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The Roles of Local Community in Sustainable Marine Resources Management: A Case Study of Tun Mustapha Park, Sabah

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ARTICLE INFO	ABSTRACT
<i>Article history:</i> Received April 2026 Revised June 2026 Published July 2026 <i>Keywords:</i> Marine Conservation, Tun Mustapha Park, Local community, Sustainability, Three Basic Pillars Corresponding Author's Email: ericabebek94@gmail.com <i>DOI:</i> https://doi.org/10.24191/VoA.v2i2.13440	This study focuses on the local community's roles in maintaining marine resource management, particularly at Tun Mustapha Park (TMP) in Sabah, Malaysia. This qualitative study is a systematic literature review, where key information was gathered and synthesised from secondary sources, including academic publications, non-governmental organisation papers, and official documents. Over 80,000 coastal residents and a wide variety of species call TMP, one of Southeast Asia's largest marine protected areas, home. However, overfishing, climate change, and unsustainable development pose threats to the area. The research also utilises the Three Basic Pillars Model as a community contribution. The results demonstrate how local actions, such as the restoration of 2,152 square meters of coral reef and the monitoring of turtle nests, where there has been a 50% decrease in poaching, have significantly improved ecological resilience. While economic alternatives like eco-tourism and sustainable livelihoods decreased dependency on damaging activities, social programs like photovoice and comic book campaigns increased awareness and empowered marginalised groups. Budget constraints and enforcement gaps are obstacles, highlighting the significance of inclusive policies and multi-stakeholder cooperation. According to the study, integrating traditional knowledge with contemporary techniques balances ecological health and community well-being while fostering long-term conservation success.

1.0 INTRODUCTION

Tun Mustapha Park (TMP) which covers more than 1 million hectares in Sabah, Malaysia, is not only one of the biggest marine protected areas in southeast Asia but it is also an essential lifeline for the local community (world wildlife fund, 2017). thousands of fishermen and indigenous tribes depend on its rich coral reefs, seagrass beds, and mangrove forests for their livelihoods, and they also support an amazing diversity of marine life. the park's creation will make it easier to carry out focused conservation efforts that will benefit the local population and the environment in one of the most biodiverse marine habitats on earth (world wildlife fund, 2016). however, effective conservation approaches are more critical than ever as the consequences of overfishing, climate change, and unsustainable development worsen (world wildlife fund, 2017).

2. LITERATURE REVIEW

Sustainability Development Concept

The concept of sustainable development has been extensively discussed, with many formulations emphasising different features. The Brundtland Commission defines sustainable development as fulfilling

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present demands without jeopardising future generations' ability to meet their own (Emas, January 2015). This definition is the most commonly used. The study's broad interpretation highlights the intergenerational equality principle, which distinguishes traditional environmental policies from sustainable development strategies. Traditional environmental policies primarily aim to internalise environmental externalities (Dernbach J.C., 1998; Dernbach J.C., 2003). The Brundtland concept establishes a fundamental ethical framework for sustainability discourse by emphasising long-term resource protection.

Furthermore, McBride Sustainability (2024) defines sustainable development as a complete plan that incorporates social advancement, economic growth, and environmental preservation. Their formulation reinforces the idea that, while balancing present socioeconomic demands, prudent resource management is required to ensure availability for future generations. Crucially, they argue that achieving sustainability entails making decisions that include social, economic, and environmental factors all at once, a process that requires long-term dedication and systemic integration. Dernbach (2003) and Stoddart (2011) argue that integrated decision-making is at the heart of sustainable development frameworks. Policies run the risk of preferring one feature over another in the absence of such integration, jeopardising sustainability.

Environmental sustainability is fundamentally concerned with the natural environment's resilience and productivity in supporting human life. According to Brodhag and Taliere (2006), this idea is integrally tied to biosphere carrying capacity and ecological integrity. The second pillar is social sustainability. Daly (1992) describes equity as a complex notion that encompasses empowerment, participation, accessibility, cultural identity, and institutional sustainability. By including environmental stewardship and social equity in development methods, social sustainability becomes a critical foundation for ensuring that poverty alleviation efforts are both equitable and long-term. This viewpoint underlines the interconnectedness of ecological systems and human society, emphasising the significance of acting within ecological boundaries in order to preserve a sustainable equilibrium. Third, economic sustainability. According to Lobo, Pietriga, and Appert (2015), economic sustainability is primarily a manufacturing system that serves present customer demands without jeopardising future ones. Due to the historical assumption that natural resources were infinitely available, economists have placed insufficient emphasis on market processes to optimally allocate resources (Du & Kang, 2016). Furthermore, it was widely assumed that economic success would eventually drive technological advancement, allowing natural resources used during manufacture to be restored.

Conservation

According to the International Union for Conservation of Nature and Natural Resources (1980), conservation is the management of human use of the biosphere so that it can provide the greatest long-term benefit to current generations while also meeting the needs and aspirations of future generations. According to the World Wildlife Fund-International (2019), conservation can be defined as the preservation of the world's biological diversity to halt the degradation of the planet's natural environment and construct a future in which humans coexist with nature.

Leap (2019) stated there are four major categories of conservation that contribute to the health of the world. First, there's environmental conservation. The Leap team states that the environment is being used in a sustainable manner and will not be harmed. Second, consider animal conservation. It is a practice of preserving endangered wild animal species and their habitats. Third, consider marine conservation. According to Leap (2019), marine conservation is about protecting the creatures and ecosystems that dwell in the oceans and seas. Last but not least, human conservation. Human conservation refers to the issue faced by human and the needs of certain procedures are needed in order to keep them alive, such as educating them about climate change and teaching them to use eco-friendly methods. Dudley, Shadie, and Stolton (2008), added that conservation areas are classified into seven types. Conservation areas are classified into seven categories: Category 1 (a) for strict nature reserves or wilderness protection areas, Category 1 (b) for wilderness areas, Category II for National Parks, Category III for natural monuments, Category IV for habitat or species management, Category V for protected landscapes or seascapes, and the Managed Resources Protected Area. This research focuses on marine conservation management within the protected landscape region

Three Basic Pillars

The United Nations World Summit (2005) stated that the "three-pillar basic model" is probably the best-known model of sustainable development. The three fundamental pillars of strategy normally take into account three aspects: "social, economic, and environmental resources" (WCED, 1987). This paradigm asserts that when all three pillars work together, sustainable development is achieved. The goal of social sustainability is to protect future generations and foster just communities in order to preserve and build social capital. It comprises sponsoring initiatives that sustain social structures while developing a greater understanding of globalisation, cultures, and communities, according to Future Learn (2002).

Second, economic sustainability aims to preserve capital while improving living conditions and ensuring long-term profitability through resource efficiency. The UK Government's Annual Report (2000, 2001) emphasises the importance of consistent economic growth for long-term development, but it also emphasises the need to quantify and analyse progress. However, one key weakness in traditional accounting methods is the failure to reflect environmental costs when setting market pricing, which has led to criticism of traditional economic models (Hawking, 2010). Third, consider environmental sustainability. It focuses on maintaining natural resources such as air, water, land, and minerals while ensuring that current use does not threaten the needs of future generation.

Marine Park

Marine Park is a sea area designated as a sanctuary for the protection of marine ecosystems, particularly coral reefs and their associated flora and fauna, such as seagrass beds, mangroves, and seashores (Kenchington et al., 2003). Furthermore, the primary goal of Malaysia's marine parks has been to safeguard particular biological and environmental resources (Ali et al., 2013). However, open access to marine park resources, combined with the market system's failure to limit their use, has resulted in overuse and environmental degradation (Ali et al. 2013). Furthermore, environmental degradation, such as declining fish stocks and exploitation of breeding grounds, loss of habitat for marine life and coral reef destruction, habitat degradation, and water quality degradation, are the primary threats to ecotourism's long-term viability. (Ali et al. 2013).

According to Kaur (2007), Malaysia's Marine Parks are established by the Fisheries Act of 1985, specifically Part IX of Marine Parks and Marine Reserves, sections 41 to 45. This Act intends to safeguard marine life from any form of concerns related to island development and activities on or around the island (Sazali, Azlan, & Mohamed, 2013). Other marine park-related statutes include the Great Barrier Reef Marine Park Act 1975, the Establishment of Marine Parks Gazette 2012, the Malaysia Marine Parks Act Validation Fi Year 2004, and the Act 1951 of Fee Fi Marine Park Malaysia Year 2003 (Sazali, Azlan, & Mohamed, 2013). According to Sazali, Azlan, and Mohamed (2013), Malaysia's marine parks are similar to Pulau Redang and Pulau Perhentian in Terengganu, the Payar Islands in Kedah, the Tioman Islands in Pahang, and the islands of Pulau Tinggi in Johor. These are among Malaysia's best marine parks, with a large number of visitors, in addition to having the best island tourism development (Sazali, Azlan, & Mohamed, 2013).

Tun Mustapha Park (TMP)

According to Johari et al. (2017), Sabah is part of the Coral Triangle, a region with rich marine biodiversity that extends beyond the Sulu Sulawesi Marine Ecoregion to include the waters off the southern Philippines, eastern Indonesia, Sabah, east Malaysia, and other South Pacific seas. According to Sabah Parks (2019), Tun Mustapha Park (TMP) was granted Cabinet status in March 2003 under the Parks Enactment of 1984. Furthermore, the establishment of Tun Mustapha Park (TMP), an 898,762.76-hectare multiple-use protected area in the northern portion of Sabah, is one of the most significant attempts to manage the region's resources (World Wildlife Fund, 2017).

The State Government granted the request to gazette the Park in 2003, because of a shared vision between the State of Sabah and Universiti Malaysia Sabah (UMS) (Liew-Tsonis et al., 2012). Since then, the World Wildlife Fund for Nature (WWF-Malaysia) and Sabah Parks have performed a number of socioeconomic and scientific

studies, as well as community forums, to build support and awareness for the proposed park establishment (Johari et al, 2017). The Park was officially designated as a multiple-use protected area in May 2016, following nearly 12 years of effort and collaboration.

This massive park, designated as a Category VI multiple-use protected area by the International Union for the Conservation of Nature (IUCN), supports around 80,000 people on the coastal mainland and more than 50 islands. The TMP covers Sabah's three northernmost districts, Kudat, Kota Marudu, and Pitas (WWF Malaysia, 2017).

Furthermore, TMP is Malaysia's largest multipurpose marine protected area, home to one of the world's most diverse marine wildlife and plant communities. The TMP aims to protect the integrity of the region's important marine resources, which benefit the community and are sustainably used, as well as the region's globally unique marine biodiversity.

In 2008, fishing accounted for 22% of total marine fisheries production in Sabah, making it the region's primary economic sector (PE Research, 2011). The live reef fish trade, long-line, and small-scale artisanal fisheries are vital for local livelihoods, despite the fact that trawl and purse seine fisheries are the most prevalent. Overfishing, destructive fishing, unsustainable coastal land use, and the illicit capture of sea turtles and their eggs are all examples of human actions that endanger habitats and marine life.

Furthermore, pollution, damaging fishing methods, and overfishing pose major threats to TMP, despite its rich biodiversity (World Wildlife Fund, 2017). Several endangered species include marine turtles such as *Chelonia mydas*, *Eretmochelys imbricata*, and *Lepidochelys olivacea* (Dumaup et al., 2003), humpback whales known as *Megaptera novaeangliae*, otters known as *Lutra perspicillata*, and dugongs. Thus, TMP will surely become a marine park of national and worldwide significance as a result of the park's concept of a controlled, multipurpose area with protected areas, tourism, artisanal fishing, and commercial fishing (Sabah Park, 2019).

Issues in Tun Mustapha Park (TMP)

Several community-related issues have been identified within Tun Mustapha Park, including exclusion from preservation zones near villages, reliance on fish for livelihoods, a perceived lack of collaborative management, economic pressure from commercial fishing, destructive fishing methods, encroachment by outsiders, mangrove degradation, plastic pollution, and climate and environmental change.

First, exclusion from preservation zones near villages. According to Jumin et al. (2017), residents expressed concerns during stakeholder conversations about the relocation of preservation zones, which took place away from coastal areas and settlements with different habitats. These actions have an impact on people's lives by undermining conservation goals and limiting access to crucial fishing areas (Jumin et al., 2017). Second, people's livelihoods are based on fishing. Moreover, half of the Park's 187,000 residents make their life and livelihood from marine resources. Fish breeding grounds, which are critical for the survival of local fisheries, are jeopardised when nearshore habitats such as mangroves and seagrass beds are removed from preservation zones (Department of Statistics Malaysia, 2010). Furthermore, overfishing has a negative effect on marine resources. Communities are transitioning to eco-tourism, such as homestays and guided tours, but they require government support, such as training and funding, to ensure sustainability (Lim et al., 2021; WWF-Malaysia, 2017).

Third, there is a perceived lack of collaboration in management. This is happening because the Sabah Parks Enactment prohibits collaborative governance, and local communities and government groups have questioned the Park's management effectiveness. Opposition to the inclusion of specific coastal areas in the Park hampered conservation efforts (Binson, 2014; Thandauthapany, 2008). In addition, certain villages, such as Pitas, were excluded from TMP's initial zoning negotiations, leading to mistrust and ineffective conservation measures. Lim et al. (2021) argued that inclusive decision-making and capacity building are essential for better stewardship. Furthermore, despite zoning laws, illicit activity persists due to insufficient enforcement. Communities encouraged officials and locals to be more involved in monitoring (Lim et al., 2021). Finally, stakeholders were not fully involved in early planning. Communities were not included until much later in the zoning process,

resulting in mistrust and subpar conservation outcomes. Early engagement may have resulted in higher acceptability of no-take zones and other measures (Beger et al., 2015; Weeks et al., 2014).

Fourth, economic pressures from commercial fishing. This can be explained by the fact that trawl operators resisted limits in multiple-use zones due to financial concerns about boat and equipment debt. This debate highlights the conflict between local fishermen's economic survival and conservation goals (Cinner et al., 2009; McNally et al., 2011). Fifth, harmful techniques of fishing. Local residents have expressed worry over unsustainable fishing tactics such as fish bombing and cyanide fishing, which destroy coral reefs and seagrass meadows. These acts endanger livelihoods based on small-scale fishing by reducing fish numbers and degrading habitat. To put an end to these behaviours, communities underlined the need for stricter regulations and alternative forms of income (Lim et al., 2021; Jumin et al., 2018). Sixth, outsider intrusion. Communities have reported encounters with non-local fishermen invading their traditional fishing grounds using destructive tactics such as purse seining and compressor fishing. Food security is jeopardised, and resource depletion is exacerbated. Locals advocated for stronger zoning enforcement and patrols to protect their rights (Lim et al., 2021).

Next, degradation of mangroves. Shrimp aquaculture and land clearing endanger mangroves, which are crucial for coastal protection and nursery habitats. Participants reported that habitat loss and water pollution had an influence on fish populations. Communities emphasised the importance of restoration projects and sustainable aquaculture techniques (Lim et al., 2021; Lee et al., 2018). Pollution from plastics is another concern where poor waste management methods harm marine life and tourism potential by accumulating plastic litter on shores, particularly on Banggi Island. Communities demanded improved garbage disposal facilities and awareness programs (Lim et al., 2021). Finally, climate and environmental change. Riverine mangroves are drying up, and coastal erosion has been linked to changed water flow and sedimentation, both of which affect fishing. Locals underlined the need for adaptive management, such as mangrove restoration, to mitigate these effects (Lim et al., 2021).

The Roles of the Local Community in Marine Conservation

Cobigo, Martin, and Mcheimech (2016) define a community as a group of people who connect and support one another through shared experiences, qualities, a sense of belonging, and, in many cases, geographic proximity. They also argued that there are 13 critical elements for establishing community, the most important of which are geographic proximity, shared traits, group dynamics, bounded relationships, interaction, belonging, and support. Furthermore, they emphasise that, while geographical location has traditionally been a key characteristic of community, new definitions include territory-free communities such as online networks, emphasising the dynamic nature of human interactions (Cobigo, Martin, & Mcheimech, 2016).

PHAROS (2024) added that our oceans contain a varied spectrum of species that support life on Earth in ways that we are only beginning to understand. The seas are actually our planet's lifeblood, regulating the temperature and producing oxygen while also providing livelihoods and food security to millions (PHAROS, 2024). Nonetheless, they face persistent threats including overfishing, pollution, climate change, and habitat destruction. Despite these restrictions, locals have emerged as important collaborators in marine conservation, driven by a strong connection to the ocean and a growing sense of stewardship (PHAROS, 2024). PHAROS (2014) further added that local communities use a range of strategies, such as traditional knowledge, cooperative management, sustainable livelihoods, citizen research, and awareness-raising initiatives, to play a significant role in maritime conservation throughout Europe.

IUCN (2024) stated that many coastal areas have modified traditional fishing methods to support sustainability. For example, Spain's Mediterranean almadra technique, which has been improved to stop tuna overfishing, shows how traditional methods, when paired with contemporary science, can help protect fish populations and marine biodiversity. Additionally, as demonstrated in the Ligurian Sea, community-led Marine Protected Areas (MPAs) have grown in popularity. Local stakeholders, such as fishermen and environmental organisations, work together to manage these zones, guaranteeing both ecosystem protection and sustainable resource use for neighboring populations (Gornjac, 2024). As seen by Turkish fishing towns in Gökova Bay, which have embraced eco-tourism and responsible fishing, communities are moving beyond conservation efforts to more

sustainable livelihoods that support economic stability and lessen the strain on marine environments (Moore & Kumble, 2024). Citizen science projects boost conservation by allowing Baltic Sea residents to monitor fish stocks and pollution, providing critical data for scientific research and policy decisions (Moore & Kumble, 2024). Finally, grassroots organisations in locations like the North Sea operate educational programs to encourage marine stewardship, empowering people to support ocean health and execute long-term sustainable practices, thereby fostering a common commitment to safeguarding marine ecosystems (Gornjac, 2024).

In Malaysia, however, the local population makes considerable contributions to marine conservation through a range of projects, as evidenced by Reef Check Malaysia's 2025 report (Chelliah et al., 2025). One of their most notable contributions is active participation in Community Marine Conservation Groups (CMCGs), which were established to include locals in marine resource management. For example, the Tioman Marine Conservation Group (TMCG), founded in 2015, engages community people in coral reef surveys, bleaching monitoring, and ghost net removal (Reef Check Malaysia, 2025). Reef Check Malaysia's training programs support these efforts by teaching locals scuba diving, Reef Check EcoDiver certification, and coral reef rehabilitation.

Local communities also serve as valuable informants for reef managers, reporting hazards such as coral bleaching, oil spills, and damaged buoy lines. Their involvement encourages timely responses to environmental threats, as seen during the COVID-19 epidemic, when CMCGs continued conservation work despite travel restrictions (Reef Check Malaysia, 2025). Furthermore, Sabah Parks has appointed some members, such as those on Selakan Island, as Honorary Park Rangers, who will assist with park enforcement and maintenance under the Parks Enactment of 1984.

The community-based approach has also developed links with government agencies, including the Department of Fisheries Malaysia (DoF), under the Reef Care Smart Partnership program, which launched in 2019. This collaboration has expanded conservation efforts to encompass Redang, Mabul, and Mersing, with CMCGs conducting over 188 coral reef assessments and 226 restoration projects between 2023 and 2024 (Reef Check Malaysia, 2025). Furthermore, homeowners have helped to promote eco-tourism by supporting sustainable practices, including eco-friendly snorkel guide training and "adopt a coral" initiatives, which also serve as fundraising tools. Overall, the local population plays a diverse role in Malaysian maritime conservation, including direct conservation activities, stakeholder involvement, and sustainable resource management, according to the 2025 study. Their involvement not only promotes marine preservation but also fosters social and ecological resilience, which is consistent with national and global conservation goals (Chelliah, 2025).

3. RESEARCH METHODOLOGY

This study examines the three fundamental pillars used to evaluate the local community's responsibilities in sustaining Tun Mustapha Park's (TMP) maritime resources. The pillars are social, economic, and environmental. According to the United Nations World Summit (2005), the "three-pillar basic model" is likely the most well-known model of sustainable development. The three essential pillars method typically considers three aspects, such as "social, economic, and environmental resources" (WCED, 1987).

This study employed a qualitative document analysis methodology. The research was conducted by using a systematic review of secondary sources, with the conceptual approach guided by three fundamental pillars. Data were collected from a wide range of peer-reviewed journal papers on marine conservation, community-based management, and sustainability frameworks. The review also included studies and publications from non-governmental groups that are actively involved in the research region, such as the World Wildlife Fund for Nature (WWF-Malaysia) and Reef Check Malaysia. Official government records and policies from Sabah Parks and was also studied. The data from these sources was combined and thematically analysed using the Three Basic Pillars framework to better understand the local community's contributions to marine conservation at Tun Mustapha Park.

Purvis, Mao, and Robinson (2019) identify three primary pillars of sustainability: environmental, social, and economic. The environmental pillar is centred on the preservation and conservation of ecosystems, biodiversity,

and natural resources. Purvis, Mao, and Robinson (2019) underline the importance of ecological integrity and resilience in ensuring long-term planetary health. Secondly, the social pillar. This pillar emphasises human needs, equity, social justice, and cultural variety. It highlights the importance of meeting basic needs, fostering participation, and ensuring the quality of life for present and future generations (Purvis, Mao, & Robinson, 2019).

Finally, the economic pillar. It prioritises economic development, prosperity, and equitable resource allocation. However, interpretations vary, with some critics calling for systemic changes to align economic activity with environmental and social goals (Purvis, Mao, & Robinson, 2019).

4. FINDING AND ANALYSIS

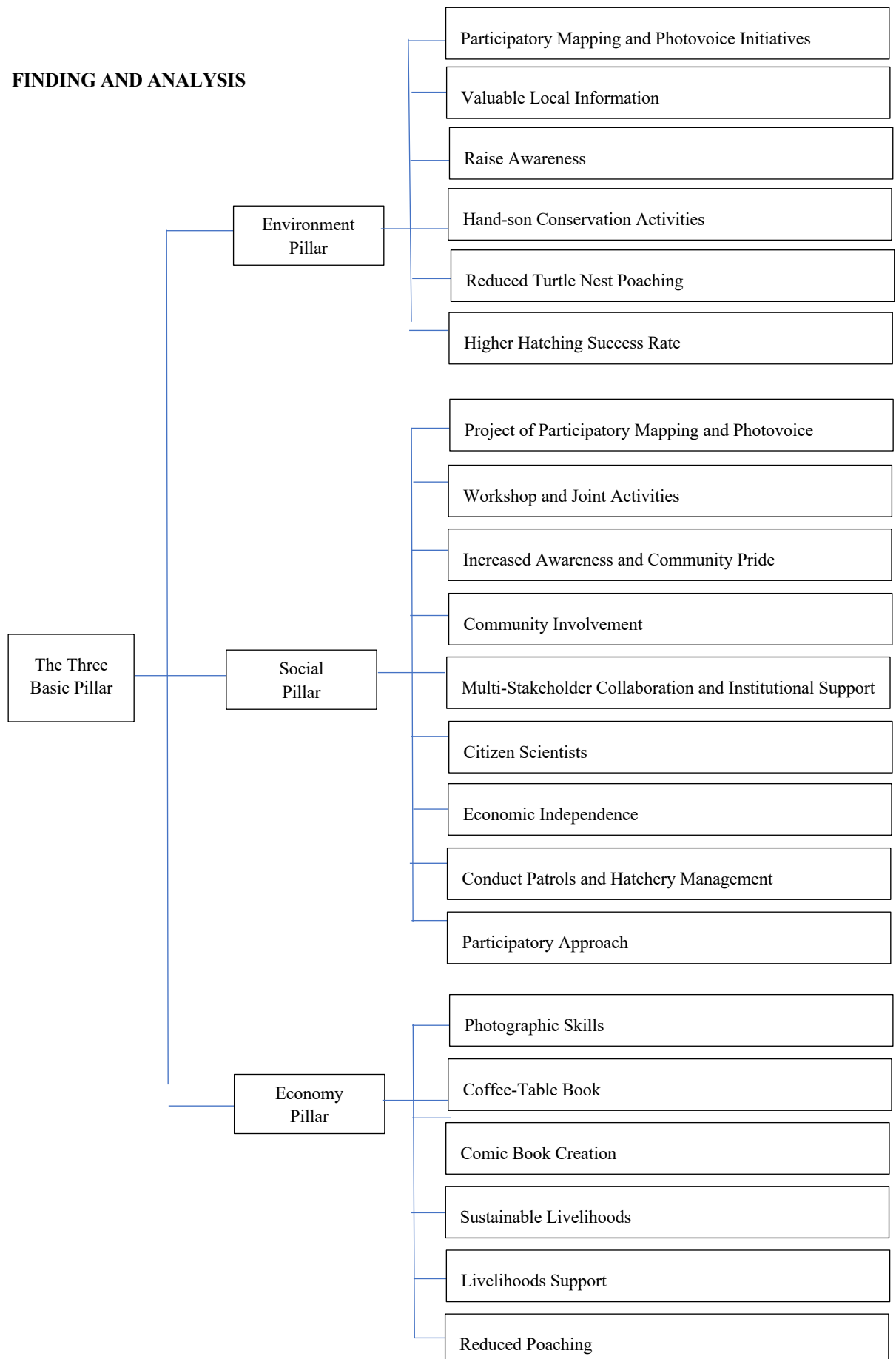


Diagram 1: The Three Basic Pillars of Sustainable Development (SD)

Roles of the Local Community in TMP Sustainable Development

Malaysia's local community has played a vital role in marine conservation, particularly at Tun Mustapha Park (TMP), Sabah, through collaboration with government agencies, non-governmental organisations (NGOs), and other stakeholders. They help to restore coral reefs, protect sea turtles, promote sustainable livelihoods, and conduct active patrols and monitoring. Community members, for example, have revitalised degraded reefs by deploying 1,600 coral frames and restoring 22,000 coral fragments across 2,152 square meters, resulting in a significant increase in Live Coral Cover. Furthermore, the Kekal Asli Tigabu group has reduced turtle nest poaching by 50% through careful monitoring and hatchery management, resulting in higher hatchling survival rates (WWF-Malaysia, 2024).

Lim (2022) claimed that in the environmental pillars, participatory mapping and photovoice efforts documented maritime habitats and ecosystem services from the perspective of communities, thereby contributing to environmental conservation. Furthermore, their engagement provided significant local information for the scientific understanding of the park's socio-ecological dynamics. Furthermore, their findings on fish bombing were made into an educational comic book, raising children's understanding of marine conservation issues (Lim, 2022). Aside from that, locals in Tun Mustapha Park (TMP), Sabah, contribute significantly to the protection of marine biodiversity through hands-on conservation efforts. Since 2016, community-led coral restoration programs have rebuilt 2,152 square meters of damaged reefs with 1,600 coral frames and 22,000 coral fragments from over 30 species, resulting in a significant increase in Live Coral Cover.

Additionally, the Kekal Asli Tigabu group has reduced turtle nest poaching by 50% through meticulous monitoring and hatchery management, resulting in increased sea turtle hatchling survival rates (WWF-Malaysia, 2024). These activities show how local stewardship directly enhances ecological resilience. Furthermore, Malaysians play an essential part in marine conservation by actively monitoring and protecting endangered species such as marine turtles. For example, from 2009 to 2020, community members trained as Honorary Wildlife Wardens and Park Rangers patrolled the beach and documented Green, Hawksbill, and Olive Ridley Turtle nesting activities (Jolis et al., 2023). Furthermore, these operations produced crucial data on nesting seasons, hatchling survival, and poaching concerns, enabling more targeted conservation strategies. Furthermore, communities maintain hatcheries to relocate vulnerable nests, resulting in 75.7% hatching success rates for Green Turtles despite obstacles such as low egg depth and poaching (Jolis et al., 2023). Such initiatives show how local knowledge and labour may directly promote biodiversity conservation.

Second, the social pillar. Participatory mapping and photovoice projects enhance social inclusion by actively engaging youth and women, who have historically been underrepresented in social research (Lim, 2022). The project encouraged social inclusion by actively engaging historically underrepresented groups in research, such as teenagers and women. Through workshops and collaborative events, these organisations aired their differing viewpoints, fostering community connections and strengthening underprivileged members. The distribution of 300 comic books to students at Tun Mustapha Park raised environmental awareness (Lim, 2022). Furthermore, community involvement includes social development and education, in addition to conservation efforts. Local fishermen have become citizen scientists, assisting with patrols and data collection, combining traditional wisdom with modern conservation (WWF-Malaysia, 2024). Women's groups such as LA'NU have achieved economic independence through sustainable soap-making, donating 10% of their revenues (RM3,000) to conservation funds while promoting gender equality (WWF Malaysia, 2024). These programs encourage social cohesion and long-term community involvement in marine resource protection. Furthermore, community-based monitoring fosters social bonds and raises environmental consciousness. Since 2009, contacts between NGOs like WWF-Malaysia, government agencies, and Tun Mustapha Park residents have strengthened trust and shared responsibility for conservation (Jolis et al., 2023). Locals were empowered to perform patrols and manage hatcheries through training programs such as those offered by the Sabah Wildlife Department, establishing conservation ideals in community norms. This participative strategy also overcomes generational knowledge gaps, assuring long-term

sustainability. For example, remarks from untrained residents on unmonitored beaches like Hibiscus on Malawali Island supplemented official data, indicating widespread engagement (Jolis et al., 2023).

Finally, there's the economics. While the planned coffee-table book that would generate pay for participants did not materialize because of a low response, the project provided indirect financial benefits. Throughout the lessons, participants developed photographic abilities, which could lead to increased work opportunities. The comic book development, supported by the grant and Universiti Malaya Publisher, also aided local dissemination campaigns, while the direct financial advantages to communities were minor. Through workshops and collaborative events, these organisations aired their differing viewpoints, fostering community connections and strengthening underprivileged members. The distribution of 300 comic books to schools in Tun Mustapha Park and Klang Valley raised environmental consciousness and community pride (Lim, 2022). Furthermore, sustainable livelihoods have been integrated into conservation through eco-friendly companies and other economic streams. LA'NU's soap-making enterprise demonstrates how environmental stewardship may generate revenue while reducing reliance on unsustainable fishing methods (WWF-Malaysia, 2024).

Furthermore, TMP's pursuit of IUCN Green List accreditation increases ecotourism potential by creating jobs and fostering equitable benefits for local communities (WWF Malaysia, 2024). This economic incentive ensures that conservation is a viable and appealing option for coastal towns. Furthermore, marine conservation activities benefit livelihoods through sustainable tourism and fishing. In Tun Mustapha Park, community patrollers and hatchery operators frequently receive stipends or equipment, giving financial incentives for conservation (Jolis et al., 2023). Reduced poaching, driven by alternative income sources, benefits both ecosystems and local economies. For example, lower egg poaching rates, which account for 18.8% of Green Turtle nests poached in monitored areas, are associated with increased tourism earnings from turtle-watching activities (Jolis et al., 2023). Furthermore, agreements with the Kudat Turtle Conservation Society show how conservation can diversify revenue streams while preserving traditional ties to marine resources.

Local communities in Malaysia integrate environmental, social, and economic benefits into marine conservation activities. Their contributions, which range from data collection to ecotourism, emphasise the importance of inclusive policies that balance ecological goals with community well-being, as evidenced by longitudinal studies such as Jolis et al. (2023). Partnerships must be strengthened to ensure long-term success.

5. DISCUSSION AND CONCLUSION

Discussion

The findings of this literature review highlight the crucial role of Malaysian communities, particularly those in Tun Mustapha Park (TMP), Sabah, in promoting marine conservation through environmental, social, and economic efforts. The synthesis of evidence from diverse sources shows that communities are active agents of change, contributing to all three pillars of sustainable development. This discussion evaluates the findings, discusses their relevance, connects them to previous literature, and contrasts them with other worldwide situations.

Environmental Pillar: Community-Led Conservation and Ecological Outcomes

The study reveals that community-led environmental actions have resulted in measurable ecological benefits in the TMP. The deployment of 1,600 coral frames and restoration of 22,000 coral pieces across 2,152 square meters resulted in considerable increases in Live Coral Cover (WWF-Malaysia, 2024), demonstrating the efficacy of community-led restoration when assisted by external organisations. This finding is consistent with the larger literature on community-based conservation, which suggests that when properly resourced and trained, local stewardship can produce tangible ecological outcomes on par with professionally managed restoration projects (Gornjac, 2024; Moore & Kumble, 2024).

However, this study adds richness to our understanding by demonstrating that, while environmental initiatives have been successful, they exist in the context of persistent threats. The literature assessment revealed persisting concerns such as overfishing, damaging fishing methods, pollution, and the effects of climate change (World Wildlife Fund, 2017; Lim et al., 2021). This finding is consistent with Ali et al. (2013), who stated that free access

to marine park resources, along with market system failings, has resulted in misuse and environmental degradation throughout Malaysia's marine parks. The documenting of fish bombing and cyanide fishing in TMP (Lim et al., 2021; Jumin et al., 2018) supports Boey et al.'s (2018) worries regarding the persistence of damaging practices despite conservation initiatives.

In comparing TMP's environmental outcomes with the Raja Ampat Archipelago in Indonesia, both TMP and Raja Ampat, situated within the Coral Triangle, face similar threats, including destructive fishing and climate change. TMP's community-driven strategy is different from Raja Ampat's MPA network, which was founded in 2007 by government proclamation (Xue, 2023). However, 74% of fishermen report declining catches, with blast fishing (62%) and cyanide fishing (41%) cited as the main causes (Larsen et al., 2018). Raja Ampat has concurrent enforcement issues. Threats associated with tourism that are shared by both areas are highlighted by the 2017 MS Caledonian Sky incident, which destroyed 19,000 square meters of coral (Nogueira, n.d.). TMP's photovoice and participatory mapping programs are examples of innovative monitoring strategies that are not as widely used in Raja Ampat.

Social Pillar: Community Empowerment and Social Inclusion

The social aspects show how conservation promotes inclusive governance and societal cohesiveness. In line with Purvis, Mao, and Robinson's (2019) focus on equity and participation, photovoice and participatory mapping involved women and youth, populations historically underrepresented in conservation research (Lim, 2022). 300 educational comic books were distributed to promote environmental awareness (Lim, 2022), while LA'NU's soap business, which spent 10% of its income in conservation, encouraged gender equality and economic independence (WWF-Malaysia, 2024). Community-based monitoring bridged generational knowledge gaps and improved social ties (Jolis et al., 2023).

Although having a smaller population of about 49,000 (Nogueira, n.d.) than TMP, which is 80,000 population, both marine parks struggle to manage conservation in populated areas. TMP's strategy is similar to that of the Raja Ampat Research & Conservation Centre, which works with indigenous tribes on independent conservation efforts (Xue, 2023). However, different governance dynamics are produced by the tourism-dominated economy of Raja Ampat. Studies reveal that local fishermen in Raja Ampat reported detrimental effects from MPAs (Larsen et al., 2018), which is similar to TMP's difficulties with community acceptance and perceived lack of cooperative management (Binson, 2014; Thandauthapany, 2008).

Economic Pillar: Sustainable Livelihoods and Conservation Incentives

The economic aspects of TMP's conservation efforts show how environmental care may improve livelihoods while lowering reliance on unsustainable practices. LA'NU's soap-making firm (WWF-Malaysia, 2024) serves as an example of how enterprises connected to conservation can offer alternative revenue streams and lessen the strain on marine resources. The idea of economic sustainability put forth by Lobo, Pietriga, and Appert (2015), which emphasises manufacturing systems that meet current requirements without jeopardising the ability of future generations to meet their own needs, is supported by this study.

However, the study also identifies difficulties in turning conservation efforts into direct economic gains. The proposed coffee-table book, which would have generated revenue for participants, did not materialise due to a poor response (Lim, 2022), underlining the challenges of building long-term financial methods for community conservation. Indirect financial rewards, such as photography skill improvement, may add to future employment chances, but they do not give immediate economic incentives. This study indicates that economic sustainability in community-based conservation requires careful consideration of business model development and market access.

Raja Ampat's tourism economy, which began with the first diving resort in 1994 (Nogueira, n.d.), exemplifies ecotourism's potential. However, COVID-19's influence showed tourism vulnerability, leading some communities to mine nickel (Nogueira, n.d.). Raja Ampat's Marine Park fee, necessary for visitor access (Nogueira, n.d.), provides a financial method informative for TMP; nonetheless, effectiveness relies on transparent governance.

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Integration of the Three Pillars: A Framework for Interdependence

The findings show a strong relationship between the environmental, social, and economic pillars. Weak enforcement encourages damaging practices, destroying habitats, reducing fish stocks, lowering community income, and causing tension between residents and park management. In contrast, integrated interventions provide positive feedback where LA'NU's soap-making firm gives economic independence while also reducing unsustainable fishing dependency and empowering women. This lends support to the theoretical position that pillar-specific interventions should be replaced by integrated policy responses (Purvis, Mao, & Robinson, 2019).

The comparison to Raja Ampat emphasises the significance of integrated approaches. The Raja Ampat example indicates that conservation strategies that focus solely on environmental protection without proper consideration for social and economic components may face opposition from residents. In contrast, initiatives that offer economic opportunities through ecotourism while retaining social inclusion have demonstrated greater sustainability. The Raja Ampat Research approach to involving indigenous communities in financially self-sufficient projects and small businesses that promote conservation (Noqueira, n.d.) exemplifies the integration of economic and social goals with environmental conservation.

Contribution of the Study

There are several contributions of this study, which are in terms of empirical, contextual and theoretical. Firstly, in terms of empirical evidence, the study presents evidence from literature findings of community conservation effectiveness where the restoration of 2,152 square metres of coral reef, a 50% drop in turtle poaching, and social benefits such as women's empowerment and youth participation through educational programs. These findings strengthen the empirical base for community-based natural resource management.

On the other hand, in terms of context. This study offers unique information from a highly populated, multiple-use MPA in Sabah, showing how the 80,000 resident population significantly influence conservation feasibility. In areas where locals reside and depend on park resources, community involvement in enforcement is essential. The study also describes the challenges faced in managing a one-million-hectare region spread over 50 islands and three districts, where logistical limitations lead to gaps in enforcement (Boey et al., 2018). A comparison with Raja Ampat reveals how population distribution and geographic scale impact conservation outcomes, providing information pertinent to large-scale MPAs throughout the Coral Triangle.

Finally, the study enhances the three-pillar model by clearly showing how a weakness in one pillar impacts the others and how integrated interventions produce positive feedback. Participatory mapping and photovoice demonstrate how local knowledge can be translated into conservation action, supporting community-based natural resource management theory.

Limitations of the Study

There are some limitations to consider when reviewing the study's findings. First, the study relied heavily on literary sources rather than gathering primary data from all stakeholder groups. While the analysis draws on a variety of sources, including WWF reports (WWF-Malaysia, 2016; 2024), research articles (Jolis et al., 2023; Lim, 2022), and policy documents, the findings may not fully represent the perspectives of all community members, particularly those in the most remote areas of TMP. Because the study is based on existing evidence, some points of view, particularly those of underprivileged groups may be overlooked.

Second, the study's geographical scope is limited. Although TMP has three districts, which are Kudat, Kota Marudu, and Pitas, and over 50 islands totalling almost one million hectares, the current literature does not cover all geographical regions inside the park. Some islands and coastal villages are extremely remote and may only be accessible during specific weather conditions, reducing the representativeness of available data. As a result, the

findings may not accurately reflect the experiences and perspectives of persons living in the most remote sections of TMP.

Finally, the scope of stakeholder representation is limited. While the synthesis contains perspectives from WWF-Malaysia, Sabah Parks, and other organisations, the existing literature's collection of community voices may not adequately represent the diversity of experiences and opinions among the approximately 80,000 people. The studies listed (Jolis et al., 2023; Lim, 2022) feature community opinions, although their sampling methods may limit generalizability. The stakeholder imbalance identified in the larger literature, with institutional players having more representation and authority than regular community members, may bias findings in favour of institutional interests.

Suggestions for Future Research

Based on the limitations discussed above, several directions for future research are suggested. First, future studies should prioritise primary data gathering from rural communities within TMP to acquire a more thorough understanding of marine conservation challenges throughout the park. Villages in the most rural portions of the Pitas district may have vastly different experiences with fish bombing, police presence, and access to alternative livelihoods than villages near Kudat. Researchers should plan longer fieldwork periods and allocate more resources to boat transportation in order to reach all islands and coastal towns within the park's limits and ensure representation of varied perspectives.

Third, additional in-depth research should be conducted to measure the success of community ranger programs, including their impact on enforcement outcomes, community attitudes, and conservation compliance. Understanding the characteristics that contribute to ranger program success would help with program design and scaling. Ecotourism and alternative livelihood programs should also be studied for their economic consequences on households, as well as their distributional effects across different socioeconomic categories in communities. Lastly, future studies should more thoroughly investigate the roles of youth and women in conservation participation. The findings indicate that participatory mapping and photovoice projects effectively involved these populations (Lim, 2022), but the mechanisms by which engagement leads to conservation outcomes remain understudied. Research should also look into the possibility of intergenerational knowledge transfer in community-based conservation, specifically how traditional ecological knowledge is passed down and adapted between generations.

Conclusion

This study shows that local people at Tun Mustapha Park play an important role in sustaining marine ecosystems on environmental, social, and economic levels. Environmentally, community-led coral restoration and turtle conservation have led to demonstrable results, such as improved live coral cover and a 50% reduction in poaching. Socially, participatory initiatives have strengthened underprivileged communities, improved gender equality, and increased environmental awareness. Economically, while issues persist, alternative livelihoods such as eco-tourism and sustainable businesses have reduced dependency on unsustainable methods.

Besides, a comparison with Raja Ampat reveals shared threats such as destructive fishing, climate change and enforcement challenges, but different governance systems where government-declared MPAs compare with community-driven initiatives and tourism economies. The TMP experience shows that community-led approaches can achieve major conservation outcomes, but they require institutional support and resources. Furthermore, the study extends theoretical understanding by establishing the interconnection of the three sustainability pillars and presenting empirical evidence that deficiencies in one pillar degrade others, but integrated solutions provide positive feedback.

Apart from that, policy recommendations include enhancing community-based enforcement, increasing participatory governance, promoting sustainable livelihoods, and implementing integrated policy approaches.

These measures reinforce each other where effective enforcement protects resources that support fisheries and tourism, community engagement assures local support and equitable benefit distribution, and economic opportunities reduce dependency on harmful activities.

Finally, TMP's sustainability is dependent on combining enforcement, community participation, and livelihood enhancement. Conservation cannot be achieved solely through legislation, but it involves community-based governance and economic solutions that lessen resource demand while sustaining livelihoods. Current and future stakeholders must work together to adopt coordinated strategies that ensure TMP's marine resources are protected for future generations

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7. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests in this study.

8. AUTHORS' CONTRIBUTIONS

Erica Joanne Reuben served as the primary researcher, independently conceptualizing the framework, writing the problem statement, doing a full literature evaluation, carrying out the data gathering phase, and performing the statistical analysis. The main supervisor, Professor Madya. Dr. Haijon Gunggut, and co-supervisor, Dr. Haidy Henry Dusim, offered constant academic direction, technical help, critical evaluations of manuscript drafts, and final intellectual polishing.

9. ETHICS STATEMENT

The authors specifically emphasize that all respondents in this study were fully informed about the research objectives and willingly submitted their formal informed consent before engaging in any data collection procedures.

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