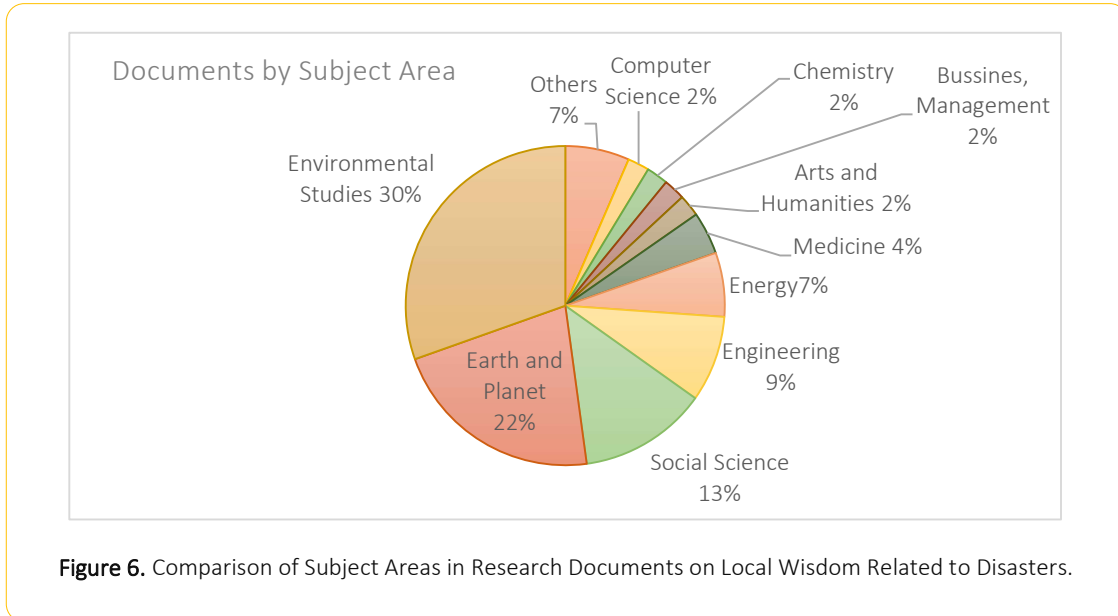
Lastly, a growing awareness and acknowledgment, both domestically and internationally, of the value of local wisdom in disaster management likely propel heightened research activity and publication output on the subject.

In essence, Indonesia's substantial contribution to the body of literature underscores its dedication to addressing disaster challenges and harnessing local wisdom as a crucial asset in disaster management endeavors

it is evident that Indonesia dominates the number of article publications on the concept of local wisdom in disaster management. There are 19 articles associated with Indonesia, while other countries each have only one article.

Subject Areas of Research on Local Wisdom in Disasters (RQ6)

The figure 6 presented below depicts the various subject areas or research fields that focus on the concept of local wisdom or local wisdom. In the realm of scientific literature, this image illustrates the diverse aspects or topics that are the main focus of research related to local wisdom.



The data presented indicates that Environmental Studies stands out as the most dominant research area, contributing 30.40% of the total. This signifies that much of the research related to local wisdom is focused on environmental issues and natural sustainability.

Furthermore, Earth and Planetary Science follows significantly, contributing 21.70%. This reflects an interest in examining the concept of local wisdom from a geoscience perspective, which includes an understanding of Earth and planetary dynamics.

Additionally, Social Science and Engineering also demonstrate significant contributions, each at 13.00% and 8.70% respectively. This indicates that studies of local wisdom also involve social and technological dimensions, such as cultural aspects, policies, and relevant technologies.

Although in smaller proportions, Medicine and Energy each contribute 4.30% and 6.50% respectively. This highlights the relevance of the concept of local wisdom in the fields of health and energy. Finally, other subjects such as Computer Science, Chemistry, Business Management, and Arts and Humanities each contribute 2.20%. While their contributions are smaller, this indicates that local wisdom is studied and applied in various disciplines. Thus, this overview provides valuable insights into the diversity of topics studied in the context of local wisdom, highlighting the interdisciplinary nature of this research.

Discussion

In disaster management, according to Norris' concept (2008), there are three critical stages known as the Pre-, During, and Post-disaster stages. This article aims to identify and describe the roles played by Local Wisdom in each stage of disaster management.

The first stage, known as the Pre-disaster stage, involves preparation and planning before the disaster occurs. In this stage, Local Wisdom can play a role in helping communities plan preventive actions, identify risks, and develop strategies appropriate to the local environment and culture.

The second stage, which is the During-disaster stage, involves response and handling while the disaster is occurring. Local Wisdom can contribute by providing guidance on actions to be taken in emergency situations, mobilizing local resources, and assisting in effective response coordination.

The third stage, referred to as the post-disaster stage, is related to recovery and rehabilitation after the disaster. Here, Local Wisdom can assist in the community's recovery process, facilitate cultural healing, and promote sustainability and learning from disaster experiences.

This article will detail the roles of Local Wisdom that emerge in each of these stages in disaster management, providing a deeper understanding of how local values and cultural practices play a role in mitigation, response, and recovery from disasters.

Application of Local Wisdom in the Pre-disaster Stage (RQ7)

In the early stage, Disaster Management can be interpreted as the steps taken before a natural disaster occurs. However, it is important to note that to harness local participation and potential in disaster mitigation efforts, the values of religion and local wisdom should not be overlooked (Rozi et al., 2021).

In the context of prevention, an example is the "Tolaki Ethnic Cultivation System," the results of which show that the entire *monda'u* activities play a significant role in disaster prevention efforts (Hos et al., 2021).

Furthermore, in the effort to integrate the values of local wisdom into the management of natural disasters in the West Sumatra region, the concept of "Tambo" (which includes Minangkabau proverbs and philosophy of life regarding disaster preparedness and management) becomes highly relevant. The philosophy of "nature is the best teacher" is one of many local values that provide guidance to the Minangkabau community in various aspects of life, including culture, social, political, economic, and ecological. This philosophy provides understanding, guidance, and inspiration to the community in their daily lives.

In addition to "Tambo," there is also the concept of "*Badoncek*," which is a regional social security system that plays a role in disaster preparedness for natural disasters. Furthermore, in structural mitigation, there is also the use of traditional architecture such as the "*Rumah Gadang*" (a traditional Minangkabau house) and local spatial planning that act as precautionary measures against natural disasters.

In summary, the emphasis on local values, including the concepts of "Tambo" and "*Badoncek*," as well as the use of traditional architecture like "*Rumah Gadang*," provides a solid foundation for the development of sustainable understanding, actions, and behaviors in facing potential natural disasters.

In an article titled "Disaster risk management based on local wisdom in handling natural disaster victims" written by Cahyono et al. (2022), the importance of the Disaster-Resilient Community's role in the disaster management context at the pre-disaster stage is emphasized. This means that communities aware of disaster potential play a crucial role in disaster risk management efforts before a disaster occurs.

The article also highlights the need to improve facilities and infrastructure in Disaster-Prone Village (KSB), which should not only include social granary and social guard posts but also consider aspects such as transportation, communication, and logistics facilities. All these need to be adapted based on various factors such as the type of possible disasters, potential disaster-affected areas, anticipated disaster intensities, foreseeable impacts, and the time required to respond to disasters (Cahyono et al., 2022)

Furthermore, the article emphasizes the importance of fostering and developing local wisdom through a disaster-responsive culture. Efforts to raise community awareness in disaster mitigation must be intensive, not only in the pre-disaster stage but also during the emergency response (rescue operations) and post-disaster recovery phase.

In this context, synergy among various stakeholders is crucial. Training and education activities related to disaster mitigation become a primary pillar in these efforts (Triastari et al., 2021). Particularly, there is a focus on massive socialization, especially for communities residing in coastal areas. This is due to the understanding that shelter protection is not the sole main issue in reducing disaster risks such as earthquakes and tsunami.

Moreover, a writer named Wialdi suggests that disaster education can be conducted in the Surau, a traditional Islamic assembly place. This indicates that the approach to disaster handling awareness can be aligned with the local culture and traditions of the community. Thus, messages and information regarding disaster management can be more effectively received by the community, enabling them to be better prepared for potential disaster risks (Wialdi et al., 2021).

Application of Local Wisdom in the During-Disaster Stage (RQ8)

In the emergency response stage, the strong culture of solidarity and cooperation, which is characteristic of Indonesian society, becomes very apparent. One example is the establishment of communal kitchens (commonly known as "*dapur umum*") in shelter locations.

In emergency situations, Indonesian communities often establish communal kitchens as an initiative to provide food assistance to those affected by disasters. These communal kitchens aim to provide meals to refugees and those in need, exemplifying concrete instances of the culture of mutual assistance deeply ingrained in society (Astuti et al., 2022).

These communal kitchens reflect the spirit of togetherness and solidarity of the Indonesian community in facing emergency situations. It is a concrete form of the profound social and cultural principles of helping one another in crisis situations and is often an effective collective effort in providing aid to those in need during emergencies.

In an article written by Damsar and Indrayano (2018), a traditional saying is presented: "*ka bukit samo mandaki, ka lurah samo manurun, tatungkuik samo makan tanah, tatilantang samo minum ambun*" (up to the hills all go, down to the valleys all descend, face down all eat the earth, lie on your back all drink the dew). This saying reflects the Minangkabau culture that encourages cooperation to achieve harmonious life goals. It also shows that mutual assistance plays a vital role, especially in times of disaster.

Specifically in Padang Pariaman Regency, the housing development pattern involving community participation has been successful. This is because the community there has a tradition of cooperation and assistance through traditions like "*badoncek*" or "*barantam*." These traditions depict the spirit of mutual aid in various aspects of life, such as marriage ceremonies, house construction, funeral processes, and so on (Zulfadrim et al., 2018).

In the context of disaster management, the spirit of cooperation and community participation in traditions like "*badoncek*" can also be an asset. Communities that support and collaborate with one another can be more effective in dealing with disasters and contribute to better disaster mitigation efforts.

Thus, this article highlights the importance of local wisdom values, such as the spirit of cooperation, in the context of disaster management and how these values can be used to strengthen community resilience to disasters.

Application of Local Wisdom in the Post-Disaster Stage (RQ9)

In the post-disaster context, the role of cooperation (*gotong royong*) plays a crucial and vital role. *Gotong royong* is a collaborative principle and practice among community members with a common goal of restoring and rebuilding their disaster-affected environment. It involves various actions, including mutual assistance, sharing of resources, and working together to address the consequences of the disaster. This concept reflects solidarity and cooperation in facing post-disaster challenges (Kusumasari & Alam, 2012).

Gotong royong illustrates the community's ability to come together and support each other in overcoming the damage and losses caused by disasters. It is a vital aspect in facilitating post-disaster recovery and reconstruction,

enabling communities to work together in facing the occurring impacts and rebuilding their lives. In many cultures around the world, gotong royong has become a strong foundation in community disaster management, aiding in accelerating the recovery process.

Application of Local Wisdom in Disaster Management (RQ10)

The application of local wisdom in disaster management among the Bugis Makassar community not only reflects a rich cultural heritage but also plays a crucial role in safeguarding the population from natural hazards. Rooted in long-standing cultural beliefs and practices, this local wisdom has proven to be a valuable asset in confronting disaster challenges.

In the belief system of the Bugis Makassar community, which is based on the teaching of panngadereng, there are three main values considered capable of providing stability in human life: recognition of God as the center of life, honesty, justice, and wisdom. This submissive attitude is often found in the rituals of fishermen before going to sea, as a form of acknowledgment of the uncertainty in the ocean and awareness of the various dangers that may occur. Values such as honesty, godliness, and hard work are strong values in South Sulawesi society (Naping et al., 2019).

In the Bugis Makassar community, the concepts of *bala'* or *abala*, as well as the concept of *mappasili*, are understood as cause-and-effect relationships, implying that disasters or hazards experienced by humans do not occur arbitrarily but are often triggered by human actions. This community believes that if their actions violate the balance of nature, damage the environment, or are not in harmony with nature's will, they will experience disasters.

Furthermore, there is a strong belief that to achieve well-being in life, humans must maintain a harmonious relationship with nature. They believe that reckless actions toward the environment will result in disasters. Therefore, they strive to always behave in accordance with nature's will and maintain ecological balance.

In the context of disaster mitigation, the coastal communities in Barru Regency possess local wisdom that they utilize. Some elements of local wisdom related to disaster mitigation include the ability to read natural signs indicating disaster potential, the existence of prohibitions (taboos) related to behaviors that can trigger disasters, and efforts to avoid or anticipate disaster threats (Naping et al., 2019).

Thus, this local wisdom becomes an asset in disaster mitigation efforts and explains how local communities utilize it to protect themselves from potential natural hazards.

Table 2. Table of Local Wisdom Activities Before, During, and After Disasters.

Stage	Sub-Stage	Activity	Note
Pre-Disaster	Prevention	Community Farming Rules in NTT Taboos in Barru District	Community establishes Disaster-Aware Community (KSB) as part of mitigation. This is a step to raise awareness and preparedness of the community in facing potential disasters.. KSB aims to prepare the community in facing disasters.
	Mitigation	Structural: Non-Structural:	Structural: Building Earthquake-Resistant Traditional Houses "Rumah Gadang" Non-Structural: Traditional regulations for forest conservation
	Preparedness	Establishing Disaster-Aware Community (KSB)	Community establishes Disaster-Aware Community (KSB) as part of mitigation. This is a step to raise awareness and preparedness of the community in facing potential disasters. KSB aims to prepare the community in facing disasters.

Stage	Sub-Stage	Activity	Note
	Early Warning	Recognizing Natural Signs	Communities with a history of disasters already understand the natural signs before a disaster occurs in their area.
During Disaster	Emergency Response	Mutual Assistance	In emergency situations, the Indonesian community helps each other to rescue and evacuate the affected disaster victims.
	Emergency Assistance	Mutual Assistance	In emergency situations, the Indonesian community has a strong culture of mutual assistance. They set up public kitchens in evacuation centers to provide food assistance to those affected by the disaster. This reflects the spirit of solidarity and cooperation in facing emergency situations.
Post-Disaster	Recovery	-	At this stage, the community has local wisdom of mutual assistance to quickly recover and restore after a disaster.
	Rehabilitation	-	After a disaster, rehabilitation efforts are made to restore the physical and social conditions of the affected community. This includes infrastructure repair and economic recovery.
	Reconstruction	-	Reconstruction is the next stage in recovery, where damaged or destroyed buildings and facilities due to the disaster are rebuilt. This is an essential part of the long-term recovery process.

Source: Compiled by the Author from Various Sources.

Conclusions

From what has been presented, the "disaster management based on local wisdom" approach encourages the transformation of religious values and local wisdom, enabling communities to be more proactive in facing disaster challenges. In this regard, communities often have a deeper understanding of potential disasters in their own environment compared to the government, as they are more connected to the real conditions in their areas.

In the overall context of disaster management in Indonesia, there are several stages including prevention, mitigation, emergency response, and recovery. Local wisdom, such as the culture of cooperation and understanding of the environment, plays a crucial role in all these stages. In the pre-disaster stage, communities in East Nusa Tenggara have farming rules as a form of disaster prevention. They also establish Disaster Awareness Communities (KSB) and understand natural signs as mitigation efforts. When a disaster occurs, the culture of mutual assistance among the Indonesian community is reflected in the establishment of communal kitchens at evacuation sites, demonstrating solidarity and cooperation. After a disaster, rehabilitation and reconstruction efforts are undertaken to restore the physical and social conditions of the affected community. All these stages underscore the importance of local wisdom, such as the culture of cooperation and environmental understanding, in disaster management.

An effective approach to disaster management requires a harmonious collaboration between scientific knowledge and local wisdom possessed by the community. Local communities have valuable insights into their environment and how to deal with disasters, which can be applied in conjunction with scientific methods to reduce disaster risks and enhance preparedness. Therefore, local culture and values are crucial components in a comprehensive and sustainable disaster management strategy.

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