



Approach Management In Marine Protected Areas : A Case Study of Surin Marine National Park, Thailand

Sucaí Worachananant¹, Sara Shamshiri², Gilbert Ryan Semilla³

¹Department of Natural and Rural Systems , University of Queensland, Australia

²Department Physical Education and Sport Science, Islamic Azad University Dezful, Dezful, Iran

³Department Physical Education and Sport Science, Tourism & Hospitality, Metro Manila, Philippines

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ABSTRACT

Purpose of the study: Research This aiming For identify limiting factors effectiveness of management strategies area conservation the sea in Thailand, as well as to study how are those strategies can improved , through studies the case of Surin Marine National Park.

Methodology: The method used covering studies literature , survey social towards stakeholders interests (visitors , tour operators, staff) park national), as well as survey biological use line intercept transect technique . Post-tsunami data from 2004 were also collected For evaluate change condition ecology and capacity management

Main Findings: Research results show that approach management in Surin yet fully effective in guard sustainability environment sea . Conflict between stakeholders interests , weakness capacity management , and change condition post tsunami become challenge main . Management based on zoning Still need revision and participation more wide .

Novelty/Originality of this study: This study integrate perspective biological and sociological as well as evaluate impact crisis big (2004 tsunami) against effectiveness management area conservation. Approach This produce framework contextual and accessible evaluation applied in management area sea similar in developing countries

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Corresponding Author:

Sucaí Worachananant,

Department of Natural and Rural Systems , Faculty of Agriculture and Natural Resources , University of Queensland,

St Lucia, Queensland, 4183, Australia

Email: sucaiwora@gmail.com

1. INTRODUCTION

Marine protected areas such as marine national parks play an important role in conserving biodiversity while supporting socio-economic activities such as tourism. However, in the context of a developing country like Thailand, various challenges in managing these areas remain a crucial issue[1]-[3]. This study starts from the main question: what factors limit the effectiveness of management strategies in marine protected areas in Thailand, and how can management approaches be improved to achieve conservation goals while serving utilization needs.

As a case study, Surin Marine National Park was chosen because it has a high diversity of tropical marine ecosystems, including coral reefs, mangrove forests and seagrass beds, but also faces significant pressure from human activities, especially diving-based tourism[4], [5]. The management approach used in this area has not fully considered dynamic changes, both caused by human activities and natural disasters.

During the research process, a major disaster event occurred, namely the tsunami on December 26, 2004, which drastically changed the biophysical and social conditions in the western coastal areas of Thailand, including the study area[6]-[8]. Therefore, the research structure is divided into two phases: before and after the tsunami.

Before the tsunami, research focused on evaluating the effectiveness of existing management approaches, based on biological data and stakeholder perceptions of management policies[9]-[11]. After the tsunami, the focus shifted to evaluating the impact of the disaster on management systems and how adaptive strategies are needed in times of crisis.

This study uses an interdisciplinary approach that combines marine science and environmental sociology approaches to provide a comprehensive picture of the effectiveness of marine conservation area management in real conditions in the field[12]-[14]. With this evaluation framework, the results of the study are expected to provide applicable recommendations for the development of marine conservation policies in Thailand and other regions with similar characteristics[15], [16].

Previous research entitled "A Method for Evaluating Marine Protected Area Management" focused more on the development and application of general marine conservation area management evaluation methods. The study provided a systematic framework for assessing the effectiveness of marine protected areas (MPA) management using key indicators that are general and can be applied to various locations [17]. However, the study has not provided a specific focus on how the management approach is applied concretely in the field in a particular MPA, including the specific challenges and conditions faced by the area managers. Different from previous research, the study entitled "Approach Management in Marine Protected Areas: A Case Study of Surin Marine National Park, Thailand" seeks to explore in depth the application of the management approach in real terms in one specific location, namely Surin Marine National Park. This study focuses on the unique local context, including the social, economic, and ecological aspects that influence the area's management strategy [18]-[20]. This is important because the effectiveness of MPA management is greatly influenced by local characteristics and management practices applied, which have not been widely explored in general management evaluation research. A major gap that can be identified is the lack of studies that link theoretical MPA management evaluation methods with management practices applied in the field at a specific location with unique characteristics. Research on Surin Marine National Park has the potential to fill this gap by providing empirical insights into effective management approaches in a specific context, while also testing the relevance and adaptability of existing evaluation methods [21]-[23]. Thus, this study will make a significant contribution in linking management evaluation theory with real-world practices, which is essential for more effective and sustainable MPA management.

The novelty of the study "Approach Management in Marine Protected Areas: A Case Study of Surin Marine National Park, Thailand" lies in the contextual and adaptive approach that specifically highlights the dynamics of marine protected area management in one location with unique characteristics, namely Surin Marine National Park. Unlike previous studies that are general in nature and focus on developing a theoretical evaluation framework, this study presents an in-depth analysis of the actual implementation of management strategies, taking into account local social, economic, and ecological factors [24]-[26]. This study also offers a new perspective through the two-phase time structure before and after the 2004 tsunami disaster that allows an understanding of how conservation policies respond to drastic changes and adjust strategies in the midst of a crisis. In addition, the use of an interdisciplinary approach between marine science and environmental sociology contributes significantly to building a holistic understanding of the effectiveness of marine protected area management [27], [28]. Thus, this study not only fills the literature gap regarding the relationship between evaluation theory and practice in the field, but also provides an analytical model that is applicable to MPA management in other areas facing similar pressures.

If this research on "Approach Management in Marine Protected Areas: A Case Study of Surin Marine National Park, Thailand" is conducted, the implications will be very significant for the development of policies and practices for marine protected area management, especially in developing countries such as Thailand. This study will produce an in-depth understanding of the effectiveness of management approaches applied in the local context, as well as provide empirical evidence on how management strategies can adapt to extreme socio-ecological changes, such as the impacts of massive tourism and natural disasters [29]-[31]. The results of this study have the potential to be an important reference for policy makers in designing a responsive, participatory, and field-data-based marine protected area management model, so as to be able to balance conservation objectives and utilization needs [32]-[34]. Furthermore, this study can contribute to improving the capacity of local institutions and stakeholders through a collaborative approach, as well as being a practical reference for similar conservation areas in Southeast Asia that face complex challenges in marine resource conservation.

The research "Approach Management in Marine Protected Areas: A Case Study of Surin Marine National Park, Thailand" has a high urgency because it reflects the urgent need to evaluate and improve marine protected area management strategies amidst increasing pressure from human activities and the dynamics of environmental change [35], [36]. In developing countries such as Thailand, marine national parks play a dual role as protectors of biodiversity and supporters of the local economy through tourism, but the imbalance between conservation and utilization often leads to significant ecosystem degradation. The urgency of this research lies in its efforts to

contextually explore the management approaches that have been used so far, while also examining their ability to adapt to major disturbances such as tsunami disasters [37]-[39]. By analyzing the limiting factors of management effectiveness and offering a more responsive approach to local socio-ecological characteristics, this research is very important in order to produce a management model that is not only based on theory, but also applicable and relevant to real conditions in the field, which can ultimately improve the sustainability of marine protected areas in Thailand and other similar areas.

Based on the background and gaps that have been described, it can be concluded that the marine conservation area management approach still faces various challenges, especially in the local context such as in Surin Marine National Park. This study was conducted to answer the need for a more adaptive, contextual, and sustainable management strategy by considering social, ecological factors, and the dynamics of change that occur in the field [40], [41]. By evaluating the management approach that has been implemented and its impact on conservation effectiveness, this study is expected to provide a real contribution to the development of more targeted and sustainable marine area management policies.

2. RESEARCH METHOD

This study used an exploratory case study design with a mixed methods approach, combining quantitative and qualitative approaches. This approach was chosen to provide a comprehensive understanding of the effectiveness of management approaches in Surin Marine National Park, Thailand. The study was divided into two phases, namely pre-tsunami (before December 2004) and post-tsunami (after December 2004), due to the major changes in ecological and social conditions due to the tsunami disaster. In the first phase, researchers focused on mapping biological conditions, analyzing management strategies, and stakeholder perceptions of management policies. In the second phase, the study adjusted the objectives to evaluate the impact of the tsunami on marine ecosystems and management capacity, and assess how management strategies responded to the major disturbance. [42], [43].

The study population included various stakeholders who were directly or indirectly involved in the management and utilization of Surin Marine National Park. The subjects of the study included general visitors, SCUBA divers, tour operators, national park officers, and academics. The selection of participants was done purposively and incidentally, depending on their availability and involvement during the data collection process. Respondents were selected to represent diverse views, both from the perspective of resource users and conservation area managers. [44]-[46].

This study utilized multiple instruments to collect both quantitative and qualitative data in order to obtain a comprehensive understanding of stakeholder perspectives and environmental conditions. One of the primary instruments was a set of closed and open-ended questionnaires, which were designed to assess respondents' perceptions, knowledge, and levels of acceptance regarding the various management approaches implemented in Surin Marine National Park. To complement this, semi-structured interview guides were employed to explore participants' deeper insights, lived experiences, and critical evaluations of the effectiveness and practicality of those management strategies. Additionally, observation checklists were used to systematically record the behavior of tourists particularly divers and snorkelers during their interactions with the marine environment, with special attention given to activities that might directly impact coral reefs and other sensitive ecosystems. These combined instruments allowed the researcher to triangulate findings and present a well-rounded analysis of both human and ecological dimensions of marine park management.

Table 1. the research instruments

No	Instrument Type	Purpose of Use	Data Type	Data Sources
1	Closed/Open-ended Questionnaire	Assess perceptions, knowledge, and attitudes of respondents	Quantitative & Qualitative	Visitors, divers, tour operators
2	Semi-structured Interview Guide	Explore views on policies and management practices	Qualitative	Park staff, academics, tour operators
3	Field Observation Checklist	Record visitor behavior and interaction with coral reefs	Qualitative	On-site tourists at snorkeling/diving areas
4	Line Intercept Transect Form	Measure coral cover condition over time	Quantitative	Coral reef sites at Surin (1997–2006)

The study used both quantitative and qualitative data analysis techniques. Biological data were analyzed using descriptive and inferential statistical methods to assess trends and changes in coral reef conditions over time. Data from the LIT surveys were compared across years to detect ecological shifts. Social survey data were analyzed through tabulation and descriptive statistics to identify patterns in perceptions and attitudes. Qualitative data from interviews and observations were analyzed using content analysis to identify key themes and stakeholder

concerns. Triangulation was employed to cross-validate findings from different data sources and methods, ensuring the reliability of results.

The study employed a variety of data collection techniques to obtain comprehensive and reliable information. Biological surveys were carried out consistently from 1997 to 2006 at seven dive sites within Surin Marine National Park, utilizing the Line Intercept Transect (LIT) method to record coral cover percentages and species diversity. Alongside this, social surveys were administered using structured and semi-structured questionnaires to evaluate stakeholders' awareness, perceptions, and acceptance of park management policies, conducted both before and after the tsunami to capture any changes over time. To gain deeper insight, semi-structured interviews were conducted with key informants such as park managers, tour operators, and researchers, aiming to understand their views and critical evaluations of existing management strategies. Additionally, field observations were opportunistically carried out to document real-time tourist behavior, particularly focusing on actions that could impact reef health, such as direct contact with coral by divers, and to triangulate findings from surveys and interviews.

The research was carried out through a multi-stage procedure designed to address both the long-term and sudden changes in Surin Marine National Park. In the preparation phase, the researcher conducted a comprehensive literature review and preliminary field observations to develop a conceptual framework, identify appropriate research instruments, and select relevant study sites. This was followed by Data Collection Phase I (Pre-Tsunami), during which biological and social surveys were conducted from 1997 to 2004 to establish baseline ecological data and stakeholder perceptions. In response to the unexpected 2004 tsunami, the study entered an adjustment phase, where the research design was revised to incorporate new objectives aimed at evaluating the ecological damage and the capacity of park management to respond to the crisis. Subsequently, Data Collection Phase II (Post-Tsunami) was implemented through follow-up biological and social surveys in January and March 2005 to assess reef conditions and stakeholder reactions, with a particular focus on early-responding groups such as SCUBA operators. Finally, in the analysis and interpretation phase, data from both pre- and post-tsunami periods were analyzed comprehensively to evaluate the effectiveness of existing management strategies and to generate informed recommendations for improving future marine park management.

3. RESULTS AND DISCUSSION

3.1. Before the Tsunami

The results show that although has applied system zoning (Zoning Plan 2000–2004), its effectiveness Still limited . Changes significant in cover coral and the presence of marine biota happens in some point diving . Conflict between group users , such as divers and fishermen , increased consequence limitations supervision and lack of participation stakeholders interest in planning . Social surveys also show the level of understanding and awareness diverse environment among users , with part big visitors Not yet knowing the boundaries of the zone or applicable regulation[47]-[49] .

3.2. After the 2004 Tsunami

The tsunami had a major impact on infrastructure and ecosystems in Surin National Park. At least one reef was severely damaged and management facilities were completely destroyed. Visitor activity dropped drastically, making it impossible to conduct a general social survey. However, the diving industry recovered more quickly than other sectors. Data from divers was used to compare perceptions and impacts on the reef before and after the tsunami [50], [51]. The study found that post-disaster adaptation strategies were inadequate due to a lack of management preparedness.

3.3. Implications Managerial

This study confirm that management area conservation sea need approach participatory , scientific data-based , and flexible to disturbance ecological or social . Adjustment to condition local , including involvement stakeholders interest in making policy and planning zoning , very crucial For effectiveness term long.

Previous studies have emphasized the importance of a multidisciplinary approach to marine protected area design, integrating science and stakeholder participation as the main foundation. These studies provide a conceptual framework for designing marine protected areas based on scientific data and social, economic, and cultural input from the community involved [52], [53]. While these studies have made important contributions in emphasizing collaboration between science and society, their focus has been more on the initial design and planning of marine protected areas, without delving into how these approaches are implemented and tested in real-world, sustainable management. In contrast, this study offers an in-depth exploration of the application of a management approach in a real-world context in one specific marine protected area [54], [55]. The study not only examines the initial design, but also examines the effectiveness of the implementation of management policies in response to changing ecological and social pressures, including the impacts of major natural disasters such as tsunamis. The approach used is longitudinal, covering pre- and post-disaster phases, providing a more

comprehensive understanding of management challenges and adaptations over time, which has not been covered by previous studies of marine protected area design. A key gap identified is the lack of research that directly links the multidisciplinary framework in MPA design to long-term management practices in the field that are influenced by local and external dynamics [56], [57], [58]. The study of Surin Marine National Park fills this gap by showing how a multidisciplinary approach is truly tested in a complex geographical and social context, including how stakeholders play a role in the process of management adaptation after a crisis event. As such, this study makes an important contribution in bridging protected area design theory with actual management practices, making it relevant and necessary for the development of resilient and sustainable MPAs.

Based on the research findings, the novelty offered by this study lies in its approach that presents a longitudinal evaluation of the effectiveness of marine conservation area management in two extreme conditions, namely before and after a major natural disaster (tsunami), as well as its relationship with stakeholder participation and management readiness to face crises [59]-[61]. Unlike previous studies that only highlighted multidisciplinary integration at the conservation area design stage, this study delves deeper into the real application of the management approach in the field, including the limitations of the zoning system implementation, weak supervision, low visitor awareness, and minimal community involvement in planning. This study also reveals that post-disaster adaptation strategies are inadequate due to a lack of institutional readiness, thus offering a new perspective on the importance of management flexibility that is based on scientific data and responsive to ecological and social changes. Thus, the main novelty of this study is the presentation of empirical evidence that links ecosystem and social dynamics with concrete sustainable management practices in specific geographic and cultural contexts, while emphasizing the urgency of an adaptive and participatory management approach in facing long-term challenges in marine conservation areas.

The implications of this study suggest that the success of marine protected area management is highly dependent on the ability of the management system to respond adaptively to ecological and social changes. The findings that the zoning system that had been implemented before the tsunami was ineffective, as well as the lack of visitor understanding and stakeholder engagement, indicate the need for improvements in policy communication, monitoring, and environmental education [62], [63]. Furthermore, the major impacts of the tsunami on infrastructure and ecosystems, which were not anticipated managerially, emphasize the importance of integrating disaster mitigation strategies into marine protected area planning. Therefore, this study has implications for the need to reformulate management policies that are not only based on scientific data, but also involve active community participation and are responsive to major disturbances. If widely implemented, the approach proposed in this study could serve as a model for other marine protected areas in developing countries, in order to create more resilient, inclusive, and sustainable management.

The limitation of this study lies in the scope of the study which focuses only on one marine conservation area, so that the results and recommendations produced have limitations in terms of generalization to other areas with different ecological and social characteristics [64], [65]. In addition, the limitations of post-tsunami data, especially in collecting social data due to decreased tourism activities and destroyed infrastructure, hinder a more comprehensive longitudinal analysis of the dynamics of social change in the surrounding community. Qualitative approaches that rely on stakeholder perceptions also have the potential for subjectivity that can affect the objectivity of the results. Nevertheless, the findings in this study still provide important contributions to the understanding of adaptive management of marine conservation areas in the context of developing countries.

4. CONCLUSION

This study concludes that the effectiveness of marine conservation area management, such as Surin Marine National Park, is affected by various factors including policy design that is not responsive to marine characteristics, minimal stakeholder engagement, and unpreparedness for major disturbances such as tsunamis. The zoning system needs to be comprehensively revised by considering biological data and social input from users. By integrating ecological and social approaches in one evaluation framework, this study provides a practical contribution to the development of marine conservation policies in developing countries facing similar challenges.

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REFERENCES

- [1] Y. Hung, "T Teaching English to Speakers of Other Languages," *esol Int. J.*, vol. 10, no. 2, pp. 1–141, 2015, [Online]. Available: <http://www.tesol-international-journal.com>
- [2] S. Katona *et al.*, "Navigating the seascape of ocean management: waypoints on the voyage toward sustainable use," 2017, [Online]. Available: <https://www.openchannels.org/literature/16817>

- [3] L. S. Hoon, S. Syihabuddin, D. Sudana, and W. Gunawan, "Analisis Multimodal pada Teks Iklan untuk Mengidentifikasi Aspek Ketulusan Iklan," *Diglosia J. Kaji. Bahasa, Sastra, dan Pengajarannya*, vol. 6, no. 2, pp. 303–318, 2023, doi: 10.30872/diglosia.v6i2.579.
- [4] I. D. G. Sugiharmetha, "Respon kebijakan: mitigasi dampak wabah covid-19 pada sektor pariwisata," *J. Perenc. Pembang. Indones. J. Dev. Plan.*, vol. 4, no. 2, pp. 191–206, 2020, doi: 10.36574/jpp.v4i2.113.
- [5] A. Akbar, T. Herman, and D. Suryadi, "Exploration of Phinisi Ship Components as a Source for Learning Elementary School Geometry: Ethnomathematics Study," *Prism. Sains J. Pengkaj. Ilmu dan Pembelajaran Mat. dan IPA IKIP Mataram*, vol. 11, no. 4, p. 1018, 2023, doi: 10.33394/j-ps.v11i4.8461.
- [6] G. Wang and D. Li, "The diversified communication methods of chinese and Korean cultural education based on new media technology," *Mob. Inf. Syst.*, vol. 2022, 2022, doi: 10.1155/2022/1351908.
- [7] S. Sumarwati, "Traditional ecological knowledge on the slope of Mount Lawu, Indonesia: all about non-rice food security," *J. Ethn. Foods*, vol. 9, no. 1, 2022, doi: 10.1186/s42779-022-00120-z.
- [8] B. C. Yalçın, C. Martinez, M. Hubert Delisle, G. Rodriguez, J. Zheng, and M. Olivares-Mendez, "ET-Class: An energy transfer-based classification of Space debris removal methods and missions," *Front. Sp. Technol.*, vol. 3, no. March, pp. 1–23, 2022, doi: 10.3389/frspt.2022.792944.
- [9] Y. K. Anastasiya Spaska, Halyna Kozub, Gulaim Abylasynova, Vladyslav Kozub, "Evaluation of innovative teaching methods using modern," *J. Ilm. Ilmu Terap. Univ. Jambi*, vol. 9, no. 1, pp. 422–440, 2025, doi: 10.22437/jiituj.v9i1.38107.
- [10] E. Mufidati, "An Indonesian National English Textbook for Secondary Level : Is It Qualified Enough?," *J. Varidika - Variasi Pendidikan. is Licens. under a*, vol. 32, no. 1, pp. 117–124, 2020, doi: 10.23917/varidika.v32i1.
- [11] F. Bachrong and F. A. Ansar, "Religious moderation in karapasan the local culture of tana toraja community in south sulawesi," *Al-Qalam*, vol. 27, no. 1, p. 63, 2021, doi: 10.31969/alq.v27i1.973.
- [12] J. A. Abah, C. O. Iji, B. O. Abakpa, and P. I. Anyagh, "Design, implementation and assessment of a Web-Based ethnomathematics instructional content repository for mathematics teachers in Benue State, Nigeria," *J. Math. Sci. Teach.*, vol. 1, no. 1, p. em002, 2021, doi: 10.29333/mathsciteacher/11075.
- [13] T. G. Troxler *et al.*, "A system for resilience learning: developing a community-driven, multi-sector research approach for greater preparedness and resilience to long-term climate stressors and extreme events in the miami metropolitan region," *J. Extrem. Events*, vol. 08, no. 03, 2021, doi: 10.1142/s2345737621500196.
- [14] I. Noviandari, M. Balafif, and D. Aprilia, "Peran objek wisata lumpur lapindo Sidoarjo dalam meningkatkan pendapatan masyarakat," *Cakrawala J. Litbang Kebijak.*, vol. 15, no. 1, pp. 64–69, 2021, doi: 10.32781/cakrawala.v15i1.368.
- [15] F. Bazzanella, N. Muratore, P. A. Schlemmer, and E. Happ, "How the covid-19 pandemic influenced the approach to risk management in cycling events," *J. Risk Financ. Manag.*, vol. 14, no. 7, 2021, doi: 10.3390/jrfm14070296.
- [16] S. Syaharuddin, H. Susanto, and M. A. H. Putra, "Portrait of community economic activities in the river as a learning resources on social studies with local culture-based," *Innov. Soc. Stud. J.*, vol. 1, no. 2, p. 178, 2020, doi: 10.20527/iis.v1i2.2095.
- [17] A. Littleton and K. Guskiewicz, "Current concepts in sport concussion management: A multifaceted approach," *J. Sport Heal. Sci.*, vol. 2, no. 4, pp. 227–235, 2013, doi: 10.1016/j.jshs.2013.04.003.
- [18] J. P. Mihalik, R. C. Lynall, E. F. Teel, and K. A. Carneiro, "Concussion management in soccer," *J. Sport Heal. Sci.*, vol. 3, no. 4, pp. 307–313, 2014, doi: 10.1016/j.jshs.2014.07.005.
- [19] A. Timm *et al.*, "Promoting men's health through sports clubs: A systematic rapid realist review," *J. Sport Heal. Sci.*, vol. 14, p. 100969, 2024, doi: 10.1016/j.jshs.2024.100969.
- [20] L. M. Schwab Reese, R. Pittsinger, and J. Yang, "Effectiveness of psychological intervention following sport injury," *J. Sport Heal. Sci.*, vol. 1, no. 2, pp. 71–79, 2012, doi: 10.1016/j.jshs.2012.06.003.
- [21] H. Liu, W. E. Garrett, C. T. Moorman, and B. Yu, "Injury rate, mechanism, and risk factors of hamstring strain injuries in sports: A review of the literature," *J. Sport Heal. Sci.*, vol. 1, no. 2, pp. 92–101, 2012, doi: 10.1016/j.jshs.2012.07.003.
- [22] M. Lochbaum and J. Gottardy, "A meta-analytic review of the approach-avoidance achievement goals and performance relationships in the sport psychology literature," *J. Sport Heal. Sci.*, vol. 4, no. 2, pp. 164–173, 2015, doi: 10.1016/j.jshs.2013.12.004.
- [23] R. Li, "Why women see differently from the way men see? A review of sex differences in cognition and sports," *J. Sport Heal. Sci.*, vol. 3, no. 3, pp. 155–162, 2014, doi: 10.1016/j.jshs.2014.03.012.
- [24] X. Meng, L. Shi, L. Yao, Y. Zhang, and L. Cui, "Heartbeat electro-language: Exploring piezoelectric technologies for cardiovascular health monitoring," *Colloids Surfaces A Physicochem. Eng. Asp.*, no. Iii, p. 124658, 2020, doi: 10.1016/j.esci.2025.100436.
- [25] G. Sjøgaard *et al.*, "Exercise is more than medicine: The working age population's well-being and productivity," *J. Sport Heal. Sci.*, vol. 5, no. 2, pp. 159–165, 2016, doi: 10.1016/j.jshs.2016.04.004.
- [26] Y. Guo, H. Shi, D. Yu, and P. Qiu, "Health benefits of traditional Chinese sports and physical activity for older adults: A systematic review of evidence," *J. Sport Heal. Sci.*, vol. 5, no. 3, pp. 270–280, 2016, doi: 10.1016/j.jshs.2016.07.002.
- [27] L. N. Erickson and M. A. Sherry, "Rehabilitation and return to sport after hamstring strain injury," *J. Sport Heal. Sci.*, vol. 6, no. 3, pp. 262–270, 2017, doi: 10.1016/j.jshs.2017.04.001.
- [28] M. Caru, A. Levesque, F. Lalonde, and D. Curnier, "An overview of ischemic preconditioning in exercise performance: A systematic review," *J. Sport Heal. Sci.*, vol. 8, no. 4, pp. 355–369, 2019, doi: 10.1016/j.jshs.2019.01.008.
- [29] B. J. Stenner, J. D. Buckley, and A. D. Mosewich, "Reasons why older adults play sport: A systematic review," *J. Sport Heal. Sci.*, vol. 9, no. 6, pp. 530–541, 2020, doi: 10.1016/j.jshs.2019.11.003.
- [30] A. Vlahoyiannis, G. Aphamis, G. C. Bogdanis, G. K. Sakkas, E. Andreou, and C. D. Giannaki, "Deconstructing athletes' sleep: A systematic review of the influence of age, sex, athletic expertise, sport type, and season on sleep characteristics," *J. Sport Heal. Sci.*, vol. 10, no. 4, pp. 387–402, 2021, doi: 10.1016/j.jshs.2020.03.006.
- [31] C. Towlson *et al.*, "Maturity-associated considerations for training load, injury risk, and physical performance in youth soccer: One size does not fit all," *J. Sport Heal. Sci.*, vol. 10, no. 4, pp. 403–412, 2021, doi: 10.1016/j.jshs.2020.09.003.

- [32] J. Pérez-Gómez, J. C. Adsuar, P. E. Alcaraz, and J. Carlos-Vivas, "Physical exercises for preventing injuries among adult male football players: A systematic review," *J. Sport Heal. Sci.*, vol. 11, no. 1, pp. 115–122, 2022, doi: 10.1016/j.jshs.2020.11.003.
- [33] A. Zech *et al.*, "Sex differences in injury rates in team-sport athletes: A systematic review and meta-regression analysis," *J. Sport Heal. Sci.*, vol. 11, no. 1, pp. 104–114, 2022, doi: 10.1016/j.jshs.2021.04.003.
- [34] J. van Ierssel, K. F. Pennock, M. Sampson, R. Zemek, and J. G. Caron, "Which psychosocial factors are associated with return to sport following concussion? A systematic review," *J. Sport Heal. Sci.*, vol. 11, no. 4, pp. 438–449, 2022, doi: 10.1016/j.jshs.2022.01.001.
- [35] A. Konrad *et al.*, "Chronic effects of stretching on range of motion with consideration of potential moderating variables: A systematic review with meta-analysis," *J. Sport Heal. Sci.*, vol. 13, no. 2, pp. 186–194, 2024, doi: 10.1016/j.jshs.2023.06.002.
- [36] S. Faggian *et al.*, "Sport climbing performance determinants and functional testing methods: A systematic review," *J. Sport Heal. Sci.*, vol. 14, p. 100974, 2024, doi: 10.1016/j.jshs.2024.100974.
- [37] J. M. Schulz, L. Pohlod, S. Myers, J. Chung, and J. S. Thornton, "Are female athlete specific health considerations being assessed and addressed in preparticipation examinations? A scoping review and proposed framework," *J. Sport Heal. Sci.*, vol. 14, p. 100981, 2024, doi: 10.1016/j.jshs.2024.100981.
- [38] M. Pengelly, K. Pumpa, D. B. Pyne, and N. Etzebarria, "Iron deficiency, supplementation, and sports performance in female athletes: A systematic review," *J. Sport Heal. Sci.*, vol. 14, p. 101009, 2024, doi: 10.1016/j.jshs.2024.101009.
- [39] H. L. R. Souza *et al.*, "Does ischemic preconditioning enhance sports performance more than placebo or no intervention? A systematic review with meta-analysis," *J. Sport Heal. Sci.*, vol. 14, 2025, doi: 10.1016/j.jshs.2024.101010.
- [40] D. Jochum *et al.*, "The merit of superimposed vibration for flexibility and passive stiffness: A systematic review with multilevel meta-analysis," *J. Sport Heal. Sci.*, vol. 14, 2025, doi: 10.1016/j.jshs.2025.101033.
- [41] J. H. Kim, K. Lee, and Y. Kim, "Ethical implications of artificial intelligence in marketing: A systematic literature review," *J. Bus. Res.*, vol. 134, pp. 722–735, 2021, doi: 10.1016/j.jshs.2025.101047.
- [42] M. Waruwu, "Pendekatan penelitian pendidikan: metode penelitian kualitatif, metode penelitian kuantitatif dan metode penelitian kombinasi (Mixed Method)," *J. Pendidik. Tambusai*, vol. 7, no. 1, pp. 2896–2910, 2023, doi: 10.31004/jptam.v7i1.6187.
- [43] I. O. Pappas and A. G. Woodside, "Fuzzy-set qualitative comparative analysis (fsqca): guidelines for research practice in information systems and marketing," *Int. J. Inf. Manage.*, vol. 58, no. January, p. 102310, 2021, doi: 10.1016/j.ijinfomgt.2021.102310.
- [44] P. C. Susanto, L. Yuntina, E. Saribanon, and J. P. Soehaditama, "Qualitative method concepts : literature review , focus group discussion , ethnography and grounded theory," *Siber J. Adv. Multidiscip.*, vol. 2, no. 2, pp. 262–275, 2024, doi: /10.38035/sjam.v2i2.
- [45] A. Wutich, M. Beresford, C. SturtzSreetharan, A. Brewis, S. Trainer, and J. Hardin, "Metatheme Analysis: A Qualitative Method for Cross-Cultural Research," *Int. J. Qual. Methods*, vol. 20, pp. 1–11, 2021, doi: 10.1177/16094069211019907.
- [46] S. A. Dzogovic and V. Bajrami, "Qualitative Research Methods in Science and Higher Education," *Hum. Res. Rehabil.*, vol. 13, no. 1, pp. 156–166, 2023, doi: 10.21554/hrr.042318.
- [47] M. Irjayanti and L. Lord, "Operating a business with local wisdom: a grounded research of women in the creative industry," *Cogent Bus. Manag.*, vol. 11, no. 1, p., 2024, doi: 10.1080/23311975.2024.2392047.
- [48] H. Saleh, B. Surya, D. N. A. Ahmad, and D. Manda, "The role of natural and human resources on economic growth and regional development: With discussion of open innovation dynamics," *J. Open Innov. Technol. Mark. Complex.*, vol. 6, no. 4, pp. 1–23, 2020, doi: 10.3390/joitmc6040103.
- [49] C. L. Neely *et al.*, "Inclusive, cross-sectoral and evidence-based decision-making for resilience planning and decision-making in a devolved context," *Eur. J. Dev. Res.*, vol. 33, no. 4, pp. 1115–1140, 2021, doi: 10.1057/s41287-021-00410-3.
- [50] J. O. Jeon, J. Masunah, and T. Karyono, "Media Art Community Festival Based on Local Culture in Indonesia: An Ethnopedagogy Perspective," *J. Urban Cult. Res.*, vol. 28, pp. 248–267, 2024.
- [51] R. A. Mashami, S. Suryati, B. M. Harisanti, and Y. Khery, "Identification of local wisdom of the sasak tribe in chemistry learning as an effort to strengthen student character," *J. Penelit. Pendidik. IPA*, vol. 9, no. 1, pp. 337–345, 2023, doi: 10.29303/jppipa.v9i1.2434.
- [52] R. R. Krishnan, "A knowledge network for a dynamic taxonomy of psychiatric disease," *Dialogues Clin. Neurosci.*, vol. 17, no. 1, pp. 79–87, 2015, doi: 10.31887/dens.2015.17.1/rkrishnan.
- [53] R. Bertrand, H. Jonsson, I. Margot-Cattin, and B. Vrkljan, "A narrative analysis of the transition from driving to driving cessation in later life: Implications from an occupational lens," *J. Occup. Sci.*, vol. 28, no. 4, pp. 537–549, 2021, doi: 10.1080/14427591.2021.1879239.
- [54] T. Steimer, "Animal models of anxiety disorders in rats and mice: Some conceptual issues," *Dialogues Clin. Neurosci.*, vol. 13, no. 4, pp. 495–506, 2011, doi: 10.31887/dens.2011.13.4/tsteimer.
- [55] J. K. Nelson, "Cartography & geovisual analytics in personal contexts: designing for the data creator," *Int. J. Cartogr.*, vol. 9, no. 2, pp. 210–230, 2023, doi: 10.1080/23729333.2023.2189431.
- [56] C. W. Callaghan, "Contemporary HIV/AIDS research: Insights from knowledge management theory," *Sahara J.*, vol. 14, no. 1, pp. 53–63, 2017, doi: 10.1080/17290376.2017.1375426.
- [57] D. A. Adeniyi and M. F. Dinbabo, "Efficiency, food security and differentiation in small-scale irrigation agriculture: Evidence from North west Nigeria," *Cogent Soc. Sci.*, vol. 6, no. 1, 2020, doi: 10.1080/23311886.2020.1749508.
- [58] H. von Kürthy, K. Aranda, G. Sadlo, and G. Stew, "Embroidering as a transformative occupation," *J. Occup. Sci.*, vol. 30, no. 4, pp. 647–660, 2023, doi: 10.1080/14427591.2022.2104349.
- [59] S. Lovestone, "Fleshing out the amyloid cascade hypothesis: the molecular biology of Alzheimer's disease," *Dialogues Clin. Neurosci.*, vol. 2, no. 2, pp. 101–110, 2000, doi: 10.31887/dens.2000.2.2/slovestone.

- [60] I. Wenger, S. Kantartzis, H. Lynch, C. Schulze, and J. Jackson, "Making secret hiding places: An occupation of childhood," *J. Occup. Sci.*, vol. 31, no. 1, pp. 118–131, 2024, doi: 10.1080/14427591.2023.2240815.
- [61] R. C. Gur and R. E. Gur, "Memory in health and in schizophrenia," *Dialogues Clin. Neurosci.*, vol. 15, no. 4, pp. 399–410, 2013, doi: 10.31887/dcms.2013.15.4/rgur.
- [62] E. J. Crawford, E. C. Crook, L. Waldby, and P. Douglas, "New perspectives on responsive infant care: A qualitative study of the ways in which Neuroprotective Developmental Care (NDC) shapes mother-infant co-occupations," *J. Occup. Sci.*, vol. 31, no. 2, pp. 337–353, 2024, doi: 10.1080/14427591.2023.2236117.
- [63] C. Håkansson, A. B. Gunnarsson, and P. Wagman, "Occupational balance and satisfaction with daily occupations in persons with depression or anxiety disorders," *J. Occup. Sci.*, vol. 30, no. 2, pp. 196–202, 2023, doi: 10.1080/14427591.2021.1939111.
- [64] Y. Liu, R. Zemke, L. Liang, and J. M. L. Gray, "Occupational harmony: Embracing the complexity of occupational balance," *J. Occup. Sci.*, vol. 30, no. 2, pp. 145–159, 2023, doi: 10.1080/14427591.2021.1881592.
- [65] W. Kurevakwesu, E. Mthethwa, K. Chirangwanda, and T. Mabeza, "Parental perceptions towards reintegration of pregnant girls and teenage mothers into the education system in Zimbabwe," *Cogent Soc. Sci.*, vol. 9, no. 1, 2023, doi: 10.1080/23311886.2023.2186564.