

Marine Conservation Area in Sabah: The Role of World-Wildlife Fund (WWF) in Sustaining the Marine Resources of Tun Mustapha Park (TMP)

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Abstract

Tun Mustapha Park (TMP) is located off the coast of Sabah, Malaysia, and it is a crucial marine protected area known for its abundant biodiversity and ecological significance. TMP was founded in 2016 with the goal of striking a balance between conservation and sustainable resource usage, tackling issues like habitat deterioration, overfishing, and climate change. This qualitative study used document analysis as its main method in a case study design. Peer-reviewed journal articles, government documents and World Wildlife Fund (WWF) reports were among the data sources. The data was analysed using thematic analysis to examine WWF's tactics, which include multi-stakeholder cooperation, habitat restoration, and community empowerment. This study also employs the Three Basic Pillars Model which are environmental, social, and economic sustainability to analyse how the World Wildlife Fund (WWF) sustains TMP's marine resources. Important conclusions show that WWF has been successful in increasing coral cover by 20.8%, encouraging sustainable livelihoods, and encouraging local stewardship through initiatives like MARRS (Mars Assisted Reef Restoration System). The study emphasizes how the three pillars are interdependent, showing how community involvement guarantees efficient monitoring (which links the environment and society), environmental restoration promotes ecotourism (which links the environment and economy), and financial incentives promote long-term conservation (which links the economy and society). WWF's work in TMP provide a replicable paradigm for marine conservation globally by incorporating these elements.

Keywords: Marine conservation, Tun Mustapha Park, WWF, sustainability, Three Basic Pillars Model.

INTRODUCTION

Received: 1 February 2026

Accepted: 1 March 2026

Published: 30 April 2026

According to Grorud-Colvert et al. (2021), marine protected areas (MPAs) are widely acknowledged as essential tools for the protection of marine biodiversity and the sustainable management of marine resources. They also stated that MPAs are areas designated to protect biodiversity, maintain ecosystem services, and support local livelihoods through controlled activities. The region of Southeast Asia (SEA) is blessed with a wide range of marine resources (Southeast Asian Fisheries Development Centre, 2022). Tang et al. (2022) added that there are serious problems with the current SEA MPA system, despite the fact that effective MPAs have many important benefits such as enhancing the biophysical components of marine ecosystems and giving local communities socioeconomic benefits. Harmful anthropogenic activities continue to take place within MPAs in addition to the fundamental lack of MPA

coverage (Tang et al, 2022). They further added that this condition persists for several reasons, including inadequate financing and staffing, gaps and inconsistencies in the current regulations, and poor monitoring and law enforcement.

According to World Wildlife Fund (2017), marine ecosystems in Tun Mustapha Park (TMP) provide vital services that support livelihoods, enhance food security, and contribute to the cultural identity of coastal communities, making them significant habitats on Earth. However, overfishing, habitat degradation, pollution, and climate change pose tremendous dangers to those ecosystems (World Wildlife Fund, 2017). As a response to these issues, marine conservation activities have become important techniques for preserving and enhancing marine biodiversity. With a wide variety of marine life and ecosystems, Tun Mustapha Park (TMP), which is situated off the coast of Sabah, Malaysia, is a respectable attempt at marine conservation (World Wildlife Fund, 2017 & Asmat et al, 2021). World Wildlife Fund (2017) added that, TMP was created as a marine-included area with the goal of developing sustainable management strategies that benefit the local community and the environment, as their livelihoods are closely linked to the health of marine resources.

The biodiversity of TMP and the dangers it faces have been thoroughly described by previous study (Joseph et al., 2021; Mithoo-Singh et al., 2021). According to Pauzoulinie et al. (2024), by tackling a wide range of global issues like pollution, deforestation, soil erosion, falling water levels, depletion of national resources, poverty eradication, and health challenges, non-governmental organizations (NGOs) play a critical role in advancing progress towards the Sustainable Development Goals. They showed that NGOs actively create and run community-based organizations to assist startups and innovative projects, encourage entrepreneurship, maintain and enhance infrastructure, and engage in a wide range of activities that support sustainable development. However, the unique role that non-governmental organizations (NGOs) like WWF play in operationalizing sustainability within TMP has not been explained clearly. Furthermore, while the Three Basic Pillars Model, a well-known sustainability framework was used to evaluate NGO-led marine conservation governance has been rarely applied. In particular, not enough research has been done on how WWF's activities concurrently target social, economic, and environmental objectives in an integrated way. Boey et al. (2018), stated imbalanced hierarchies such as those involving authority or seniority, produce dominating voices that have the potential to prejudice and influence the course of discussions to achieve social, economic, and

environmental goals in an integrated way. Zainuddin et al. (2025) added that while developers put short-term financial gain ahead of long-term ecological resilience, NGOs serve as watchdogs but have no enforcement authority. This study fills this gap by evaluating WWF's TMP efforts critically using the Three Pillars Model.

Therefore, it is important to evaluate marine conservation strategies in Tun Mustapha Park (TMP) through the lens of the three basic pillars model. This model's theoretical foundation, which is based on the Brundtland Commission's definition of sustainable development (WCED, 1987), holds that social justice, economic viability, and environmental integrity must all be achieved together for long-term sustainability. Clune and Zehnder (2018) stated by comparison, the three pillars framework highlights the most significant components for implementing applicable projects and sustainability solutions, which aids in identifying crucial break points. By using the third pillar basic models to examine the interplay between the social, environmental and economic dimensions within the park, stakeholders can identify integrated strategies that promote biodiversity conservation while supporting local livelihoods. This study looks at both historical and current situations to give thorough knowledge of the sustainability of marine conservation activities in Tun Mustapha Park. By adopting a sustainable development model of the three basic pillars model, the study will examine how conservation efforts have changed over time, evaluate how they have affected social dynamics, ecological health, and economic stability, and investigate how local populations have been involved in these activities.

LITERATURE REVIEW

The Theoretical Foundation: Sustainability Development (SD) and the Three Pillars Model

The Sustainable Development (SD) paradigm, namely its articulation as a tripartite framework, serves as the conceptual cornerstone of this study. The Brundtland Commission (WCED, 1987) provided the most widely used definition, which defines SD as development that satisfies current demands without jeopardizing the ability of future generations to satisfy their own (Cerin, 2006). Its emphasis on intergenerational justice which is a moral duty to protect social, economic, and environmental resources for future generations that is what gives this definition its lasting significance.

Critically, the three conceptual pillars of environmental, social, and economic sustainability interact to operationalize the SD framework. According to a review of the literature, this model's analytical strength is found in its emphasis on their interdependence, which purposefully avoids the negative trade-offs typical of siloed development models (Stoddart, 2011; Dernbach, 2003). The resilience and productivity of natural systems, limited by the carrying capacity of the biosphere, are referred to as environmental sustainability (Brodhag & Taliere, 2006). Social sustainability presents social justice as inextricably linked to ecological stewardship and includes equity, participation, cultural identity, and institutional stability (Daly, 1992).

On the other hand, economic sustainability has historically been characterized as a production system that meets current consumption without endangering future needs, frequently with the assumption that resource depletion would be offset by technological innovation (Lobo, Pietriga, & Appert, 2015; Cooper & Vargas, 2003). A more modern synthesis, however, integrates social and natural capital as necessary, limited resources, challenging the conventional capitalist premise of unrestricted expansion (Benn et al., 2014). This interdependence was defined by the United Nations World Summit in 2005 as the "three pillars basic model," which states that true SD can only be attained when all three pillars work in concert rather than in a hierarchical manner (Diesendorf, 2001). The current study's consideration of marine conservation, where ecological integrity, community livelihoods, and economic activity are intricately interwoven, is directly informed by this theoretical framework.

Although TMP was founded on sustainable development principles, a critical analysis of the literature shows that the Three Basic Pillars Model which are Environmental, Social, and Economic has not been methodically operationalized as an analytical framework to assess conservation outcomes within the park. Previous research on TMP has mostly concentrated on certain facets of its administration. For example, Joseph et al. (2021) focused on biodiversity issues like turtle egg poaching, while Jumin et al. (2017) used a systematic conservation planning tool (Marxan) to develop the park's zoning scheme. Boey et al. (2018) found structural difficulties in multi-stakeholder participation, whereas Mithoo-Singh et al. (2021) investigated the socioeconomic intricacies of the Live Reef Food Fish Trade. None of these studies have used the integrated Three Pillars paradigm to specifically evaluate how WWF's actions concurrently address environmental integrity, social fairness, and economic viability in an interconnected manner, even whether they touch on environmental or social

dimensions separately. As a result, in the context of TMP, the synergistic links between these pillars. For example, how habitat restoration (environmental) directly supports tourist livelihoods (economic) or how community governance (social) promotes monitoring (environmental) will remain understudied. By using the Three Pillars Model as a structured lens to examine WWF-Malaysia's comprehensive conservation strategy, this study fills this gap.

Additionally, although non-governmental organizations (NGOs) are clearly involved in Malaysian marine conservation, the precise processes of NGO-led sustainability governance are still empirically understudied in the country's academic literature. The regulatory frameworks set up by government organizations like the Department of Fisheries and Sabah Parks have been the main subject of previous research (Sazali, Azlan & Mohamed, 2013; Kaur, 2007). Instead of examining NGOs as complex governance actors that use particular tactics, like localized supply chain optimization (WWF Coral Triangle Programme, 2024), cascade training models for capacity building, or the facilitation of multi-stakeholder platforms (Boey et al., 2018), studies that do address NGOs frequently treat them as monolithic service providers or advocates.

More recent policy discussions on the 30x30 conservation targets and Malaysia's Blue Economy blueprint (13th Malaysia Plan) have focused more on government-led financing and spatial planning than on how NGOs work with communities to operationalize sustainability on the ground (WWF-Malaysia, 2025). By offering a thorough analysis of WWF-Malaysia's governance role in TMP and looking at how it manages the interaction between institutional partnerships, community stewardship, and financial incentives to produce sustainable results, this paper closes this gap. By doing this, it answers more general demands in the literature (Pauzoulinie et al., 2024) to assess NGO contributions to the Sustainable Development Goals in the context of developing nations.

Conservation

Conservation offers the operational logic for environmental action, whereas SD provides the wider framework. The idea of conservation has significantly changed, according to a critical analysis of the literature. Early definitions, like the one by Leader-William et al. (2011), emphasize habitats, species, and quantifiable survival

outcomes and concentrate on actions that directly boost the likelihood of species and habitat persistence in the wild. By describing conservation as actions intended to establish, strengthen, or maintain beneficial interactions with nature, Sandbrook (2015) expands on this perspective and presents conservation as an active, relational activity as opposed to a passive condition. This is an important conceptual distinction where conservation is the active creation of sustainable human-nature relationships rather than just preservation against harm.

Furthermore, in order to address urgent socio-environmental issues, Hambler and Canney (2013) contend that conservation is universally applicable, bridging several disciplines like biology, philosophy, economics, governance, and human rights. A crucial operational nuance is clarified by the National Geographic Society (2023) stated the conservation seeks to guarantee that humans can utilize nature sustainably. For example, by fishing or logging. While preservation rigorously protects nature from human use. Protected area typologies are used to operationalize this distinction.

There are seven types of conservation areas (Dudley, Shadie, & Stolton, 2008). Strict nature reserves and wilderness protection areas fall under Category 1(a); wilderness areas fall under Category 1(b); national parks fall under Category II; natural monuments fall under Category III; habitat or species management falls under Category IV; protected landscapes or seascapes fall under Category V; and managed resources protected areas are the final category of conservation areas. Marine conservation is the main emphasis of this project, and protected landscape area management falls under Category V. It is regulated places where conservation and human activities coexist. The analysis of Tun Mustapha Park's multi-use zoning policy, which specifically strikes a balance between limited protection and sustainable use, requires this theoretical foundation.

Marine Park: Regulatory Frameworks and Ecological Rationale

The geographical implementation of conservation concepts within SD frameworks is exemplified by marine parks. A marine park is a recognized sanctuary for the preservation of marine ecosystems, such as coral reefs, mangroves, seagrass beds, and related species, according to Kenchington et al. (2003). A crucial functional assertion is added by Worm (2017) stated that marine protected areas (MPAs) have the capacity to restore harmed ecosystems, establishing them as restorative rather than merely preserving instruments. Given the interdependence of all marine life, from

whales to krill, governments create MPAs expressly to combat manmade dangers like overfishing and oil drilling (National Geographic Society, 2023).

However, In the Malaysian context, under Part IX (Sections 41–45) of the Fisheries Act of 1985, marine parks were created to safeguard marine life from island development and related activities (Kaur, 2007; Sazali, Azlan & Mohamed, 2013). This framework has been strengthened by other laws, such as the Malaysia Marine Parks Act Validation Year 2004 and the Establishment of Marine Parks Gazette 2012. Pulau Redang, Pulau Perhentian, Pulau Payar, Pulau Tioman, and Pulau Tinggi are notable marine parks in Malaysia. Despite being popular tourist destinations, these islands are under intense development pressure (Sazali, Azlan & Mohamed, 2013). Government agencies and non-governmental organizations (NGOs) in Sabah have also worked to create MPA frameworks that include community consultations to guarantee that locations for biodiversity preservation are unanimously agreed upon while the freedom to fish in other locations is prescribed to varying degrees (Jumin et al., 2017; Sabah Parks, 2017). The main obstacle to putting the three-pillar SD model into practice is this conflict between ecological sustainability and tourism-driven economic objectives.

Tun Mustapha Park (TMP)

Establishment and Zoning Framework

Tun Mustapha Park (TMP) is Malaysia's largest multipurpose marine protected areas with 898,762.76 hectares spread throughout the districts of Kudat, Kota Marudu, and Pitas (Sabah Parks, 2019). TMP was created to safeguard globally important maritime habitats endangered by overexploitation. It was granted cabinet status in March 2003 under the Parks Enactment of 1984 and officially constituted on May 19, 2016 (Liew-Tsonis et al., 2012; Sabah Parks, 2019). A no-take zone ecological integrity), a community-use zone for traditional fishing (social sustainability), a multiple-use zone for tourism (economic sustainability), and a commercial fishing zone (regulated extraction) comprise the park's zoning scheme, which is an intentional attempt to operationalize the SD pillars (Sabah Parks, 2019; Jumin et al., 2017). The literature constantly finds a gap between TMP's goals and the realities on the ground, even with this sophisticated framework.

Persistent Threats and Governance Gaps

Basically, Tun Mustapha Park (TMP) was confronted with significant problems pertaining to overfishing and harmful fishing, taking turtles directly, mining, overexploitation, illegal activity, and transboundary conflicts, inability to establish measurable progress indicators and unbalanced hierarchies and land clearing and coastal development.

(a) Overfishing and Harmful Fishing Practices

World Wildlife Fund (2013) stated that overfishing and harmful fishing practices are among the identified issues within TMP. Basically, fishermen often take more fish than is permitted when it comes to overfishing and harmful fishing, and some have even been known to use cyanide and fish bombs to get fish which causes damage to the coral reefs and seagrasses within the park (Sabah Parks, 2017; World-Wildlife Fund, 2017). WWF-Malaysia (2023) stated that in Sabah, the growing risk of fish bombing is a terrible reality, with numerous occurrences documented year.

(b) Poaching of turtle eggs

In Southeast Asia, Tun Mustapha Park (TMP), which was designated as a marine protected area (MPA) in 2016, is an important but understudied marine turtle habitat. A small but growing number of nesting turtles are supported by TMP, in contrast to the well-documented rookeries of Sabah Turtle Islands Park (Joseph et al. 2021), underscoring its growing significance for regional conservation. According to Joseph et al. (2019), chronic poaching of turtle eggs persists despite the species' protected status, highlighting the urgent need for improved conservation measures.

(c) Overexploitation, Illegal Activity, and Transboundary Conflicts

Mithoo-Singh, Matjanji-Matsumoto and Sulehan (2021) highlighted in their study on inductive content analysis on the Live Reef Food Fish Trade (LRFFT) in Tun Mustapha Park (TMP), Sabah: Key stakeholders Interactions and Trade Operations, that in Sabah, Malaysia, the Live Reef Food Fish Trade (LRFFT) is a crucial nexus of socioeconomic dynamics and ecological sustainability, especially with regard to luxury fish species that are essential to the trade and the growing seafood tourist industry. However, overexploitation, illegal activity, and transboundary conflicts are

becoming more and more of a danger to the sustainability of this trade. Kudat and Banggi Island in Tun Mustapha Park (TMP), a marine protected area in northern Sabah, have been recognized by the World-Wide Fund for Nature (WWF) as important sourcing centers for live reef fish in the biodiverse Sulu-Sulawesi seas. The LRFFT in this area is tainted by intricate transnational trading networks and illegal, unreported, and unregulated (IUU) fishing, especially near the Malaysia-Philippines maritime border, despite its ecological value.

(d) Inability to Establish Measurable Progress Indicators and Unbalanced Hierarchies

According to a study done by Boey et al. (2018) on initializing multi-stakeholder engagement in the context of Marine Protected Area management and capacity-building programmes: A Tun Mustapha Park case study, the study highlighted that visit to The Tun Mustapha Park (TMP) helped them to identify several structural challenges in implementing effective marine conservation strategies. One of the main challenges was the inability to establish measurable progress indicators, especially for programs promoting alternative livelihoods, because of unanswered concerns regarding implementation obstacles, long-term sustainability, and true community acceptability. This shows that before establishing conservation goals, further baseline evaluations are required.

(e) Land Clearing and Coastal Development

The loss of mangrove forests and, as a result, the nursery grounds for numerous seafood species have been caused by land clearing and coastal development. This has an effect on the local residents' livelihood and food security (World-Wildlife Fund, 2017 & Lee et al., 2018). These threats prompted the creation of TMP in 2016, which is separated into four zones: the no-take zone, which forbids extractive activities; the community-use zone, which permits non-destructive small-scale and traditional fishing activities and allows local communities to participate in the management of natural resources; the multiple-use zone, which permits tourism and recreation and allows for sustainable development activities; and the commercial fishing zone, which permits large-scale extractive fishing practices (Sabah Parks, 2019, Jumin et al., 2017).

The Roles of World Wildlife Fund (WWF) in Marine Conservation

World Wildlife Fund (WWF) provides a crucial case study for putting SD theory into practice. According to Amundsen (2011) and Dragomir (2019), environmental strategy balances stakeholder pressures with ecological preservation by coordinating operations with sustainability goals. This is operationalized by WWF's TMP interventions through ten interrelated processes that can be combined into three strategic domains.

(a) Effectively Managed Area

The Tun Mustapha Park (TMP) is a noteworthy accomplishment in maritime conservation, combining ecosystem-based fisheries management, collaborative governance, and sustainable zoning to strike a balance between biodiversity preservation and socioeconomic advantages, (World Wildlife Fund, 2017). Through the integration of these tactics, TMP guarantees the comprehensive management of marine resources, according to the requirements of coastal populations as well as ecological integrity. This strategy demonstrates how environmental and economic goals may support one another and is in line with larger conservation aims, such as protecting important ecosystems while sustaining livelihoods.

(b) Community-Managed Area

Community involvement in the management of natural resources is a vital component of guaranteeing the sustainability of conservation initiatives. According to the World-Wildlife Fund (2017), this was demonstrated by a four-year project in Malaysia that was supported by the European Union and that improved local participation in resource governance, community protocol building, and the creation of sustainable livelihood projects. These initiatives not only aided in the management of regions under community control, but they also showed how crucial formal frameworks are to the empowerment of indigenous communities. Measures adopted to improve the long-term viability of community-led projects strengthened the project's effectiveness by highlighting the necessity of ongoing stakeholder involvement.

(c) *Simple Technology-Based Community-Led Coral Restoration (MARRS)*

The Mars Assisted Reef Restoration System (MARRS) was chosen by WWF as a low-cost, natural solution that uses modular "Reef Stars" which is steel frames covered in sand and anti-rust epoxy (WWF Coral Triangle Programme, 2024). These buildings are constructed locally by community free divers using easily accessible materials such as Y-10 steel bars, sand, and resin. The frames are adorned with pieces of coral that were recovered from destroyed reefs. With more than 1,300 Reef Stars deployed by 2023, this strategy gave coastal communities like Tajau Laut village, the ability to take the lead in restoration. The technology's ease of use allowed for reproduction in far-flung locations, overcoming both technical and financial obstacles while encouraging local ownership (WWF Coral Triangle Programme, 2024).

(d) *Multi-Stakeholder Strategic Partnerships*

To scale efforts, WWF worked with the EU Ocean Governance Project, the Banggi Coral Conservation Society (BCCS), and Sabah Parks, the park management body (WWF Coral Triangle Programme, 2024). Sabah Parks integrated restoration into TMP's administration, created coordinators for volunteers, and offered institutional assistance. More than 70 community members received MARRS training from BCCS, and resource mobilization was made possible by EU financing, which is RM450,000. In order to create a networked conservation model, partnerships extended restoration from pilot sites (like Banggi Island) to five locations throughout TMP, including Tajau Laut and Mabul Island (WWF Coral Triangle Programme, 2024).

(e) *Optimization of the Localized Supply Chain*

The development of a community-centered supply chain aimed to optimize both economic rewards and efficiency (WWF Coral Triangle Programme, 2024). Locally produced steel and sand were used as raw materials; skilled community welders created Reef Stars and local boats and divers were employed for deployment. This strategy kept money in local communities and cut costs by 40% when compared to outsourcing which is RM2,305/Reef Star vs. RM40,000 for third-party reef balls (WWF Coral Triangle Programme, 2024). Local knowledge led to innovations like sand-filtering methods by using 1-2 mm mesh, which improved flexibility and cost-effectiveness.

(f) *Ecosystem Resilience and Integrated Threat Reduction*

In addition to restoration, WWF tackled underlying threats such as patrols and enforcement. This can be explained where there are seven fish-bombing instances were reported by community-led SMART patrols between 2022 and 2023, and the information was shared with law enforcement (WWF Coral Triangle Programme, 2024). Secondly, climate adaptation. To counteract coastal erosion, mangrove planting was encouraged. For example, Tajau Laut lost 30m of beach in 7 years. Lastly, policy advocacy. WWF fought for regulated restoration requirements under Sabah Parks and opposed detrimental operations including trawling and silica mining. By increasing reef resilience, these initiatives resulted in a 30-fold increase in fish biomass in restoration sites and a 20.8% increase in live coral cover (WWF Coral Triangle Programme, 2024).

(g) *Learning from One Peer to Another and Developing Capabilities*

In order to teach community members such as 53 Tajau Laut locals, WWF developed a cascade training methodology in which eight local practitioners were certified by international MARRS specialists (WWF Coral Triangle Programme, 2024). Best practices were shared through cross-site learning exchanges such as with Semporna, Malaysia, and Derawan, Indonesia. Additionally, communities received training on SMART patrol tools to report illegal activities, cover 1,102 km of shoreline, and monitor hazards like fish bombing. Communities were given more authority as stewards, which enhanced threat response and restoration effectiveness (WWF Coral Triangle Programme, 2024).

(h) *Reviving "Gotong-Royong" and other sociocultural customs*

WWF made use of the Malay custom of collective action, or "gotong-royong" to encourage community involvement. More than 100 residents of Tajau Laut, including women, youth, and seniors, worked on Reef Star's manufacturing lines, coating frames, affixing corals, and setting up structures (WWF Coral Triangle Programme, 2024). This reestablished societal harmony and connected cultural identity and conservation. Young people obtained diving certifications, which improved ecotourism activities such as guesthouses and snorkelling tours and connected environmental objectives with economic prospects (WWF Coral Triangle Programme, 2024).

(i) *Long-Term Governance and Roadmaps*

To formalize efforts, WWF and Sabah Parks created Malaysia's first Coral Restoration Roadmap in 2025 to 2026 (WWF Coral Triangle Programme, 2024). There are several important turning points which is evaluating deteriorated areas by 2025, obtaining funds from the National Conservation Trust Fund of Malaysia, statewide restoration expansion by 2026. In order to prevent disorganized CSR initiatives and guarantee science-based management, Sabah Parks was assigned to oversee all coral projects (WWF Coral Triangle Programme, 2024).

(j) *Adaptation to Climate Change and Sustainable Finance*

WWF encouraged nature-based solutions such as mangroves for erosion control and incorporated climate projections like bleaching concerns into planning (WWF Coral Triangle Programme, 2024). They promoted national funding systems and creative finance such as tourism-related coral adoption programs to address financial sustainability and lessen reliance on short-term handouts (WWF Coral Triangle Programme, 2024).

RESEARCH METHODOLOGY

The purpose of this study is to analyse the roles of WWF in sustaining the marine resources of Tun Mustapha Park (TMP) through the lens of the three basic pillars model which are social, economic and environment pillars. This study used a qualitative method, and the conceptual approach is framed using the three basic pillars. According to the United Nations World Summit (2005), the "three pillars basic model" is likely the most well-known model of sustainable development. The three basic pillars approach typically considers the three aspects of "social, economic, and environmental resources" (WCED, 1987).

This study is a qualitative study is a case study where document analysis is use as its primary method. Besides, the data sources of this study include of World Wildlife Fund (WWF) publications, government records, and peer-reviewed journal articles. Data that can help to fulfil the gaps in this study are selected and accessed. In addition, thematic analysis was used to analyse the data in order to look at WWF's strategies, which include community empowerment, habitat restoration, and multi-stakeholder

collaboration. Furthermore, the Three Basic Pillars Model of environmental, social, and economic sustainability is also used in this study to examine how TMP's marine resources are maintained by the World Wildlife Fund (WWF).

This paradigm states that when all three pillars function together, sustainable development is attained. For social sustainability, the aim is to protect future generations and create just communities in order to maintain and improve social capital. It entails funding programs that support social structures while encouraging a better comprehension of globalization, cultures, and communities, claims (Future Learn, 2002). The idea highlights how current behaviours impact both people and the environment in the long run. by this viewpoint.

Secondly, economic sustainability seeks to maintain capital while raising living standards and guaranteeing long-term profitability through resource efficiency. The UK Government's Annual Report (2000, 2001) highlights that steady economic growth is necessary for sustainable development, but it also underscores that growth must be quantified and evaluated. But one major flaw in traditional accounting methods is that environmental costs are not taken into consideration when setting market prices, which has led to criticism of traditional economic models (Hawking, 2010).

Thirdly, environmental sustainability. It focusses on preserving the natural resources, including air, water, land, and minerals, while making sure that present usage does not jeopardize the requirements of future generations. It is the capacity of enterprises to generate financial gains without creating immediate or long-term ecological damage, according to Diesendorf (2001). Additionally, he makes the case that social, economic, and environmental sustainability pillars must all be given equal weight in order to achieve real environmental sustainability, rather than one being prioritized over the others.

FINDING AND ANALYSIS

Roles Of WWF-Malaysia in TMP Sustainable Development

The World Wildlife Fund (WWF), founded in 1961, is a global conservation organization whose principal goals are to save the earth and safeguard rare and endangered species (World Wildlife Fund, 2020). On the surface, WWF takes a

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science-based strategy to addressing extinction drivers such as habitat destruction, poaching, wildlife trafficking, and climate change, combining high-level policy negotiation with grassroots action. However, most of its public narrative is mainly based on flagship species such as pandas, rhinos, and tigers, which, although useful for fundraising, raises concerns about whether resources are appropriately focused toward less charismatic but equally threatened habitats.

WWF functions at the local, landscape, regional, and global levels. At the landscape level, it employs scientific tracking to advise on habitat protection and human-animal coexistence. Meanwhile, at the local level, it seeks to empower communities to combat poaching. Besides, at the regional level, it works to strengthen anti-trafficking laws and enforcement; and globally, it collaborates with governments and businesses to create sustainable markets. Previous achievements include increasing panda and rhino populations and prohibiting the ivory trade. However, a critical approach would question whether these triumphs are broadly represented or selectively publicized, and whether business relationships, while helpful, can generate conflicts of interest when funders are tied to environmental harm.

WWF-Malaysia, founded in 1972 as a subsidiary of the global WWF, works in six major areas such as forests, seas, animals, food, climate and energy, and freshwater. The organization's stated goal is to halt the deterioration of the planet's ecosystem and create a future in which humans coexist peacefully with nature, specifically by preserving biodiversity, ensuring the sustainable use of renewable natural resources, and reducing wasteful consumption and pollution. While these objectives are admirable, a rigorous review would reveal that the organization's self-reported materials do not bridge the gap between stated goals and measured accomplishments.

WWF also expresses four shared values which are courage, respect, honesty, and teamwork. Courage is defined as pushing for change where necessary; respect as valuing local rights and viewpoints; integrity as functioning with honesty, responsibility, and openness; and teamwork as leveraging collaboration for impact (WWF-Malaysia, 2025). One specific example is WWF-Malaysia's work in Sabah to construct and administer Tun Mustapha Park (TMP). The World Wildlife Fund (2017) claimed that the park was necessary to alleviate the TMP marine ecology's rising and unsustainable demands.

The three basic pillars theory can be used to explain the roles and contribution of WWF-Malaysia in the process of sustaining the marine resources of TMP. This study applied all three pillars of the three basic pillars theory which are environment pillar, social pillar and economic pillar. The implementation of the environmental pillar of the Three Pillars framework by WWF-Malaysia in Tun Mustapha Park (TMP) is the most explicit and successful, according to sustainability theory. A quantifiable relationship between intervention and ecological outcome is provided by the organization's use of locally produced "Reef Stars" and the MARRS system for coral restoration: a documented 20.8% increase in live coral cover and a 30-fold increase in fish biomass at restoration sites (WWF Coral Triangle Programme, 2024).

These figures are important from an analytical standpoint for both ecological benefits and the restoration of ecosystem function, healthier coral substrates offer habitat variety, which promotes trophic recovery. This is consistent with the sustainability philosophy of preserving natural capital as opposed to just reducing loss. Even if these restoration initiatives are environmentally sound, a crucial analytical finding is that they target symptoms rather than systemic causes. Sustainability theory would question whether this approach unintentionally places the burden of enforcement on vulnerable communities without addressing the economic incentives driving destructive fishing. The community-led SMART patrols that report fish bombing events represent a hybrid governance model, blending local enforcement with state authority (WWF Coral Triangle Programme, 2024).

In terms of ecosystem-based management and climate change adaptation, WWF initiatives demonstrate a proactive but incomplete implementation of the Three Pillars concept. Climate-informed planning, which sustainability theory acknowledges as crucial for developing adaptive capacity, is demonstrated by the inclusion of bleaching hazard forecasts in restoration site selection (WWF Coral Triangle Programme, 2024). Mangrove restoration protects the shoreline and sequesters blue carbon in places like Tajau Laut, where 30 meters of beach had been destroyed. From an analytical perspective, this is a nature-based approach that connects climate resilience to the environmental pillar, but it does not automatically satisfy the social or economic pillars. TMP's fundamental strategy balances conservation with sustainable resource use through "cooperative governance and spatial planning" (World Wildlife Fund, 2017).

WWF-Malaysia's activities in Tun Mustapha Park (TMP) demonstrate a coherent strategy that connects capacity building, governance strengthening, cultural restoration, and multi-stakeholder collaboration to measurable social impacts. The cascade training model for MARRS restoration, in which foreign experts certified local trainers who then instructed community members, produced measurable results where more than 70 people gained local restoration experience, and training in SMART patrol tools covered 1,102 km of coastline (WWF Coral Triangle Programme, 2024). Analytically, this signifies a movement from top-down conservation to what sustainability theory refers to as "social learning," in which knowledge is distributed horizontally through peer-to-peer interactions, such as cross-site exchanges between Malaysia and Indonesia. Similarly, WWF's assistance for community-managed areas and institutional frameworks seeks to empower indigenous communities and recognize their participation in management choices (WWF Coral Triangle Programme, 2024). From a sustainability governance standpoint, this tackles a significant criticism of protected area models: the historical exclusion of local voices. Ownership entails not just decision-making participation but also rights to rewards and remedy in the event of a problem. The mention of community protocols is promising, because they can act as legally significant tools under customary law.

Additionally, a sophisticated application of the social pillar that connects ecological outcomes to social cohesion is demonstrated by WWF-Malaysia's integration of cultural revitalization into conservation, particularly through the Malay tradition of Gotong-Royong or also known as collective action. In Tajau Laut, this approach mobilized over 100 community members, including women, youth, and elders, for restoration efforts, simultaneously mending social ties and aligning conservation with cultural identity (WWF Coral Triangle Programme, 2024). Analytically, this is consistent with the sustainability concept of "social capital," which holds that networks of reciprocity and trust improve environmental results as well as community resilience. The incorporation of volunteer coordinator roles and restoration into park administration by Sabah Parks is an example of institutional mainstreaming, which sustainability theory acknowledges is essential for sustainability beyond project funding cycles (WWF Coral Triangle Programme, 2024).

Although the long-term sustainability of these economic models remains analytically dependent on external factors, WWF-Malaysia's interventions in Tun Mustapha Park (TMP) show a conscious effort to align conservation with local economic development within the economic pillar of the Three Pillars framework. The most convincing evidence comes from the optimization of localized supply chains for the MARRS restoration system: WWF cut costs by 40%, from RM40,000 to RM2,305 per Reef Star, by sourcing sand, steel, and labor locally, including community welders and boat operators (WWF Coral Triangle Programme, 2024). From an analytical standpoint, this is different from traditional conservation methods, which frequently import resources and knowledge, so depriving the local community of financial gains. Similar to this, there is no denying the short-term financial benefits of Reef Star fabrication, coral attachment, and deployment; however, sustainability theory would question whether these are project-dependent "boom and bust" livelihoods or whether they can continue once outside funding stops (WWF Coral Triangle Programme, 2024). Although the connection to ecotourism- snorkeling excursions and locally owned guesthouses made possible by restored marine habitats and diving certifications offers a more resilient route, ecotourism markets are infamously unstable and vulnerable to outside shocks like pandemics, political unrest, or climate events that harm the very tourist attractions.

The promotion of coral adoption programs and access to Malaysia's National Conservation Trust Fund indicate an attempt to shift from short-term funding, such as the original RM450,000 from the EU to financially self-sustaining models (WWF Coral Triangle Programme, 2024). Analytically, this accords with the sustainability idea of "financial additionality," which states that conservation spending develops new, long-term revenue streams rather than simply replacing existing ones. The proposed Coral Restoration Roadmap for 2025-2026, which gives Sabah Parks control to avoid fragmented initiatives, is a step toward institutionalization (WWF Coral Triangle Programme, 2024). However, sustainability theory would question whether Sabah Parks has the financial and people capacity to fulfil this function without continuous WWF funding.

According to Dragomir (2019), the overall environmental policy should improve the market position of sustainable products and services, and WWF's initiatives to demonstrate the feasibility of sustainable fisheries management and community-led restoration within TMP help to achieve this goal. However, economic

competitiveness is not only determined by feasibility; it is also influenced by market prices, regulatory enforcement, and consumer willingness to pay a premium for environmentally friendly practices, none of which WWF has direct control over. Thus, while WWF-Malaysia's economic pillar interventions are thoughtfully designed and grounded in local economic realities, a critical analytical assessment concludes that their success is dependent on the transition from externally facilitated projects to internally governed, financially autonomous systems, a transition that, based on the evidence provided, is still ongoing rather than complete. Applying the Three Pillars framework rigorously necessitates not only the existence of economic strategies but also proof of their resilience to external shocks, scalability, and durability; according to this criterion, WWF-Malaysia's economic pillar exhibits great potential but needs long-term validation (WWF Coral Triangle Programme, 2024).

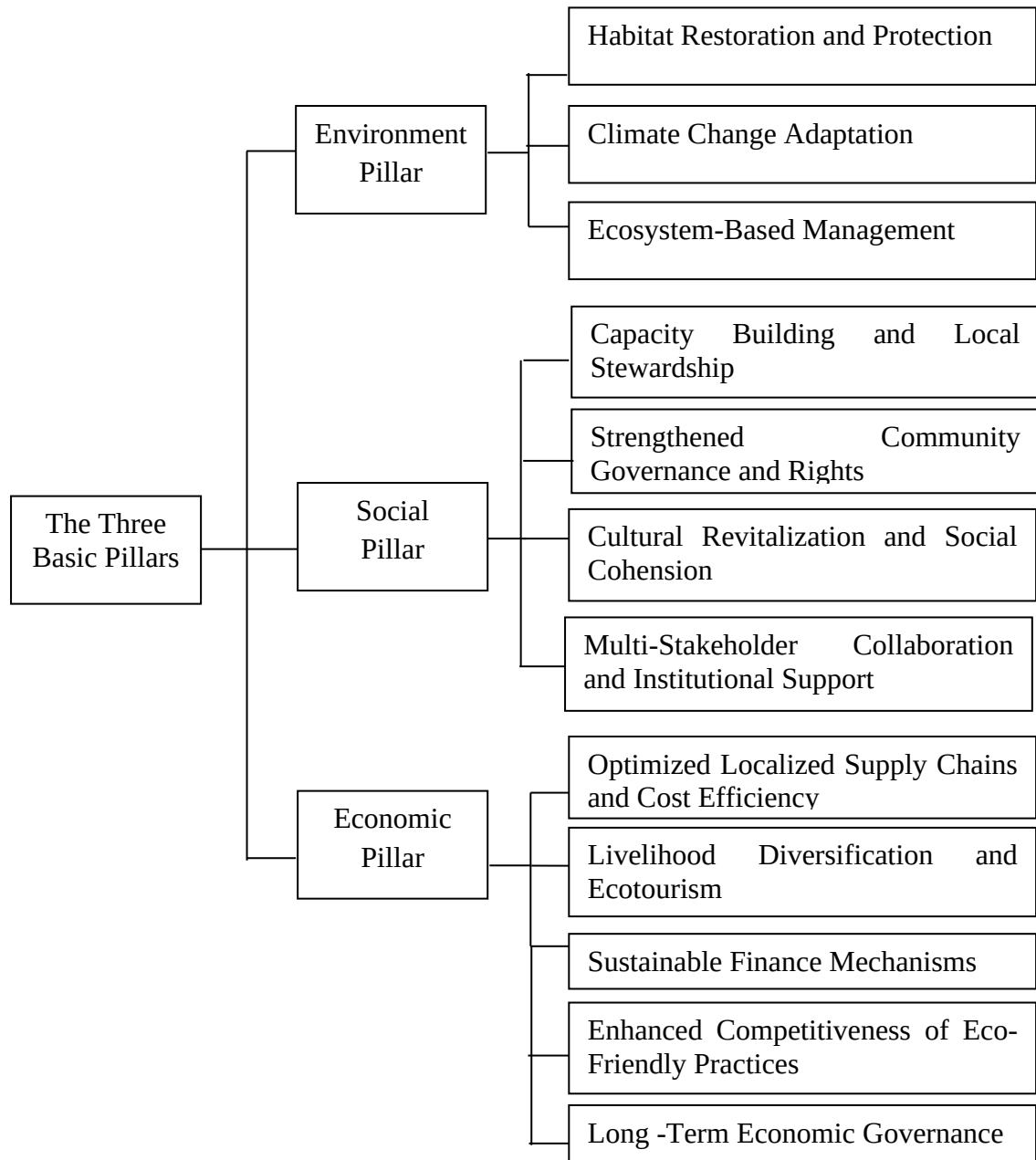


Diagram 1: The Three Basic Pillars of Sustainable Development (SD)

DISCUSSION AND CONCLUSION

Discussion

Numerous initiatives and activities demonstrate WWF's involvement and contributions to the preservation of TMP maritime resources. All parties involved, including those from other pertinent government agencies, non-governmental organizations, and local communities, must work together to guarantee that TMP can accomplish its objectives (World Wildlife Fund, 2013).

In terms of environmental pillar. Habitat restoration with locally built Reef Stars and the MARRS system resulted in a 20.8% increase in live coral cover and a 30x increase in fish biomass. Proactive climate adaptation used bleaching risk estimations into site selection. Nature-based solutions, such as mangrove restoration in Tajau Laut, improve coastal protection, store carbon, and reduce erosion. Ecosystem-based management, including spatial zoning and cooperative governance, struck a balance between conservation and sustainable resource use. Community-led SMART patrols, law enforcement support, and policy campaigning such as restrictions on harmful trawling and silica mining where all helped to increase environmental protection.

Besides, social pillar. The WWF prioritized local stewardship through cascade training, with over 70 people taught in MARRS and SMART patrols, resulting in a network that monitors 1,102 kilometres of coastline. Community norms and governance systems acknowledged indigenous rights and encouraged ownership. The traditional Malay ritual of Gotong-Royong encouraged social cohesion by involving women, youth, and the elderly. Youth diving certifications improved social mobility. Strategic collaborations with the EU, BCCS, and Sabah Parks incorporated community roles into official governance, thereby anchoring conservation in the social fabric.

Furthermore, economic pillar. The WWF streamlined local supply chains by using community welders and boat operators, lowering Reef Star costs by 40% (RM2,305 against RM40,000). Short-term revenue from reef star production was supplemented by long-term income diversification such as guesthouses, snorkelling tours. Sustainable financing strategies included coral adoption initiatives and access to Malaysia's National Conservation Trust Fund. The first Coral Restoration Roadmap,

created in collaboration with Sabah Parks, established the framework for long-term finance and scientifically sound management beyond the project cycle.

On the other hand, comparing WWF's approach to traditional marine protected area (MPA) management, which frequently stresses top-down zoning and enforcement, reveals a paradigm shift toward networked governance. Unlike standard MPAs, which consider people as stakeholders to be engaged, WWF actively integrated community members as co-managers, formally incorporating their duties into Sabah Parks' administration. This contrasts starkly with fortress conservation strategies, which have historically evicted indigenous usage. However, a key need remains, the lack of rigorous conflict-resolution processes when conservation goals such as no-take zones conflict with immediate subsistence demands, implying that WWF's collaborative framework may conceal underlying power inequalities.

Implication for Marine Conservation Theory, Policy and Practice

In terms of marine conservation theory, WWF's integrated implementation of the Three Pillars Model enhances sustainability theory by proving that the environmental, social, and economic pillars are dynamically causal, rather just coexisting. The 30-fold increase in fish biomass (environmental) directly facilitated ecotourism livelihoods (economic), while community-led SMART patrols (social) generated enforcement data that supported habitat protection (environmental). This empirical evidence suggests a shift away from linear, pillar-separated sustainability models and toward a synergistic interdependence framework in which conservation theory explicitly predicts feedback loops between ecological health, social capital, and local economic systems. Furthermore, the WWF's use of Gotong-Royong to mobilize collective action calls into question exclusively rational-choice models of common-pool resource management, implying that culturally rooted reciprocity norms can serve as important governance mechanisms alongside official legislation.

Besides, policy. The WWF experience provides policymakers with three actionable lessons. First, national MPA legislation should include community co-management agreements that legally acknowledge indigenous rights and provide enforceable roles, rather just advisory seats to local stewards inside park administration structures, as demonstrated by Sabah Parks' inclusion of volunteer coordinators. Second, funding policies must move beyond short-term project cycles in which Malaysia's National Conservation Trust Fund and similar mechanisms should require

co-financing match arrangements. Besides, NGOs, the government, and the private sector such as tourism operators, all contribute to restoration maintenance, reducing donor dependency. Third, the development of Malaysia's first Coral Restoration Roadmap (2025–2026) offers a replicable policy template, where any MPA that receives assistance from non-governmental organizations should be obliged to create a transition to local governance roadmap with specific deadlines for the transfer of financial, technical, and administrative responsibilities from outside NGOs to state and local entities.

On the other hand, practice. There are four useful insights are produced by WWF's methods for conservation practitioners. First, practitioners should perform pre-project market mapping to determine which materials and skills are available locally and design restoration technologies around them. Localized supply chains, such as hiring community welders for Reef Stars, are not just cost-saving strategies but fundamental economic pillars that foster local ownership. Second, practitioners should budget for cross-site exchanges such as between Malaysia and Indonesia as a cost-effective means of peer-to-peer learning. Cascade training, which involves teaching local trainers who subsequently train community members, proved beneficial for scaling capacity across 1,102 km of coastline. Third, because they reduce mobilization transaction costs and improve long-term stewardship, culturally relevant techniques like Gotong-Royong should be methodically incorporated into project design rather being viewed as unnecessary add-ons. Fourth, the 20.8% gain in coral cover and the 30-fold increase in fish biomass offer quantifiable benchmarks; practitioners should use similar linked indicators which is ecological, economic and social to show integrated outcomes to funders and communities alike.

Lastly, in order to avoid post-project collapse, practitioners must develop exit strategies from the outset, incorporate revenue-generating activities such as coral adoption programs connected to current tourism flows before short-term grants expire, and legally vest their governance in local authorities like Sabah Parks. This is because WWF's ongoing challenge is to sustain economic benefits beyond project cycles.

In the end, WWF's unique contribution to TMP is not found in any one intervention, but rather in its role as an integration broker, an actor that consciously plans activities to produce co-benefits across all three sustainability pillars concurrently. In terms of the environment, WWF restored habitat, in terms of society, it

used that restoration to hire and teach locals and in terms of the economy, it connected reef restoration to tourism income. This tripartite integration sets WWF's NGO-led model apart from community-only efforts, which sometimes lack technical and financial scalability, and government-only MPAs, which usually concentrate on enforcement and zoning. Theoretically, this makes NGOs crucial catalytic intermediaries in shifts toward sustainability. In terms of policy, it makes the case for formally acknowledging and supporting NGOs' integrative role rather than just their technical or advocacy roles. In actuality, it requires that conservation initiatives be planned with clear cross-pillar measurements from the start, such as monitoring changes in family income and participation rates across age and gender groups in addition to coral cover, to guarantee that integration is measured rather than only presumed.

CONCLUSION

To sum up, WWF-Malaysia's efforts in Tun Mustapha Park (TMP) show a purposeful and generally successful implementation of the Three Basic Pillars Theory. WWF delivered quantifiable ecological improvements, such as a 20.8% increase in live coral cover and a 30-fold increase in fish biomass, through environmental interventions, such as the MARRS reef restoration system. Socially, the group built community government institutions, restored the traditional practice of gotong-royong, and promoted local stewardship through cascade training. Ecotourism and coral adoption initiatives started to diversify local livelihoods, and localized supply chains cut restoration costs by 40%. There is clear synergy between the three pillars: community capacity facilitated enforcement patrols (environment–society), habitat restoration enabled tourism revenue (environment–economy), and financial incentives promoted long-term stewardship (economy–society).

However, a thorough analysis of these successes indicates enduring issues that limit WWF's activities' long-term viability. According to the literature and WWF's own patrol data, persistent threats like overfishing, fish bombing, and turtle egg poaching persist within TMP. Furthermore, the economic component is still partially reliant on outside project funding, such as the RM450,000 EU grant, which raises concerns about the sustainability of livelihoods and restoration efforts once donor support ends. The shift from facilitated projects to locally sustained systems is further complicated by governance gaps, such as the partial transfer of financial and administrative responsibilities from WWF to Sabah Parks and the lack of formalized conflict-

resolution mechanisms when conservation goals conflict with subsistence needs. These restrictions highlight the fact that integrating the three pillars is a continuous effort rather than a finished goal, but they do not negate WWF's achievements.

This work makes two significant contributions to the field of marine conservation research and practice. In order to examine NGO-led marine protected area governance, it first operationalizes the Three Pillars Model as an analytical framework. This goes beyond descriptive accounts of activities to evaluate the causal interactions between environmental, social, and economic objectives. By doing this, the study shows that the pillars are dynamically reinforcing or occasionally conflicting dimensions that call for intentional trade-off management rather than just coexisting domains. Second, the results provide policy-relevant insights: successful MPA governance necessitates financial mechanisms such as conservation trust funds with co-financing requirements that outlast short-term grants, transition roadmaps that gradually eliminate reliance on NGOs, and legally anchored community co-management. Practically speaking, WWF's experience demonstrates that localized supply chains, cascade training, and culturally grounded collective action are reproducible tactics but only if exit strategies and governance handovers are planned early on.

Ultimately, WWF-Malaysia has served as a TMP integration mediator, purposefully arranging interventions to provide cross-pillar co-benefits. However, even well-integrated models run the risk of reversibility if structural risks and financial dependencies are not addressed. A significant chance to codify this integrated approach into long-lasting, locally managed systems is presented by the proposed Coral Restoration Roadmap (2025–2026). This stage will determine whether TMP becomes a high-potential but unfinished experiment or a long-lasting paradigm for marine conservation.

Acknowledgement

First and foremost, I would like to take this opportunity to thank God for His blessing and amazing grace, which enable me to accomplish my assignment on schedule. In addition, He gave me the best answers to my concerns, thus I was able to solve them with His assistance. However, I would especially like to thank my dear supervisor, Dr. Haijon Gunggut, who has always encouraged and supported me in many ways and helped me with my difficulties in order to finish this research in a patient and professional manner. Most importantly, I appreciate all of your helpful suggestions and

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your constant reminders to give this paper my best effort. I also want to express my gratitude to both of my parents for their unwavering support, particularly in the financial area, and for preparing me with so many wise words that I will carry with me for the rest of my life. Finally, but just as importantly, I would like to take this chance to personally thank you to all of my friends, who always provide me advice when I need it and provide moral support. In addition, I was grateful for all of your assistance in enabling me to acquire new information and innovative perspectives while completing this assignment.

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