JCSH

JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES

JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES (JCSH)

Volume 12, Number 2 (July-December), 2025

Editor's Note

The JCSH continues to focus on publishing research works on various contemporary issues in social sciences and humanities. In this issue, we are delighted to present eight (8) research articles from various academic disciplines. In addition, these articles are related to several Asian countries.

In the first article, Chatchanok Thaohirun and Nutthathirataa Withitwinyuchon studied the causal relationship between foreign policy and geopolitics, using a case study of Thailand during the Third Indochina War. The authors affirmed that there was a connection between foreign policy and geopolitics. Based on sea-power, land-power concepts and Rimland theory, the authors concluded that Thailand was neither a land power nor a sea power. In addition, the authors proposed the idea of a hybrid geopolitical power to explain Thai foreign policy.

In the second article, Phirapat Mangkhalasiri and Krisanaphong Poothakool examined the current state of data science in Thai policing by comparing it with examples in the United States, United Kingdom, Singapore, South Korea, and Japan. The authors identified both opportunities and challenges that influenced how data science could be used within Thai policing. In addition, the authors proposed a set of policy recommendations for the Thai government.

Next, Aranee Vivatthanaporn and Navapat Narongsak investigated problems in the Thai justice system regarding psychiatric patients at high risk of committing violence. The authors identified four key problems: 1) Manpower (a shortage of correctional and police officers, a lack of medical professionals with relevant expertise, etc.); 2) Insufficient budget (money); 3) Materials (insufficient inpatient bed capacity due to the limited number of psychiatric hospitals, etc.); and 4) Management (prolonged justice system procedures and treatment duration, etc.). In addition, the authors gave recommendations for improving the Thai justice system.

In the fourth article, Yada Wornyordphan and Kannika Damrongplasit studied the impact of the old age pension on subjective well-being in Thailand for those aged 60 and over. Based on a random-effects ordered logit model and an ordered logit model, the authors found that the old age pension has a minimal impact on subjective well-being, relative to other non-financial factors. In addition, the authors found that subjective well-being decreases with age, but increases with marriage, living in urban areas, better health status, and higher income perception.

In the fifth article, Cara Sasa Trirat and Sasiphattra Siriwato studied climate change mitigation by the Bangkok Mass Transit System (BTS) and the effects of clean energy and transportation policies in the city. The authors concluded that the BTS was the country's first carbon-neutral rail service, significantly reducing greenhouse gas emissions through electric-powered operations. In addition, the authors emphasized that Bangkok's clean energy and
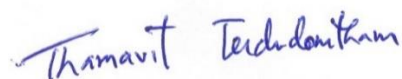
transportation policies promoted the adoption of renewable energy and electric vehicles, and improved air quality and public health.

In the sixth article, Parisa Musigakama, Sasikan Srisopon, and Aamaal P. Chimvilaisup, using an action research approach, integrated contemporary education practices with the conservation of wooden boat craftsmanship heritage in Ayutthaya. The authors found that the art- led activities effectively supported students' curiosity and raised their appreciation for Ayuthaya's identity as a "City of Water".

In the seventh article, Lin JieRu and Eakachat Joneurairatana studied the influence of Taoism's 'unity of heaven and mankind' and Confucianism's 'people- oriented' concepts on architectural features of Hakka culture, especially the Fujian Shen Yuan Tulou culture. The authors combined the philosophical nature of Hakka culture with modern digital technology, which supports the inheritance of Hakka Tulou culture.

Last but not least, Mellianne Mangana studied the authorial voices of op-ed writers in their opinion on former Vice President Leni Robredo during the May 2022 Philippine elections, using the Appraisal System Framework and Critical Discourse Analysis (CDA). The author suggested that understanding evaluative language can assist reader voters in forming opinions and navigating the influences of the media in political discourse.

We always welcome your manuscripts and appreciate your comments. Links to our manuscript submission site can be found at the JCSH Online Submission and Review System: https://so12.tci-thaijo.org/index.php/jcsh. We look forward to hearing from you and would like to express our appreciation in advance.

Editor-in-chief

JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES
(Formerly RANGSIT JOURNAL OF SOCIAL SCIENCES AND HUMANITIES)

Volume 12, Number 2, July-December 2025

CONTENTS

Thailand's Geopolitical Power and Shaping of its Foreign Policy during the Third Indochina War

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Abstract

Geopolitics has become an important part of the study of international relations. Within that field of study is the concept of geopolitical power and the Rimland theory. This study utilizes the two forms of geopolitical power, land-power and sea-power, and the Rimland theory in analyzing how geopolitics affects foreign policy through the examination of Thailand's foreign policy actions during the Third Indochina War to determine what Thailand's geopolitical power was/is and to determine the connection between foreign policy and geopolitical power. This study utilized a secondary source, supported by semi-structured interviews with diplomatic officials with experience in foreign policy, to lend insight into the foreign policy actions. The study affirms that there is a connection between foreign policy and geopolitics, both negative and positive, in the construction of the national power required to conduct wider foreign policy choices. The study concluded that Thailand leaned towards being a sea-power, but could not be categorized as one, highlighting the need for a hybrid geopolitical power categorization. The implications of such are a more accurate categorization of insular countries within the Rimland theory, and supporting the explanation of the power potential and importance of these countries in geopolitics.

Keywords: Geopolitics, Sea-Power, Land-Power, Foreign Policy, Thailand, Third Indochina War

1. Introduction

Geopolitical power is defined as the relationship between geography and other factors in the distribution of power in the world (Sprout, 1954). This is an important concept as geopolitics itself is rooted in realpolitik and is a sub-field of realism which deals with power and behavior. Deudney (1997) notes that the relationship between realism and geopolitics, most forms of geopolitics are actually types of realism and many insights of realism were first made by geopolitical theorists before the coining of the term realpolitik. Within the study of international relations, realism is broken up into four different kinds of power: hard, soft, economic and smart power. These forms of power go into constituting the abilities of the nation-state in carrying out policy. Geopolitical power proposes that these forms of power that make up national power are constructed and affected by geopolitical factors. This paper focuses on two forms of geopolitical power which are broken up as the following: sea-power and land-power.

Foreign policy is defined as the sum of a state's activities and interaction in relation to foreign states and non-state actors, with instruments comprising economic and trade policy, foreign aid, diplomacy, military action, and participation in international organizations (Eskenazi, 2015). Foreign policy therefore encompasses policy that is directed at or affects foreign entities. To understand how foreign policy is influenced by geopolitical power, one must view it in terms of grand strategy. Grand strategy is a set of guidelines that shape foreign policy and its associated instruments designed to maximize the pursuit of a national interest/goal (Eskenazi, 2015). Here, geopolitical power is viewed as that 'set of guidelines' as it constructs and impacts the instruments available for the conduction and implementation of foreign policy and national interest. Nicholas Spykman, a geopolitical theorist, viewed geography and foreign policy as interwoven elements. For him, geopolitics was a specific field of foreign policy utilizing analysis of geographical factors to formulate adequate policies for the achievement of justifiable ends; often said ends were security related. Because of this, geopolitics becomes more than just static topographical positions, but rather it refers to "areas determined on the one hand by geography and on the other

by dynamic shifts in the centers of power, and what results is that the struggle for power itself will bring certain areas into prominence, push others into oblivion, and lead to the expansion or contraction of specific areas under consideration (Spykman et al., 1944)". The general aim of this paper is to examine the relationship between foreign policy and geopolitics and to argue that foreign policy is shaped by geopolitics.

This paper aims to contribute by drawing a greater amount of attention to the usage of geopolitical power in explaining and predicting foreign policy and its application to lesser powers. It also seeks to enhance understanding of the geopolitical power of Thailand - the focus of this research paper - through a case study of its foreign policy actions during the Third Indochina War and by relating these actions to established characteristics outlined in the geopolitical power theories. Thailand occupies a central position in mainland Southeast Asia and is part of the Indo-Pacific region, which has recently regained strategic importance in the eyes of major world powers. Thailand was not chosen at random as the country of focus but due to its unique status as it is somewhat of an outlier in the grouping of Southeast Asia. The country is not a big power but rather a medium power country. Despite this, Thailand has played a major role in regional politics such as being the originator for the idea of ASEAN and the neutral mediator that allowed the first five members to cooperate and form the organization after the failure of SEATO and MAPHALINDO. Its geopolitics is unique due to being a peninsular country, being able to be affected by both landward and seaward influences. This is seen in the past as it was a major naval trading hub and in the present through government policies to interconnect landward trading routes with its neighboring countries. During the colonial era it was never colonized and acted as a geographical buffer between the colonial territories of the United Kingdom and France. During World War Two, it was not conquered and annexed by Japan unlike the rest of the European colonies in the region, and during the Cold War, it was a staging ground for supporting the operations of the United States during the Second Indochina War. By the Third Indochina War, Thailand now had to pursue foreign policy independent of a big power backing.

Geopolitics is normally focused on big power countries, and it is no different when talking about the theories applied here. This paper will attempt to use it to analyze and look at a medium power country. More importantly, this is in the context of a medium power being analyzed where it cannot bandwagon with a big power; therefore, it cannot skew analysis of independent foreign policy action as it must now act in its own capacity which is required to understand how its foreign policy behavior reflects tendencies of the two geopolitical power theories. Therefore, allowing the induction and understanding of how geopolitical power influences and constructs foreign policy and figuring out what geopolitical power Thailand adheres to. This is why this research is focused on Thailand during the Third Indochina War, as it can no longer bandwagon with a big power and have them influence their foreign policy. Doing so will also help to shed light on using theories mainly applied to big power countries and their viability in examining other powers or whether it will need adjusting. For Thailand itself, figuring out the geopolitical power it adheres to will not just help in understanding its foreign policy better, but may also allow for better formation of foreign policy by understanding their competency.

This research paper has six sections. The first section will define terms and go over relevant literature. The second section will outline the objectives of the research. The third section will explain the methods and materials used in conducting the research. The fourth section will detail the findings of the research. The fifth section will discuss the findings and relate them to the objectives of the research. The sixth section will provide a brief conclusion to the research paper.

1.1 Literature on the Theories: Sea-Power, Land-Power and Rimland Theory

Sea-power is a concept first introduced by Admiral Alfred Thayer Mahan, and therefore he provides much of the definition of terms under the concept. Sea-power puts emphasis on the control and utilization of water routes, both riverine and oceanic, which can produce the most geopolitical power for a nation and its development. The origins of this approach typically result from peaceful naval commerce. It has six core principles which are the following (Mahan, 1890): 1) geographical position, 2) physical conformation, 3) extent of territory, 4) number of population, 5) character of the people, and 6) character of the government.

Geographical position is quite straightforward in the requirement of having access to waterways as a means of building national power through the sea but also has some nuances. A nation with no or limited land boundaries but access to waterways may end up directing all its focus upon said waterways for development, giving it a natural inclination towards national development through sea-power and therefore an advantage in pursuing sea-power (Mahan, 1890). An example of this is the United Kingdom up to the end of the Second World

War. But at the same time, having access to waterways may not exactly translate into immediate higher potential for sea-power. An example of this is the United States, which prior to the construction of the Panama Canal, saw it divided between two oceans with no short route to reach the other, which hindered the ability for the concentration of naval forces to meet threats in force and this resulted in the dispersion of forces as the most optimal defensive strategy (Mahan, 1890). Even in modern times, these limitations still remain in moving crucial navy forces through it. The United States' Nimitz-class carrier, built in 1975 with a beam of 40.84 meters, could not initially traverse through the Panama Canal due to Panamax terms setting the maximum beam at 30.8 meters but could go through the Panama Canal after the expansion with the Neopanamax in 2016, which allowed for beams up to 51.25 meters.

Physical conformation refers to the features of the land in reference to waterways. Elements to consider include number and accessibility of bordering seas from the seaboard, depth of water, tributary rivers, and number, capacity and defensibility of ports and harbors (Mahan, 1890).

Extent of territory refers simply to the length of a nation's coastline in relation to the population number and the character of its harbors (Mahan, 1890). A long coastline but a small population results in diminished sea-power as defending that coastline requires a dispersion of forces, which can be easily defeated in detail. The character of its harbors refers to the state of the harbors and their positioning (Mahan, 1890).

Number of population does not refer to the total number of people within a nation but the number of manpower engaged in naval activities and activities that support naval activities and the number of manpower available that can be engaged in those activities (Mahan, 1890).

National character refers to the character of the people of the nation regarding activities concerning the sea, typically in regards to commerce (Mahan, 1890). This assessment comes from a historical perspective where the most powerful European nations, for instance, the English and the Dutch, had sought economic power through overseas activities both in the form of colonial establishments and trading (Mahan, 1890).

Character of government represents the role the government plays in the development of sea-power. It encompasses policy decisions related to maritime management both in peace and in war. According to Mahan (1890), during peacetime, the government should favor policies that allow for the natural growth of people's industries and tendencies to seek gain via the sea and if such spirit does not exist then the government can take it upon themselves to develop it.

In terms of behavior, sea-powers have a tendency to build a large navy and design an aggressive strategic doctrine based around their usage. This is chiefly due to the average size of a country that adopts the usage of sea-power for often they lack the one thing that land-powers have in excess: land-mass. For example, England, the Netherlands, and Japan are all sea-powers that have made a mark upon the oceans in history and were contenders for regional and even global powers despite being much smaller than their adversaries. The core issue for them in a land battle was that they had too little territory to give, and their key city centers were located close to their coastline. The only viable defensive option is to rely upon the navy, whose chief job during the defensive stage of a war is to prevent a naval invasion (Mahan, 1941). Another hallmark of typical sea-power behavior is having or acquiring forward bases for the navy, mainly to help with force projection and provide security for their sea-borne commerce (Mahan, 1941). Lastly, sea-powers often do not act alone but prefer to act in tandem with allies and often seek out allies and these allies have a pattern of being land-powers themselves. For example, the United Kingdom during the Napoleonic Wars allied with land-powers like Prussia and Russia against France. Then later, during World War One, it allied with the French to contain the German Empire.

Land-power is a concept first introduced by Halford Mackinder through his heartland theory. For Mackinder (2004), power lay in the Eurasian region rather than the sea and water routes of the world, so controlling the Eurasian heartland was key to constructing power. Another theorist, Major General Dr. Karl Haushofer, presented similar notions in regards to land-power. While most of them contend with the concept of Raum or 'room' (Linn, 1961), his intentions were nationalistic in nature, as his concern was with restoring Germany's status as a major power after World War One (Sprout, 1954). Within the five fundamental ideas of his school of thought, Haushofer, when discussing sea-power versus land-power, states that land-power centered at the heart of the 'world island' of Eurasian and Africa would prevail over sea-power nations (Linn, 1961). Therefore, a major point for land-powers is having lots of land and being very territorial over it, which translates into their behavior. Key examples of stereotypical land-powers are, unsurprisingly, those situated in Eurasia like Russia and China.

According to Dr Sarah Paine (Hudson Institute, 2018), land-powers view neighbors as dangerous, and any instability will cross over borders. But stable neighbors were not also desirable as their agendas may be contrary to the land-power's interest. The purpose of the military therefore was for protecting the ruling regime, garrisoning the empire and for border defense with very few outside expeditions. As a result, land-powers are of a more defensive disposition which shows readily in the way they fight and design their hard power resources. This also means that they start less wars than a sea-power would and when they do start a war, have little chance of winning. Clear examples of this occurring are the Russo-Japanese War, the Soviet-Afghan War and even the War in Ukraine, which has stalled for the Russians. This is of course due to their defensive disposition as it is hard to win a fight when the preparations made are for that of a defensive battle. When the offensive stalls, land-powers go back to doing what they are good at: digging in and defending, hoping to wear down their opposition. In a defensive war like the eastern front of the European theater in World War Two, it can be effective but in an offensive war like the War in Ukraine, it can be quite meaningless. When translating land-power into hard power, one finds an inherent defensive advantage as no other power relies so much on geographical positioning as do land-powers. The defensive advantage is derived from the principle of interior lines and communications lines (Mahan, 1941).

The Rimland, also called insular states, was initially introduced by Mackinder as the peripheral region of the heartland. Spykman argued that the most important region of the world was not the heartland but its peripheries or the rimland. When writing about the power dynamics of the Rimland, Spykman identifies that in East Asia, China would be the dominant power given two factors: that it is properly unified and that Japan's military power is completely destroyed. Arguably in the present this is true as China is largely unified now and Japan's military power is largely not of its own but borrowed from the United States. Furthermore, countries that had become global powers had become so through domination of rimland territories. Britain for example, despite being a small island had become a global power through its control of the Rimland. In contemporary times, the United States maintains control and influence over a vast area of the Rimland and also over a number of island chains in the Pacific which Spykman writes that any western power wanting to retain influence in East Asia, they will have to establish island bases power and such bases would likely be sufficient in contesting Chinese dominance over East Asia.

1.2 Literature Review on State's Geopolitical Power and Foreign Policy

They have already been several works in connecting a state's geopolitical power with foreign policy. This sub-section will go through a few of those works.

Parsaei et al., (2020) in their research, "Identifying Geopolitical Factors Affecting Foreign Policy," identify 56 factors which they grouped into seven categories: 1) geographic factors, 2) demographic factors, 3) economic factors, 4) political factors, 5) defense-security factors, 6) regional factors, and 7) global factors. The research highlights that among all the factors that go into the making of foreign policy, geopolitical factors are the most important, but conclude that there is not enough research into which factors matter the most in the making of foreign policy (Parsaei et al., 2020).

McInteer (1959), in "The Significance of Seapower to the United States," writes that the US is dependent both economically and militarily upon maritime transportation. The protection of sea lines of communication is a prerequisite and therefore sea-power has become an integral part of American security and survival. The fact is that sea-power allows the US to freely pursue its foreign policy, in the past piggybacking off of British sea-power before presently having to rely on its own sea-power (McInteer, 1959). The strategy of sea-power for the US is similar to the geopolitical thinking of Nicholas Spykman in that US security depended on maritime control of the Rimland. The security and safety of the United States depended upon control over her lines of communication and the avenues of approach to her borders. As a result, the reverse of the loss of control over these factors would reduce US power and its ability to carry out foreign policy (McInteer, 1959). As such, the greatest threat to the US and the pursuit of its national interests would be a Eurasian continent-based nation-state with absolute control or control through coalition of the maritime periphery (McInteer, 1959). Sea-power is the self-sustaining means by which the US can "achieve its national goals of security and prosperity" (McInteer, 1959).

Similarly, in his book, Admiral James Stavridis (2017) describes the usage of sea-power in the manner of a strategic concept or what this paper would refer to as a directed [foreign] policy. He explains it as "the ability to use sea-power to ultimately contain powerful nations that have concentrated their use of force ashore, ignoring

the sea out of lack of interest, or an inability to see the force of sea power argument, or simply because they lack the geography, character, or political will to exploit the oceans" (Stavridis, 2017).

In the sphere of nations in Southeast Asia, Alatas (2021), in "A Malaysian Perspective on Foreign Policy and Geopolitics: Rethinking West-Centric International Relations Theory," provides a Malaysian perspective on foreign policy and geopolitics. The article describes the impact of Malaysian culture, based on historical pre-colonial texts and cultural practice, upon its foreign policy stance and views on geopolitics; namely the concept of *Kerajaan,* recognition by others of the raja-centered government, and *Nama,* prestige. Kerajaan is a ruling concept focused on ruler-subject as opposed to western ruler-territory foreign policy and is carried out by the ethnic Malay due to the fact that foreign policy choices are made by the ruling elite. It is the ethnic Malay that is the majority group that has consistently held political power; therefore, policy decisions made by the Malay elite are geared toward their own political survival (Alatas, 2021). Security, economic, and political choices are aimed at legitimizing the current regime and that legitimation is achieved by what can be identified and prioritized as foreign policy problems (Alatas, 2021). Pre-colonial Malaysia was already an internationally connected maritime polity with multiple trading nations and multiple diplomatic missions, as a result of its geographic position, which necessitated a more fluid concept of leadership (Alatas, 2021). For Alatas (2021), this also highlights an ability to be flexible in policy. When it comes to *Nama* and foreign policy, Alatas (2021) mentions that external engagement enhances Malaysia's prestige, evident in its many diplomatic missions around the world, while reinforcing the economic and political benefits for the domestic elite. As a result of this understanding of Malaysia's geopolitics being based upon the aforementioned *Kerajaan* and *Nama* in its foreign policy, Alatas (2021) explains that to view Malaysia's behavior from a Western perspective would be wrong. For example, in regards to Sino-Malay relations, it would construe Malaysia as bandwagoning with China even though it is actually normal behavior as Malaysia has no preference to align with any power.

1.3 Thai Foreign Policy During the Indochina Wars

This sub-section will detail a selection of literature on Thai foreign policy during the Indochina Wars.

Maisrikrod (1992) highlights that Thai foreign policy had always been reactionary, like traditional assertions of bamboo diplomacy not proactive during the Cold War, but Thailand attempted to change its reactionary stance towards Indochina in the post-Cold War environment. Additionally, Buszynski (1982) provides a similar outlook to Maisrikrod in viewing that Thailand's foreign policy is reactionary in the form of bamboo diplomacy hedging between major powers as a means of protection against security threats. Thailand had allied with the US as it was opposed to Vietnam, which was a historic enemy, but found itself in the middle of a foreign policy crisis after the US withdrew from Vietnam. Buszynski (1982) believed that Thai foreign policy was one that was developed as a means to protect Thailand by catering to the dominant regional power which was shifting during the post-Second Indochina War period.

Sirichote (1986) writes on the connection between traditional realist theory and Thai foreign policy, presenting that Thailand's foreign policy had always been realist in nature. According to Sirichote (1986), "realism influences the foreign policy of all states" and a "realistic foreign policy must be flexible and able to adapt to changing conditions". In Sirichote's (1986) opinion, Thailand had a reputation for having a realistic traditional diplomacy among Asian nations and Thai foreign policy has always been determined by its realist bent and implemented through balancing major powers and leveraging them against perceived threats. This can be seen in the work by Suhrki (1971), who notes that the US was a major ally and a preferred foreign policy tactic of Thailand was to accommodate a big power. However, the US withdrawal had compounded several problems for Thailand and had created a diplomatic dilemma for them during the beginning of the 1970s. The first was economic, as Thailand faced a recession due to its continued reliance on an agricultural-heavy export economic model and its insufficient foreign reserves to weather a prolonged balance of payments deficit. The US withdrawal also created fears that the US would stop investing in Thailand, as it no longer had need of its military bases, thereby reducing the strategic significance of Thailand to the United States (Suhrki, 1971). The second was security due to the withdrawal of US forces. Additionally, nationalism in Thailand also saw a surge. This was not just due to the withdrawal of the United States from Indochina, but also because Thailand felt betrayed by the United States due to negative rhetoric from politicians in Capitol Hill which was not only just directed at the Second Indochina War but also at Thailand itself (Suhrki, 1971). The strained relationship was further compounded by US protest against Thai legislative changes to reduce favoritism towards foreign businesses which

included other countries and not just the United States alone; as one of the changes was aimed at reducing competition from Japanese investors (Suhrki, 1971).

Furthermore, the Thai government had become exasperated at the American style of diplomacy, which was found to be unpredictable, and the disclosure of a secret Thai-American pact in the senate without the consent of the Thai government were major blows to Thai sensitivity and pride (Suhrki, 1971). During that time, much of Thai foreign policy was devised by Minister of Foreign Affairs, Dr. Thanat Khoman, with little input from officials in the Ministry of Foreign Affairs and the newly reintroduced parliament (Suhrki, 1971). This is because parliamentarians regarded foreign policy as his exclusive domain and did not interfere due to lack of information and knowledge about foreign affairs (Suhrki, 1971). The Thai pursuit for regional cooperation was due to Dr. Thanat's view that ASEAN and ASPAC could become major pillars for a Pax Asiana; that rather than using military alliances, political and economic cooperation would be better for strengthening the smaller Asian countries (Suhrki, 1971). The increase in nationalism also made this move easier as it was an approach that rejected direct involvement from the West and focused on indirect involvement from major powers in the region as a countermeasure to Asian Marxist influence in Southeast Asia.

It should be noted that Dr. Thanat did not view regional cooperation as a form of neutralism as neutrality in the conflict between the free Asian nations and Asian Marxism was an impossible policy to achieve (Suhrki, 1971). Thai regional cooperation was somewhere in between Bandung neutralism and military alliances. The shift in foreign policy from being an accommodation tactic toward bigger powers to one influenced by self-reliance and regional cooperation shows a desire to be more flexible in foreign affairs, but it found itself constrained domestic issues and a lack of options on the external side (Suhrki, 1971).

Following up on the timeline of the conflict, Phonprapai (2021), in her doctoral thesis "Battlefield to Marketplace: Responses to Thailand's Major Foreign Policy Change," analyzes Thailand's foreign policy change from conflict to cooperation with communist countries during the Third Indochina War—focused mainly on the end of the conflict. The thesis falls within the field of foreign policy analysis, with a focus on leadership in the decision-making process. Phonprapai (2021) writes that "Chatichai's policy seems to go against what has been described as bamboo diplomacy in the practice of Thai foreign policy" and argues that Chatichai's decision to introduce a new policy was influenced by his judgement of the trends of events of an ever-evolving situation, combined with his own personality and experience. For Phonprapai (2021), what made Chatichai's diplomacy stand out from the past is that it caught most people by surprise and appeared to go against the general agreement on the handling of the Cambodian problem.

Phonprapai (2021) takes a similar approach to the discipline of foreign policy analysis and describes the various people and institutions that made up Chatichai's advisory, decision-making, and implementation team— as well as the operational environment of Thailand which included its economic capability, degree of democracy and the security imposed by the presence and incursions of Vietnamese troops on to Thailand. All of this formed the context for policy-making. According to Phonprapai (2021), typical bamboo diplomacy in Thai foreign policy was flexible but initiated following the footsteps of a major power, Chatichai on the other hand had moved to initiate his foreign policy independently before any major power had made a move. Chatichai believed that there was more to be gained by peaceful trading with Indochina, as opposed to sanctioning them (Phonprapai, 2021).

1.4 Addressing the Literature Gap

There has been little to no research on the application of the concepts of geopolitical power to Thailand, let alone on applying the theories to lesser powers. The literature reviewed in the above sections focused on either applying the theories to major powers or using a traditional approach of foreign policy analysis when looking at the foreign policy of Thailand. The fact of the matter is that geopolitics, itself being related to traditional realism, is often focused on nation-states that are big powers and not nation-states that are small or middle powers. The theories used in the explanation of geopolitical power in this paper also do not originate from contemporary political thought but rather from other fields. As mentioned in their relevant sections, land-power is a concept initially introduced by Halford Mackinder, who is a geographer; sea-power, within this paper, is a concept largely introduced by Admiral Alfred T. Mahan, who is a naval theorist, and his works are more prominent in military theory as opposed to political theory. Nonetheless, this paper has chosen to use these theories as a practical means of understanding the behavior of nation-states. While the methods reviewed in the literature are viable for analyzing foreign policy, this paper argues that the approach of using geopolitical power will have the advantage

of being able to predict future behavior as it identifies common behavior and strategy inherent in adherents of the specified geopolitical power theory.

2. Objectives

1) To examine the causal relationship between foreign policy and geopolitical power.
2) To explore how Thailand's geopolitical stance affected its foreign policy choices during the Third Indochina War.

3. Materials and Methods

The research of this paper was done under the qualitative research method with an inductive approach, as the research method of this paper is documentary analysis with support from semi-structure interviews to determine which geopolitical power theory has shaped Thai foreign policy through the examination of correlating patterns to each theory with the end goal of answering the research questions and objectives.

The documentary analysis was done on a secondary source written by H.E. Surapong Chaiyanam who was Ambassador to Hanoi from 1991-1992 and was a diplomatic officer to Vietnam prior to that, which gave him direct knowledge and access to Foreign Ministry archives of foreign policy and decisions during the Third Indochina War - therefore making him the best source of information on what occurred during that time from a diplomatic standpoint and the information gathered is further supported by semi-structured interviews with Thai diplomats and military officials to correlate data and provide additional data on Thailand's geopolitical power and foreign policy during that time.

The selection criteria required were: 1) a field of expertise and/or experience in international relations and related fields, 2) an occupation in diplomatic and/or related occupations, and 3) 8 or more years of experience for the purposes of ruling out junior officers. The semi-structured interviews were done with a predetermined questionnaire but additional questions were asked in relation to the specialty of the interviewee to attain additional data.

All interviewees have provided consent to their answers being used in the research but their names have been withheld from this paper and direct quotations due to reasons of privacy and permissions. As such, the interviewees have been labeled as Participant A, B, C, D, E, and F throughout the research with no relation to the numbering in the table below.

The primary method of the semi-structured interview was through the distribution of questionnaires with common questions and if deemed necessary as a result of the specialty of the interviewee, specific targeted questions were asked. This was chosen as the primary method due to the availability of the interviewees as a result of their occupations, and it was regarded as the least intrusive method. The secondary method of the interview was conducted through telecommunication and recorded through notation. The way the data from here was analyzed involved looking for correlations between the common question answers to improve validity of the answers by providing a general consensus; and then with comparison to historic events, it aimed to provide an answer to the questions. The answers provided by the targeted questions will be used to provide extra evidence in answering the research questions. There is no time frame for the study as it mainly focuses on events in the past and not the present and therefore is not an everchanging situation; but the interviews were conducted between the months of September-October 2024.

The research was framed under the understanding that the national power of a country is constructed by its geopolitical power and, as a result, foreign policy actions can be determined by geopolitical power as foreign policy choices themselves are limited by national power. As a result, the geopolitical power of a country can be seen through its geography and foreign policy actions.

Table 1 Interview Participant Information

No.	Name	Position	Affiliation
1	Undisclosed	Minister (Economic and Financial)	Undisclosed
2	Undisclosed	Former Thai Ambassador to Kenya, Egypt and Germany, Former Deputy Permanent Secretary of Foreign Affairs	Ministry of Foreign Affairs
3	Undisclosed	Former Thai Ambassador to the United States and United Kingdom	Ministry of Foreign Affairs
4	Undisclosed	Navy Attaché	Royal Thai Navy
5	Undisclosed	Counsellor	Undisclosed
6	Undisclosed	Minister Counsellor	Undisclosed

4. Results

The ultimate aim of Thai foreign policy with regard to the Invasion of Cambodia was for the Vietnamese to withdraw their troops from Cambodia without any conditions and for the Cambodian people to self-determine without any outside interference. Thailand could not pursue an isolationist foreign policy and therefore had to pursue an independent approach and contain Vietnam on its own due to a lack of national power and powerful allies with mutual perceptions of the threat at hand, with the exception of China (Participant A and E, Personal Communication, 24 September and 14 October 2024). Thailand focused on the support of ASEAN as both a regional mechanism and international mechanism within the United Nations and pushed to internationalize the Cambodian problem. This was also done to counter Vietnamese efforts to ASEANize the problem and therefore lessen international pressure on them to withdraw from Cambodia. It was also done to counter the stances of Indonesia and Malaysia who wanted to regionalize the problem and made efforts to sign an agreement to make it de jure to them. However, Thailand was able to use its status as a frontline state in the conflict to get them to back down (Chaiyanam, 2017). These maneuvers, overall, helped to create a sense of ASEAN togetherness in dealing with the issue and hampering any Vietnamese efforts to divide the organization.

To this end, the organization of ASEAN was crucial to the success of Thai foreign policy. ASEAN had been established in 1967 as a result of the non-communist Southeast Asian nations realizing the impact of communism in the region although with different perceptions on the threat-the failure of SEATO in resolving security issues in the region compounded by the withdrawal of the United States, and for promoting the development of national economies and nationalism, partly due to the number of newly independent Southeast Asian nations. For Thailand itself, it was also to help protect its own sovereignty from interference by foreign powers (Participant A, Personal Communication, 9 October, 2024). Additionally, economic development would help combat domestic communism, in the same logic applied by the Marshall Plan.

ASEAN was considered a diplomatic success by Thailand following the foreign policy ideology laid out by Dr. Thanat Khoman (Participant F, Personal Communication, 23 September 2024). Thailand was too small to call on or bring in another major power falling the exit of the United States but was still regionally powerful enough to unite the non-communist members to form ASEAN-following the failures of Association of Southeast Asia, MAPHALINDO, and the Southeast Asia Treaty Organization (Participant C and F, Personal Communication, 23 September and 10 October 2024). The situation and the concerns during that time of Indonesia, Malaysia, Singapore, the Philippines, and Thailand that contributed to the decision to form ASEAN were: 1) the threat of China and the communist bloc as China was viewed as a security threat for supporting Communist insurgent groups in Southeast Asia and calling for a communist uprising to overthrow the governments in Malaysia and Thailand; 2) the formation of ASEAN allowed for stronger bargaining power against the more industrialized and developed countries. Additionally, the British and the Americans have always guaranteed the security of these countries but the British would withdraw their military forces from the region in 1967, which resulted in a power vacuum that could have been exploited by another major power; 3) the leaders of ASEAN were looking to develop their countries not just in terms of security but also economically, which

required an environment that supported that growth. ASEAN helped in providing support for domestic stability through non-interference measures; 4) ASEAN followed the Thai foreign policy style of being flexible as it provided an alternative to relying on a major power (Participant F, Personal Communication, 23 September 2024).

While the aims and purposes of the Bangkok Declaration are mainly in the fields of economic, social and cultural development; the true aims and purposes of the organization that were not stipulated were related to war, stability and regional security as ASEAN was created during a time of major regional conflicts and proxy wars (Participant F, Personal Communication, 23 September 2024). The Second Indochina War was still ongoing, and China was supporting the communist countries of Southeast Asia and had pulled Laos and Cambodia into the war. As previously stated, the ASEAN members had different perspectives on the conflict. Thailand and the Philippines supported the United States through SEATO, and the United States had effectively acted as a security umbrella for Southeast Asia. Malaysia and Singapore relied upon the Five Power Arrangements for their security as Britain, Australia and New Zealand had ground and naval forces stationed in Singapore (Participant F, Personal Communication, 23 September 2024). As a result of the security provided by western countries, ASEAN in its first few years saw little progress in any forms of cooperation.

But the end of the Second Indochina War would change things. Thailand was already aware that the United States was losing the Second Indochina War-both on the home front and on the battlefields in Vietnam. There was a power vacuum left by the US withdrawal which ASEAN could fill to deter any more foreign major power interference in the region (Participant C, Personal Communication, October 5 2024). The political changes within Thailand in 1973 (Chaiyanam, 2017) and the absence of strict adherence to US strategy against communist countries changed Thai views on security and its stance towards Vietnam, Laos and Cambodia shifted it from being focused on an ideological factor to a more geopolitical factor. This allowed Thailand to be flexible in dealing with Vietnam on all occasions.

It was on December 25, 1978 that Vietnam invaded and occupied Cambodia. The political landscape of regional politics would change as a result and was moreover, heavily affected by the Sino-Soviet split and Nixon's visit to China to normalize relations. China in a way had already begun to act as a counterbalance to Vietnam's power and Soviet influence in Southeast Asia (Participant F, Personal Communication, 23 September 2024). Thailand, who now shared a border with Vietnam through the Thai-Cambodian border was faced with a refugee crisis as a result of the invasion of Cambodia (Participant F, Personal Communication, 23 September 2024). The invasion of Cambodia did cement the need for ASEAN countries to have closer cooperation in all fields, which led to the first ever ASEAN summit in 1976 and the subsequent production of the Declaration of ASEAN Concord. In it was the declaration of intent of ASEAN member states to increase security ties with one another in terms of political collective security Asia (Participant F, Personal Communication, 23 September 2024).

4.1 Thai Foreign Policy during the Third Indochina War

Thailand could not pursue an isolationist foreign policy and therefore had to pursue an independent approach and contain Vietnam on its own due to a lack of national power and powerful allies with mutual perceptions of the threat at hand-with the exception of China (Participant A and E, Personal Communication, September 24 and October 14, 2024). Thailand and China would contest the Vietnamese solely on the land. In terms of Thailand and Vietnam at sea, during that time, neither considered the other's navies to be a threat (Participant A, Personal Communication, September 24, 2024). Thailand had a coastal navy with only three-blue-water capable ships that could not operate in bad weather or rough seas, nor act as helicopter bases (Participant A, Personal Communication, September 24, 2024). Thailand lacked the ability to contain Vietnam in the same manner of the United States against the Soviet Union or even the ability to apply pressure on Vietnam like the US Navy against the Confederate States of America. While there is not a lot of information on the Vietnamese navy and the Vietnamese only ever attacked with small craft like patrol torpedo boats during the Gulf of Tonkin incident, the Vietnamese army was quite large-the sixth largest in the world at that time (Participant E, Personal Communication, October 14, 2024) and possessed modern Eastern-bloc equipment (Participant A, Personal Communication, September 24, 2024).

The single most important event during the war occurred in 1981 when Vietnamese troops crossed over the Thai-Cambodian border and into Thailand, violating the territorial sovereignty of Thailand. In response, Thailand submitted a memorandum to the Vietnamese, telling them that if such an incursion were to occur again, Thailand would retaliate as such an action would be intolerable to the security of the Thai government and its

people. This was also the event that shifted Thai views on the geopolitical status of the Indochina region. They could no longer view the relations between Thailand and Vietnam as separate from the Cambodian problem—they were intertwined (Chaiyanam, 2017). Thailand also concluded that the Vietnam's aim was to achieve absolute security for itself in response to Chinese hegemony.

In the same year, Thailand endorsed an idea put forth by Singapore to support the formation of a United Front made up of the FUNCINPEC, DK, and KPNLF which led to the creation of the Coalition Government of Democratic Kampuchea (Chaiyanam, 2017). The CGDK would be used to put up organized resistance to the Vietnamese (Chaiyanam, 2017). This, in combination with support from Thailand and ASEAN, reduced Vietnam to a sub-regional hegemon, incapable of solely achieving its aims through military actions (Chaiyanam, 2017).

Vietnam began to realize this from 1987 onwards and made efforts to open up talks to de-escalate the issue and resolve the Cambodian problem, beginning with the Jakarta Informal Meeting in 1988 (Chaiyanam, 2017). Following the exit of the United States from the Southeast Asian region after the end of the Second Indochina War, Thailand restored relations with the People's Republic of China and brought them along as an ally against the Vietnamese. The value of the Chinese lay in their armed forces, which had combat experience and could resist and challenge the Vietnamese Army, as well as being opposed to Soviet-styled communism (Participant A, Personal Communication, 24 September 2024).

While there was no concerted effort between Thailand and China against Vietnam (Interviewee E, Interview, 14 October 2024) Vietnam had taken the first move in suggesting the invitation of China to help resolve the Cambodian issue, acknowledging their influence in the country and their importance in a holistic solution. The fact that there was no concerted effort may have been due to Thailand's balancing act in maintaining its independence from foreign powers as well as its need for an important ally in its pursuit of its foreign policy geographically, Thailand's east had no strategic depth and no geographical barrier to slow down a Vietnamese advance.

Thailand's shift to a rapprochement began under Chartichai's premiership and the foreign policy of "Battlefields to Marketplaces". The policy provided a premise to end the conflict and measures to help those affected by the fighting recover. It provided microeconomic benefits to the household and private sector while also reducing tensions among the former belligerents (Participant B, Personal Communication, 24 September 2024).

A major point of foreign policy for Thailand during the Third Indochina War was that no military action was utilized to push and force the Vietnamese out of Vietnam. It could be pointed out that the Thai military was not strong enough to take on the very large and experienced Vietnamese army but there are several factors that also need to be outlined out also. Military action is often considered a last resort to diplomacy and impossible for Thailand to do alone. During the early 1970s the "growing rift between China and the Soviet Union presented an unprecedented opportunity for [the United States] to exploit the cracks and drive the wedge between [Russia] and [China]… Thailand also detected the shift at the early stage and was convinced that the earlier the better for it to start cultivating ties with China" (Participant C, Personal Communication, 5 October 2024) and had normalized relations with China in 1975 and China functioned as another ally against Vietnam (Participant A C D and E, Personal Communication, 20 and 24 September and 5 and 14 October 2024) but not to fill the power vacuum left after the Western withdrawal from the Southeast Asian region as China did not have the capabilities to fulfil that role (Participant C, Personal Communication, 5 October 2024).

Thailand and China would contest the Vietnamese solely on the land. In terms of Thailand and Vietnam at sea, during that time, neither consider the other's navies to be a threat (Participant A, Personal Communication, 24 September 2024). Thailand had a coastal navy with only three blue-water-capable ships that could not operate in bad weather and rough seas nor act as helicopter bases (Participant A, Personal Communication, 24 September 2024). Thailand lacked the ability to contain Vietnam in the same manner of the United States against the Soviet Union or even the ability to apply pressure on Vietnam like the US Navy against the Confederate States of America.

While there is not a lot of information on the Vietnamese navy and the Vietnamese only ever attacked with small craft like patrol torpedo boats during the Gulf of Tonkin incident; the Vietnamese army was quite large, the sixth largest in the world at that time (Participant E, Personal Communication, 14 October 2024), and possessed modern Eastern-bloc equipment (Participant A, Personal Communication, 24 September 2024). However, there was still no joint military plan developed or utilized, even though doing so could have put Vietnam in danger of a two-pronged strike. There was a major reliance on using ASEAN and the internation community

through the UN to pressure the Vietnamese and buy time for a suitable solution which in a way had materialized in the Sino-Soviet split and the weakening of the Soviet Union by the late 1980s (Participant E, Personal Communication, 14 October 2024). Additionally, the nature of Thai foreign policy was not inherently aggressive and Thailand was not prone to attacking combined with a Thai domestic politics being dominated by a military who were reluctant to get involved in outside conflict especially when defending Thailand was already difficult. (Participant E, Personal Communication, 14 October 2024). All of this meant that military action against Vietnam was never a possibility.

Overall, Thailand maintained a fairly stable foreign policy against Vietnam through the entirety of the Third Indochina War one that was not drawn along ideological lines, but a pragmatic approach based on geopolitics and capabilities which allowed a flexible response to change at the end of the Third Indochina War and the Vietnamese withdrawal from Cambodia. In terms of geopolitical power, all of this just highlights Thailand's lack of national power in dealing with threats single-handedly, forcing Thailand to pursue a foreign policy that was more on diplomatic lines, international pressure, and alliances with foreign entities as a means of attaining borrowed power from allies. What this shows is not exactly Thailand's inability to capitalize on its geopolitical power, but rather its limited capacity to build and expand on it as a means to increase national power in the run-up to potential conflict. Thailand was left mainly with diplomatic foreign policy actions as a result. In reference to the research framework here, a lack of geopolitical power meant a reduction in possible foreign policy options.

4.2 Does Geography Constrain National Power, and in Turn, its Foreign Policy?

Geographical positioning does play a role in constraining a state's national power as it can limit access to resources or key routes. However, lack of resources could be counteracted with expansionism or trading. One of the interview participants aligned with Mahan's six principles (Participant A, Personal Communication, 24 September 2024):

1. Geographical Position: Thailand is located in a fertile region which resulted in historically no need to expand towards the sea but its position resulted in it being a trading crossroads.

2. Physical Conformation: Thailand's physical conformation gives it access to deep bays and channels with decent water depth and a large river that exits into the gulf which provides good characteristics for a port.

3. Extent of Territory: Thailand has a long coastline with a large population density due to its fertility and proximity to the river lowlands but much of the activities is focused on agriculture.

4. Number of Population: Thailand does not have an advantage here as it has few people dedicated to seaward occupations.

5. Character of the People: Thailand also does not possess the national character required for a maritime oriented society like that of Holland or England.

6. Character of the Government: The character of its government does not lend a natural and adept understanding of maritime development, which is vital in the creation of an effective navy and naval strategies.

Thailand is a country that is small with a moderate level of power to draw in regional allies, which does not act aggressively, preferring a diplomatic approach to resolving issues (Participant E, Personal Communication, 14 October 2024). In terms of determining Thailand's geopolitical power, this data shows that Thailand does not fully meet the theoretical criteria for being a full sea power. However, further analysis in later sections also reveals that this does not mean that Thailand is a land power either.

Many participants also agreed that geography has an effect in constraining the potential of national power, but that there were exceptions where countries overcame geographical limitations (Participant A B C D E and F, Personal Communication, 20-24 September and 14 October 2024). According to Participant C (Personal Communication, 5 October 2024):

> "It depends. Geography could be both plus and minus. It also depends on the context and the national interests of the countries concerned at that particular point in time. Israel, Ukraine, Taiwan are good examples. All of them are prisoners of geography. But at times, each has tried its best to manipulate its surrounding geography to its advantage. Their success rates vary, depending on whether the national interests of key and major powers are similar with theirs".

Another example was presented by Participant A (Personal Communication, 24 September 2024):

"Not always. Geography may be an important factor but it is not the sole factor. Countries that had a geological disadvantage such as Japan, which was located on the Ring of Fire, and did not have sufficient resources for both food and goods consumption was able to develop in a superpower in Asia before World War 2".

This was done in a similar manner to other sea powers like England, which used its large and powerful navy to secure colonies and extract resources for the homeland. An action supported by Participant E in reference to overcoming geopolitical constraints as "[Navies] were often used for finding and securing external resources" (Personal Communication, 14 October 2024)—an inherently aggressive action. Furthermore, other constraints include the possibility of dangerous neighbors and less choices for development, such as Laos, which, being landlocked, had to choose to rely on China for infrastructural development through its land-linked policy. In doing so, Laos also made itself susceptible to Chinese influence. In reference to the research, while the data here does not reference Thailand directly, it does present a correlation between geography and power and, as a result, how geopolitical power is constructed. That construction influences foreign policy via the choices available to a country. As one participant summarized: a country's power and its foreign policy "are important and inseparably related as having power means the ability to determine foreign policy and implement it effectively. Vice versa, having no power means that foreign policy would be ineffective" (Participant A, Personal Communication, 24 September 2024).

5. Discussion

A point that came up during one of the interviews was that foreign policy decisions are choices, and they are choices that are often constrained by factors such as the geography of a country. By extension, this affects its geopolitical power. Many interview participants echoed the view that geography did play a role in constraining foreign policy and resources that the state could utilize in the pursuit of national interest; essentially, it played a role in the construction of the national apparatus of power.

To answer the first question, the relationship between foreign policy and geopolitical power is that geopolitical power defines how a state's national power is built up and therefore also ends up defining the limits of foreign policy. So, what was Thailand's geopolitical stance during the Third Indochina War and how could be seen through its policies?

The case of Thailand's geopolitical power is interesting. The situation in Indochina during the Third Indochina War was vastly different than during the Second Indochina War. Thailand's stance was not wholly neutral throughout the invasion as it did take an active foreign policy against Vietnam's political ambitions within Indochina. With no big power to rely on, Thailand had devised a more passive resistance against Vietnamese aggression in Cambodia. Unlike the Second Indochina War, Thailand would not deploy troops in direct action against Vietnam, the Third Indochina War was fought mainly on the political stage.

Therefore, let us consider the political dimensions of foreign policy in relation to the theory at hand. Thailand sought to counter the growing ambitions of a regional neighbor through two organizations, the United Nations and the Association of Southeast Asian Nations. The decision to fight using these organizations is in line with the Clausewitizian idea that the destruction of the enemy's forces is not necessary in enacting their defeat as Thailand's political goal was the complete unconditional withdrawal of Vietnamese forces from Cambodia and the utilization of regional and international pressure.

This brings us to the first point: Thailand is not a land power. Thailand's behavior throughout its history has tended to be on the defensive, becoming aggressive when backed by a major power—such as during the Franco-Thai War and the Second Indochina War. Furthermore, while land powers typically have a large number of manpower to draw from, it is not strictly a requirement. Both China's punitive invasion of Vietnam and Russia's special operation in Ukraine did not utilize the complete mobilization of their forces. This is worth mentioning to point out that Thailand not being a land power is due more to its actions than its feature and available resources. During the Third Indochina War, Vietnam being a rival power acted in an aggressive manner that constituted a security threat, meeting the conditions for a land power to attempt a defensive action via its military, However, Thailand never utilized its armed forces to force a Vietnamese withdrawal from Cambodia. China, a land power,

did attempt to use its armed forces to force a Vietnamese withdrawal. Even if the argument that Thai military force was insufficient to solely force the Vietnamese out of Cambodia or that poor Cambodian road infrastructure would have been a logistical nightmare was made, the Chinese punitive invasion of Vietnam nonetheless set up the conditions for a possible joint offensive-but this was never considered. Additionally, careful planning and strategy can compensate for poor logistics.

Moreover, the pervious section mentioned how smaller countries have manipulated their geography to their advantage. A good example here is Israel, which won the 1948 Arab-Israeli War by addressing their strategic deficits - most notably the deficit of manpower as "population imbalance with its five Arab neighbors, with the approximately 600,000 Jews in Israel facing a potential opposition of 40 million Arabs" (Heller, 2018), was remedied by both diplomatic and military means. Israel drove "a wedge between the Arab states" and was therefore "able to concentrate its forces in a few strategic locations to create local superiority" (Heller, 2018). So here we have a case for the argument that Thailand's foreign policy was not influenced by land power. Land powers would have been much more aggressive in their response, not relying solely on diplomatic means to resolve their issues.

In terms of the sea power, Thailand appears to be a sea-power by traits and behavior but its national apparatus is not traditional. The sea powers discussed in this paper have a large navy that is continually developing and a willingness to use it. Thailand, first and foremost, relies upon its diplomatic corps for the pursuit of foreign policy. Looking back upon its history, this would make sense as Thailand is a coastal nation-state connected to a variety of polities, strong and weak, through sea trade for centuries. Interaction through this connection and prosperity through trade favors a peaceful and amicable foreign policy, and the maintenance of such a policy relies upon diplomacy, not military force. Military force can be a destabilizing factor in regional or even international affairs and can cause Thailand to be perceived as a threat. Looking back to previous actions in the 20th century, it was the diplomatic finesse that kept Thailand off the losing side of World War Two, and at the end of the Third Indochina War, it allowed the flexibility needed to turn an immediate enemy into a friend with the policy of "Turning Battlefields into Marketplaces," which in a way created a situation of defeat without dishonor for the Vietnamese.

Additionally, Mahan's six principles of sea-powers when applied to Thailand shows that Thailand falls short on meeting some of the criteria for a sea power. In terms of geopolitical power influencing foreign policy the evidence points out Thailand in actuality behaves closer to that of a sea power during the Third Indochina War. Thailand never solely relies on itself and its own power to resolve issues with other countries but rather looks for international partners that might lend support and legitimacy for its actions. During the Third Indochina War, Thailand looked to securing ASEAN support and support from the UN General Assembly in denouncing and undermining Vietnam's diplomatic efforts to legitimize its invasion of Cambodia. Comparatively, the world's foremost Sea Power, the United States, during the first and second Gulf War looked to the participation of its allies to legitimize its invasion of Iraq. In practice, it was Thailand utilizing the same kind of political containment, the Cold War Containment Strategy, that the United States used to deal with threats it could not actively fight a war with.

Additionally, there was the use of proxies, much like the United States during the Cold War and after. Thailand supported the creation of a United Front in Cambodia against Vietnam which bears similarities to the usage of the Northern Alliance in Afghanistan and Kurdish Rebels in Iraq by the United States. Ultimately, through this combination, Vietnam would cave to the pressure of the containment much like the Eastern Bloc did in the 1990s. In contrast to known tactics of land-powers, for example the Soviet Union, while they did send military aid to their allies, they also directly participated in open conventional warfare; such an example were the Soviet pilots who flew in support of Egypt against Israel under Operation Rimon 20. Most importantly, one of the major findings of the research was Participant A's application of Mahan's six principles to Thailand. While Thailand met the geographical qualities it fell short on the societal sides. The people lacked a natural drive for the sea as much of the population had historically been agrarian and sedentary; additionally, the character of government does not lend a natural understanding of the sea to support maritime growth. During the Third Indochina War, neither side fought at sea or used the sea to any kind of advantage. In contrast, during the Second Indochina War, the United States had complete control over the waters around Vietnam and even attempted to project force inland through river gunboats and carrier aircraft.

If Thailand is not a land power or a sea power, does this mean that the geopolitical power theories are inapplicable to medium powers? The answer would be no-not currently-as Thailand does have a geopolitical power theory it adheres too. During a discussion in one of my interviews, another option was brought up and that was the existence of a **hybrid geopolitical power** which blended aspects of both geopolitical power theories as best fits the nation and its interests. If geopolitics is rooted from realism and realism has smart power as a combination of hard and soft power, why shouldn't geopolitics have something similar through the existence of a geopolitical power that blends both land and sea? This actually fits Thailand more when considering the traits of Thailand, its foreign policy choices and status as a small-to-medium power with no grand ambition of becoming dominant. This can help explain the importance of Rimland theory that Spykman created. Insular countries have the ability to benefit from both land-based and sea-based factors, as opposed to being solely reliant on one.

Thailand's action's during the Third Indochina War show the usage of a continental ally against a threat, a sea-power behavior, and also a defensive stance, a land-power behavior, combined with a focused diplomatic effort leveraging those factors to affect an amicable end to a war. For instance, Thailand established diplomatic relations with Vietnam in 1976; the United States established diplomatic relations with Vietnam in 1995. Throughout the war, Thailand maintained a fairly stable foreign policy throughout the war of using collective pressure to compel the Vietnamese to withdraw from Cambodia. Therefore, to answer what Thailand's geopolitical stance was during the Third Indochina War: Thailand was a hybrid geopolitical power. This is evident in how its stable foreign policy and subsequent reasoning of the events was a combination of sea-power and land-power. This combination gave rise to a national power apparatus geared towards resolution of conflicts through diplomacy, rather than through force-which might have been possible if it solely was based around a single geopolitical power. Sea power would have necessitated force through a large and competent navy whereas land-power would have necessitated force through a large land army which could be relied upon to bulk back an offensive. But as previously stated neither of this happened and the national power of Thailand as a result of its geopolitical power only allowed for diplomatic pressure as the best tool to deal with the Vietnamese.

5.1 A Discussion on the Viability of Sea-power and Land-power for Thailand as an Option

While the previous section already answered clearly that Thailand is not a land-power or a sea-power but it should be pointed out here that as an option, Thailand could shift toward becoming a sea power as it has a rich history of sea-borne interactions and functioned as a naval trading hub in the past. While doing so does mean building a naval fleet that is not a paper deterrent, but a viable threat which would go against the general spirit of the nation, it gives Thailand the ability to utilize a navy capable of offensive blue water operations. This would increase the difficulty of a foreign power to defeat the navy in a single decisive engagement and create a prolonged battle of attrition that is unfavorable to any nation whose logistics and shipyards are not within Southeast Asia, increasing the cost of losing a ship or repairing a ship. The major advantage of doing so is that it would allow Thailand the ability to go independent instead of picking a side, as it would have the military power to back itself up in the case of a failure in diplomacy. However, it should be mentioned that going down this path seems unlikely and very difficult. Thailand's competitive advantage is in its diplomacy and while a strong military force can present a stronger backing to gunboat diplomacy, that is not a diplomatic tactic utilized by Thailand; the more common tactic seen both in this paper and in history is collective action with allies.

As for Thailand becoming a land-power, conceptually, it already shows some similarities to traditional land powers such as its use of conscription to increase the size of the army during wartime through ready reserves. While conscription in modern conflicts has called into question the efficacy of these troops, conscription does not necessarily mean lower quality troops as that is tied to training and equipment. Having volunteered for the draft, I can attest to the modern training building the required discipline needed to fight and quite lengthy at six months; but equipment quality varied from regiment to regiment. In the past during the Second Indochina War, Thailand had sent two units from the Royal Thai Army, the Queen's Cobra Regiment and the Black Panther Division, as well as a unit each from the Royal Thai Airforce and Royal Thai Navy to assist the United States in Vietnam (Ruth, 2011). These Thai units were not merely token forces sent at the request of a major ally as their operational success and performance earned them praise from both Thai and American military officials; even upon first deployment, General Westmoreland had praised their combat readiness (Ruth, 2011). This shows that Thai troops were not of poorer quality compared to the Vietnamese but rather, as gathered from the interview, the Vietnamese army was much larger, better equipped and quite experienced from constant fighting since the First Indochina

War in the 1950s against the French. Aside from this, the other quality mentioned earlier that Thailand shows similarity to land-powers in is a defensive nature; it does not seek conflict unless provoked but still prefers diplomacy to resolve issues.

However, this approach would be equally difficult to enact fully. The issue does not lie in its defensive and peaceful nature but in how it can bring about its defense. Diplomacy is fine until the adversary no longer cares to talk or does not care about pressure. The national power of a land-power in this case lies entirely in its large army and large landmass, which Thailand does not have. Geography is a constant but politically and socially, there has always been pushback against the policy of national conscription with the government promising time and time again to remove it. To build national power through land-power conscription would need to be kept and possibly expanded which would most likely not happen.

5.2 Further Discussions and Recommended Study

Now this so far has only covered Thailand but remember that most of Southeast Asia is considered to be insular countries and therefore applicable to Rimland theory. But a majority of Southeast Asian countries are similar to Thailand in terms of power. Therefore, there is a suggestion that, much like Thailand, other Southeast Asian countries also have a high potential for additional power. Much like Thailand, it may be a result of the character of government that stops them from fully exploiting their geography. Myanmar, for example, is, at the time of this writing, embroiled in internal armed conflict and has a central government unable to exert full control over its sovereign territory-a regrettable affair as Myanmar is rich in natural resources that could be exploited for economic gain and military production.

Another important point that could not be addressed in the research due to the focus on just the Third Indochina War is food security. Spykman, when writing about identifying power in geography, highlighted the positioning relative to the Equator and the Rimland countries he identifies run along the Equator. The specialty of these countries is the ability to produce food all year long, and therefore can be made to not be dependent on outside food sources for the survival of the nation. This is vitally important in times of difficulty and especially war, where food can become a critical resource.

Starving out a population is a strategy as old as time, being a component of ancient siege warfare and making appearances in pre-modern and modern warfare. General William Tecumseh Sherman's strategy against the Native Americans was to attempt to kill all the buffalo, which the Native Americans relied upon as a food source. World War One and World War Two saw Germany attempt to use unrestricted submarine warfare to starve the United Kingdom, who imported twenty-two million tons of food, accounting for half of their food supplies before the war had started (Spicer, 2004). Of course, advancements in convoy escorting tactics and technology managed to stop the Kriegsmarine from starving the United Kingdom, but they came close to achieving their objective; the initial months of the Battle of the Atlantic from July to November 1940 were called the 'happy time' by U-Boat crews, who had sunk more than 280 ships, with the resulting total tonnage of 1.5 million tons (Royal Navy Association, 2023).

Additionally, there was also the Staatssekretäre conference in 1941, where Germany formulated and planned a starvation policy against the Russian population by commandeering food and resources from Russian lands they took with no plans to provide provisions for the people of their occupied territory (Kay, 2006). The point to all of this is that insular countries have the ability to sustain themselves without outside assistance which also means that they would be able to achieve a state of autarky and gain the ability to resist being influenced by outside forces by reducing dependency; Thailand's policy of sufficiency economy does echo this concept.

The issue with hybrid powers now is that current literature does not have such a concept laid out and this paper itself was more of a study in using foreign policy to figure out the geopolitical power of an entity. Therefore, going forward I would suggest there be further study on the subject of a hybrid geopolitical power with proper codification, clear parameters and degrees of hybridization. This research only covered Thailand, and it showed a more pacifistic hybrid geopolitical power, and from personal experience, a pacifism generated from culture, history and geography, which undoubtedly has made its way into foreign policy and perceptions of power. Different countries would likely have different forms of hybridized geopolitical power and therefore approaches and choices in foreign policy; understanding these hybridizations would lead to better understanding and prediction of foreign policy actions of other countries which would allow for more effective counter action and planning. Earlier in this section, this paper mentioned that geopolitical power via geography constrained the

resources for power for a state, but hybrid powers have access to both landward resources and sea routes which could help explain their importance and potential for strength.

Additionally, a greater attention should be paid to cultural geography in the study of geopolitical power and hybrid geopolitical power. As previously mentioned, Thailand is a pacifistic nation. In its history, conflicts were sporadic and mainly occurred when land-linked neighbors of comparable power provoked them-which never gave rise to a need to obtain overseas assets to overcome their neighbors, as juxtaposed with countries like England, which were separate from their regional neighbors and enemies by a body of water which they needed to secure to protect themselves and gather oversea assets to achieve parity with their much larger continental competitors. Cultural geography would help to understand how the culture through how it was built up in reference to the locale and how it would behave in relation to other tools in the construction and implementation of foreign policy.

Furthermore, this would help in expanding on Rimland theory and its current relevance as Spykman before his death had created the theory and highlighted the importance of control over rimland countries as a means to gain dominance. A formalized hybrid-power theory would bring importance not just to why Rimland countries are powerful, but also to how they operate, which would also help in understanding their strategic value and role in regional and global affairs. It is true that during the Third Indochina War, the Vietnamese army was experienced but also had suffered massive losses during the Second Indochina War. Thailand could have played the numbers game against them; eventually, the experience would be lost to combat losses, similar to Japanese pilots against the United States during World War Two, who lost their experienced pilots as the war dragged on, and due to high casualties in all theaters of fighting, could not keep up with providing quality replacements, unlike that of the United States.

Thailand consistently chose to rely on international pressure and international organizations to put a stop to the conflict. Lastly, if this theory was formalized and made specific to certain countries like Thailand, it might provide a good model for other countries to follow considering the peaceful nature of its foreign policy. For Thailand, fully understanding itself as a hybrid power can help the development of its national power apparatus and better advance its policies; and in terms of modern policy, for example, it could leverage being a hybrid geopolitical power by focusing on becoming a regional logistical hub by linking transnational land connections to its sea connections through continuing projects like the Special Economic Zone or the planned Land-Bridge.

6. Conclusion

To conclude, Thailand is neither a land power nor sea power. Through an examination of its foreign policy actions during the Third Indochina War, Thailand's actions neither paint it fully in either category necessitating the idea of a hybrid geopolitical power which would also be useful in explaining the geopolitical power and possible foreign policy options for countries similar to Thailand's power status which tend to be overlooked when examining geopolitics and the power of small to medium powers, as current theories are focused on big powers. This would also help cement an understanding of the relationship between geopolitical power and foreign policy, as it could more readily explain the available resources to these lesser powers and the limitations of their foreign policy apparatus, and help them capitalize on the building of their national power.

7. Acknowledgements

8. References

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Data Science in Policing in Thailand: Challenges and Future Directions – A Review From International Perspectives

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Abstract

Data science has become an essential element in contemporary policing, offering tools to enhance crime prevention, improve resource allocation, and strengthen decision-making. In Thailand, however, the integration of data science into policing is still in its early stages, characterised by fragmented initiatives and limited strategic direction. This article examines the current state of data science in Thai policing through a critical review of international practices and conceptual frameworks. Drawing from examples in the United States, United Kingdom, Singapore, South Korea, and Japan, it highlights how different governance models have shaped the adoption of predictive analytics, algorithmic tools, and evidence-based policing. While Thailand has made initial progress in developing digital crime databases and surveillance systems, efforts remain inconsistent and lack overarching coordination and ethical oversight. The article identifies both opportunities – such as enhanced inter-agency collaboration and data-driven resource deployment – and challenges, including infrastructural fragmentation, ethical risks, and institutional resistance. It concludes with a set of policy recommendations for the Thai government, including the creation of a national framework, investment in research-led training, ethical regulation of surveillance technologies, and stronger partnerships with academia and civil society. The article argues for a locally grounded, balanced approach to data-informed policing that prioritises effectiveness, legitimacy, and public trust.

Keywords: Data Science; Policing; Predictive Analytics; Evidence-based Policing

1. Introduction

The advent of data science has fundamentally transformed numerous sectors worldwide, and policing is no exception. In the era of digital transformation, law enforcement agencies are increasingly turning to data-driven methods to enhance operational efficiency, improve decision-making, and strengthen crime prevention efforts. Data science, which encompasses techniques such as machine learning, predictive analytics, and data mining, offers new opportunities to understand crime patterns, allocate resources more effectively, and increase transparency and accountability within policing systems (Provost, & Fawcett, 2013; Perry et al., 2013). Globally, jurisdictions such as the United States, the United Kingdom, Singapore, and South Korea have made significant strides in integrating data science into their policing practices. These countries have implemented various models of predictive policing, crime mapping, and algorithmic decision-making to support frontline officers and policymakers (Meijer, & Wessels, 2019; Brayne, 2017). For instance, predictive policing systems in the United States have been used to forecast crime hotspots, while the United Kingdom has focused on developing ethical frameworks to regulate the use of artificial intelligence in law enforcement. Singapore has applied advanced analytics in its "Smart Nation" policing strategy, and South Korea has leveraged its technological infrastructure to support real-time crime monitoring.

Despite these advances, the adoption of data science in policing is not without controversy. Scholars and practitioners have raised concerns about algorithmic bias, data privacy, over-policing in marginalised communities, and the erosion of public trust (Lum, & Isaac, 2016; Ferguson, 2017). These critiques highlight the need for a balanced approach that maximises the benefits of data science while safeguarding ethical principles and human rights. In Thailand, the integration of data science into policing is still in its formative stages. While the Royal Thai Police (RTP) has initiated several technology-driven projects - such as digital crime databases,

CCTV analytics, and pilot predictive policing tools - there remains a lack of systematic implementation, cross-agency collaboration, and clear data governance structures (Santad et al., 2023). Public opinion polls also indicate alarmingly low levels of trust in law enforcement. A 2023 national survey revealed that over 70% of Thai respondents expressed little or no confidence in police performance (The Nation, 2023), a figure that contrasts sharply with countries such as South Korea and the United Kingdom, where police trust levels often exceed 60% (Organisation for Economic Co-operation and Development, 2025). Concurrently, Thailand's intentional homicide rate has risen from 1.84 per 100,000 in 2021 to 2.20 in 2023 (United Nations Office on Drugs and Crime, 2024), indicating a growing need for more strategic and intelligence-led approaches to public safety. Moreover, the use of data in Thai policing has been largely operational rather than strategic, with limited academic scrutiny or public debate on its implications. This article aims to fill this gap by conducting a comparative review of international experiences in the application of data science in policing and critically analysing their relevance to the Thai context. By drawing on scholarly literature and real-world examples, it seeks to identify best practices, key challenges, and policy considerations that can inform the development of a more robust and ethical data science ecosystem within Thai law enforcement. Ultimately, the article proposes a set of strategic recommendations to guide Thailand toward responsible and effective data-driven policing in the future.

2. Objectives
1) To examine the current landscape and strategic development of data science in Thai policing.
2) To critically analyse the opportunities and challenges in integrating data science into Thailand's law enforcement.
3) To propose recommendations to the Thai government for the development of data science policy in policing.

3. Theoretical Frameworks and Concepts in Data Science and Policing
The integration of data science into modern policing is not simply a matter of applying new tools or adopting technical efficiencies - it represents a fundamental epistemological shift in how knowledge is constructed, decisions are made, and power is exercised within criminal justice institutions. As policing becomes increasingly datafied, it is essential to understand the conceptual underpinnings that guide, justify, and critique these transformations. This section explores four interrelated frameworks that shape the discourse on data science in policing - predictive policing, evidence-based policing, algorithmic governance, and data justice - with the aim of contextualising Thailand's current landscape, analysing key challenges, and informing future policy directions.

3.1 Mapping the Landscape: Predictive Policing and Risk Anticipation
Predictive policing has emerged as the flagship application of data science in law enforcement. It refers to the use of statistical algorithms and machine learning models to forecast future crimes, offenders, or victims, based on historical crime data, geospatial patterns, and various socio-economic indicators (Perry et al., 2013). The appeal of predictive policing lies in its promise of proactivity – moving policing from reaction to anticipation, from uncertainty to statistical probability. Yet the conceptual logic behind predictive policing is more complex than a technical fix. It is rooted in actuarial thinking, where risks are quantified and resources allocated accordingly (Harcourt, 2019). This shift reflects broader transformations in governance: from rehabilitating individuals to managing populations through risk scoring and surveillance. While predictive systems such as PredPol have been lauded for improving patrol efficiency and reducing property crimes in certain contexts (Mohler et al., 2015), a growing body of research highlights the perils of feedback loops, racialised targeting, and opaque methodologies (Lum, & Isaac, 2016; Brayne, 2021).

In practice, predictive policing may reinforce the very inequalities it seeks to prevent. Historical crime data are often products of biased policing practices – over-policing of minority communities, underreporting in informal settlements, or discretionary decisions shaped by societal prejudice. When these data are used to train predictive algorithms, they risk encoding and perpetuating systemic bias under a veneer of scientific neutrality (Longworth, 2021). This is particularly problematic in jurisdictions with limited data integrity, weak oversight mechanisms, and contested police legitimacy – as is often the case in the Global South. Here, predictive systems may be implemented without adequate safeguards, leading to arbitrary enforcement and diminished public trust.

Predictive policing should also be understood as part of broader crime prevention strategies. In many jurisdictions, including Thailand, data science supports preventive policing efforts across diverse domains, ranging from transnational crimes like human trafficking and cybercrime to domestic violence and property offences. Digital forensics plays a pivotal role here, enabling the extraction, preservation, and analysis of digital evidence to support real-time decision-making (Casey, 2011). These data-driven preventive approaches rely on integrated crime databases, social media analytics, and communication metadata, allowing law enforcement agencies to anticipate threats and allocate resources more strategically (Thompson, 2022). However, in contexts where forensic infrastructure is limited or unevenly distributed – as in many parts of Thailand – such systems risk reinforcing existing inequities and missing crimes occurring in informal or digitally invisible spaces.

3.2 Institutional Capacity and Challenges: Evidence-Based Policing in Context

In contrast to the predictive paradigm's focus on forecasting risk, evidence-based policing (EBP) emphasises the systematic use of research evidence to inform policing strategies and policy decisions. Rooted in the principles of experimental criminology and policy evaluation, EBP advocates for the development and implementation of interventions that are empirically tested, rigorously analysed, and contextually appropriate (Sherman, 2013). EBP positions policing as a professional domain grounded in knowledge rather than tradition or intuition. In jurisdictions such as the United Kingdom, the College of Policing has institutionalised EBP through its What Works Centre for Crime Reduction and its partnership with universities (Telep, & Lum, 2014). Police officers are increasingly encouraged to engage with academic literature, participate in pilot evaluations, and use outcome data to refine operational tactics. From a conceptual standpoint, EBP reflects a rational-bureaucratic model of decision-making, where evidence is assumed to be objective, generalisable, and politically neutral. However, critical scholars have cautioned against uncritical adoption of this model, noting that "evidence" is itself socially constructed, often shaped by the questions asked, the data collected, and the interests of those funding or conducting the research (Loader, & Sparks, 2011).

While evidence-based policing offers a clear path toward professionalisation, its implementation in Thailand is significantly shaped by institutional and cultural dynamics. The Royal Thai Police remains a highly centralised and hierarchical organisation, with a strong emphasis on seniority, obedience, and traditional authority structures (Mangkhalasiri, 2024). These features foster a command-and-control environment where innovation and critical reflection are often discouraged, particularly at the frontline level. Moreover, informal patronage networks and bureaucratic inertia can stifle reform, making it difficult to embed research-oriented thinking or support grassroots experimentation with new methods (Berman, 2010). Partnerships between the police and academic institutions are limited and sporadic, with few mechanisms in place for sustained collaboration or mutual capacity building. In this context, the development of data science and EBP practices requires more than technical training – it demands structural changes in incentives, leadership styles, and organisational values that support continuous learning and adaptive problem-solving (Lum, & Koper, 2024).

3.3 Algorithmic Governance: Authority and Accountability in the Age of Code

The deployment of algorithms in policing invites broader questions about how decision-making is being reshaped by automated systems. This is the realm of algorithmic governance – a conceptual framework that examines how power and control are mediated through computational technologies (Amoore, & Piotukh, 2015). In the policing domain, algorithms are increasingly used to inform bail decisions, assess recidivism risk, flag "high-risk" individuals, and determine patrol routes. While often justified as efficient and impartial, these systems are rarely transparent. The logic behind algorithmic decisions is typically hidden in proprietary code or complex statistical models that are inaccessible to the public – and sometimes even to the police officers using them. This phenomenon of "black box" decision-making undermines traditional forms of accountability and due process (Pasquale, 2015). Furthermore, algorithmic governance also raises concerns about the delegation of moral and legal authority. When decisions about freedom, surveillance, or suspicion are shaped by a machine, who is accountable for the consequences? If a predictive tool erroneously labels a suspect or misclassifies a threat, the human actor may defer responsibility to the algorithm, creating a dangerous diffusion of blame. In Thailand, where regulatory frameworks around digital governance are still developing, the risk of unregulated algorithmic expansion is particularly acute. Without robust legal safeguards, public awareness, and institutional oversight, algorithmic tools could be co-opted for surveillance, social control, or political purposes.

3.4 From Ethics to Policy: Embedding Data Justice in Reform Pathways

Finally, the concept of data justice provides an essential normative anchor to the data policing debate. While much of the literature celebrates efficiency, optimisation, and innovation, data justice compels us to ask deeper ethical questions: Whose data are being used? Who gets to decide how they are used? What are the consequences for those whose lives are rendered visible – or invisible – by data systems? Data justice emerged as a response to the "datafication" of social life, where decisions about welfare, security, and citizenship are increasingly mediated by algorithms (Taylor, 2017). It seeks to address distributive injustices (who benefits and who is burdened), procedural injustices (how decisions are made), and representational injustices (how people are categorised or misrepresented through data). In the policing context, data justice demands that systems be designed not only for accuracy and speed, but also for fairness, inclusivity, and respect for rights. This is particularly relevant in settings like Thailand, where marginalised communities – migrant workers, stateless people, ethnic minorities – often exist at the edges of state databases, or are included only through criminalisation. By foregrounding these principles, data justice challenges the techno-solutionist narrative of data science and offers a human-centred vision for responsible innovation.

Moreover, while technical and infrastructural readiness are necessary, they are insufficient without robust "peopleware" – skilled professionals who are both technically competent and ethically grounded. Without this human element, there is a risk that data science becomes a tool for political abuse or misconduct by state actors. To mitigate these risks, Thailand should develop clear and enforceable legal frameworks that regulate how police use data-driven technologies, ensuring transparency, accountability, and protection of civil liberties (Taylor, 2017; Pasquale, 2015).

4. Research Method

This study adopts a qualitative research design grounded in comparative documentary analysis. It draws on policy documents, academic literature, and official reports from five countries, including the United States, the United Kingdom, Singapore, South Korea, and Japan, alongside materials related to the Thai policing context. The analysis focuses on identifying trends, challenges, and good practices in the application of data science in policing. By systematically comparing international and domestic sources, the study aims to highlight lessons relevant for policy development in Thailand.

5. Current Landscape and Strategic Development of Data Science in Thai Policing

This section addresses the first research objective: To examine the current landscape and strategic development of data science in Thai policing. It outlines the current state of data integration within Thai law enforcement, identifying fragmented practices, institutional challenges, and limited strategic planning. The section also introduces emerging reforms and highlights opportunities to strengthen governance and technological capacity in alignment with international models.

Thailand's engagement with data science in policing remains in a nascent stage, marked by fragmented implementation, limited inter-agency collaboration, and a lack of overarching strategic direction. Initial efforts have included the development of digital crime databases, CCTV systems with some real-time analytics capabilities, and digital case management in select urban jurisdictions. However, these tools are often applied in isolation, without integration across provinces or alignment with national-level planning. The Royal Thai Police (RTP) has launched initiatives such as digital crime recording and surveillance enhancement, but these remain largely operational rather than strategic. Data-driven practices are rarely embedded in long-term crime prevention policies or institutional planning processes. As a result, efforts tend to be reactive and unevenly distributed, with some metropolitan areas adopting advanced tools while rural provinces continue to rely on manual and paper-based processes.

Thailand also faces structural challenges. The absence of a national digital policing framework means that data standards, interoperability protocols, and ethical governance guidelines are underdeveloped. Additionally, law enforcement training institutions, such as the Royal Police Cadet Academy, have yet to fully integrate data literacy, research methods, and evidence-based thinking into their curricula. Despite these challenges, there is increasing recognition of the need for reform. High-profile cases of data misuse, coupled with growing demands for accountability and transparency, have spurred dialogue about the ethical use of surveillance technologies and the role of data in supporting public trust. The rise in intentional homicide rates (UNODC, 2024)

and continued low levels of public confidence in police institutions (The Nation, 2023) highlight the urgency for more effective and legitimate policing strategies.

As this paper shows through international comparisons, the experiences of countries like the UK, South Korea, and Japan provide viable models for strategic, ethical, and research-informed integration of data science. Thailand has the opportunity to learn from these examples and build a coordinated, transparent, and community-responsive framework for digital transformation in law enforcement.

6. International Practices in Data-Driven Policing

This section supports the second research objective: To critically analyse the opportunities and challenges in integrating data science into Thailand's law enforcement. By examining five jurisdictions – the United States, United Kingdom, Singapore, South Korea, and Japan – this section draws comparative insights on how different governance systems and socio-political environments have influenced the adoption of data science in law enforcement. These international case studies serve as analytical reference points to better understand the conditions under which data science can succeed or fail, helping to inform Thailand's strategic choices in its own reform efforts. Each case contributes different insights into enabling factors and risks. The U.S. leads in innovation and private-sector collaboration; the U.K. integrates ethics and evidence-based policing; Singapore demonstrates strong central coordination and smart surveillance; South Korea offers robust digital infrastructure and cross-sectoral integration; and Japan reflects a community-oriented, trust-based approach. Together, they offer a comparative lens through which Thailand's emerging challenges and opportunities in data-driven policing can be better understood. Details are presented in the following subsections.

6.1 United States

The United States stands at the forefront of data science innovation in policing, having birthed some of the most influential predictive systems and data-driven management tools. The introduction of CompStat by the New York Police Department (NYPD) in the 1990s revolutionized how police departments conceptualized crime patterns and accountability (Bratton, & Malinowski, 2008). CompStat's model, which focused on mapping crimes, identifying trends, and holding precinct commanders accountable through data dashboards, laid the groundwork for future predictive systems. It normalized a metrics-driven culture in policing – one that prioritizes quantifiable performance indicators and outcomes.

In the 2010s, predictive policing gained momentum across U.S. cities with platforms like PredPol (predictive policing software developed in collaboration with LAPD and academic researchers) and HunchLab. These systems claimed to forecast crime hotspots and allocate resources proactively using historical data, spatial-temporal analysis, and algorithmic modelling (Perry et al., 2013). Simultaneously, departments like the Chicago Police Department piloted the Strategic Subject List (SSL) to identify individuals at high risk of perpetrating or falling victim to gun violence based on network analysis. However, this technological leap was accompanied by profound ethical, social, and legal controversies. Scholars and civil society organizations raised concerns about algorithmic bias, particularly how historical data – collected through decades of racially biased practices – reinforced structural inequalities (Lum, & Isaac, 2016). For example, predictive systems disproportionately flagged Black and Latino neighborhoods as "high risk," resulting in intensified surveillance and over-policing of already marginalized populations (Brayne, 2021). Furthermore, critics noted the opacity of proprietary algorithms, where even law enforcement officials could not fully explain how risk scores were generated, eroding transparency and accountability (Pasquale, 2015).

Several high-profile controversies contributed to a public backlash. The LAPD was forced to shut down its predictive policing programmed in 2020 after investigations revealed a lack of oversight, unclear evaluation metrics, and community mistrust (Poston, 2020). Similarly, the Chicago SSL was discontinued after studies revealed minimal impact on crime and unclear legal justifications for its use (Saunders et al., 2016). Another structural factor that complicates the U.S. approach is its decentralized policing system – over 18,000 separate agencies operating with significant autonomy. This fragmentation leads to variability in data quality, ethical standards, and technical capacity. While some major cities have access to cutting-edge analytics and dedicated crime labs, smaller or rural departments may lack the resources or expertise to implement even basic data systems. Nonetheless, the United States remains a critical case study in the promises and perils of data-driven policing. It demonstrates the power of innovation, particularly when supported by research partnerships (e.g., between RAND

Corporation and police departments), but also underscores the risks of deploying technology without adequate ethical guardrails. For countries like Thailand, where public trust in law enforcement is fragile and data governance still developing, the American case is both inspirational and cautionary.

6.2 United Kingdom

The United Kingdom represents one of the most structured and theoretically grounded approaches to data-driven policing, marked by its emphasis on evidence-based practices, institutional support for ethical data use, and a growing commitment to algorithmic accountability. Unlike the decentralised model of the United States, the UK's more unified policing structure – particularly in England and Wales – has enabled a coordinated national strategy around policing reform, including the development of central institutions that actively promote data science integration.

The UK's adoption of Evidence-Based Policing (EBP) has been internationally recognised as a pioneering model. Championed by criminologist Lawrence Sherman, EBP argues that policing decisions should be grounded in rigorous research, experimental methods, and empirical evidence rather than tradition, intuition, or anecdote (Sherman, 2013). The model gained traction within British policing through the creation of the College of Policing, a statutory body that promotes professionalism, training, and research literacy within the police force. Through partnerships with academic institutions, initiatives such as the What Works Centre for Crime Reduction and the Society of Evidence-Based Policing have embedded research-based thinking into operational decision-making. Police officers are now increasingly trained not only to consume research but also to participate in experimental design, field trials, and impact evaluations (Telep, & Lum, 2014). EBP in the UK is not simply about data collection – it reflects a culture of reflective practice, where learning from evidence is formalised within organisational routines. What makes the UK model distinct is the institutionalisation of EBP – it is not left to individual departments to experiment with data science in isolation, but rather embedded through national strategies, funding mechanisms, and professional development pathways. This has enabled the UK to move beyond ad hoc innovation toward system-level transformation.

Alongside its advancements in EBP, the UK has also explored the use of algorithmic and AI-based systems in policing, including facial recognition, automated number plate recognition (ANPR), and risk assessment tools. One of the most controversial applications has been the deployment of Live Facial Recognition (LFR) technology by the London Metropolitan Police, which has been used to scan faces in real-time at public events and high-footfall locations. The implementation of such tools has prompted robust public debate and legal challenges, particularly around proportionality, consent, and accuracy. Civil liberties groups such as Big Brother Watch and the Liberty organisation have criticised these practices for undermining privacy rights and disproportionately affecting ethnic minorities, citing studies that found higher error rates for non-white faces (Babuta, & Oswald, 2021). Responding to these concerns, UK institutions have taken steps toward algorithmic governance. The Centre for Data Ethics and Innovation (CDEI), under the Department for Science, Innovation and Technology (DSIT), has issued recommendations for public sector use of algorithmic tools, advocating for transparency, explainability, and human oversight in high-risk applications. Furthermore, police forces are encouraged to conduct Algorithmic Impact Assessments (AIAs) and publish information on their use of predictive or biometric technologies.

One of the UK's key strengths lies in its ongoing effort to balance innovation with legitimacy. Unlike jurisdictions that adopt surveillance tools with little public consultation, UK police are required to justify their methods through public interest tests, data protection principles under the UK GDPR, and oversight from bodies such as the Information Commissioner's Office (ICO) and Her Majesty's Inspectorate of Constabulary and Fire & Rescue Services (HMICFRS). This level of ethical self-regulation and external accountability offers important lessons for countries like Thailand, where surveillance technologies are increasingly deployed without robust public dialogue or legal protections. The UK's model suggests that transparency is not antithetical to security – in fact, it can enhance institutional trust, improve the quality of decision-making, and create a foundation for democratic policing in the digital age.

Furthermore, The UK case holds particular relevance for Thailand's aspirations toward data-driven policing. First, the integration of EBP suggests that technology should not precede organisational learning. Training police officers in critical thinking, research methods, and data ethics is essential if data science is to be meaningful and sustainable. Second, the UK's cautious and reflective approach to algorithmic tools shows that

not all innovations should be adopted uncritically – evaluation, regulation, and stakeholder engagement are prerequisites for responsible implementation. Also, the UK's experience illustrates that the legitimacy of data systems depends as much on process as on outcome. In Thailand, where public trust in police institutions has often been contested, adopting transparency protocols, community engagement strategies, and human rights-based design principles could help ensure that data science strengthens, rather than undermines, democratic policing.

6.3 Singapore

Singapore presents a compelling case of state-led technological integration in policing, underpinned by a strong tradition of technocratic governance, strategic planning, and institutional coherence. As a key component of its broader Smart Nation initiative, the Singaporean government has actively incorporated data science, artificial intelligence (AI), and digital surveillance into public administration – including law enforcement (Zhang, 2021). The result is a model of policing that is highly centralised, technologically advanced, and responsive, but also one that raises ongoing concerns about the balance between security and civil liberties. The Singapore Police Force (SPF) has adopted a holistic approach to integrating data science across all levels of policing (Lim, 2018). Key components include:

- PolCam 2.0: An extensive network of police-operated CCTV systems with real-time analytics capabilities deployed throughout high-traffic public spaces. These systems use facial recognition, crowd analysis, and behavioural anomaly detection to assist officers in real-time surveillance and incident response.
- Digital Investigation and Forensics Tools: SPF's Digital Forensics Laboratory uses machine learning and natural language processing to analyse seized devices, extract digital evidence, and reconstruct criminal timelines.
- Crime Risk Prediction Models: The SPF has developed internal risk modelling systems to identify geographic and temporal crime hotspots, informing patrol deployment and resource allocation.
- Smart Command and Control Centres: These integrate live data feeds from multiple agencies – transport, health, urban planning – allowing coordinated response to both routine crime and public emergencies.

These tools are embedded within a whole-of-government ICT infrastructure, coordinated by the Government Technology Agency (GovTech). Cross-agency data-sharing is facilitated by platforms such as the Singapore Government Tech Stack, enabling real-time information exchange between law enforcement, immigration, transportation, and public health agencies. This infrastructure allows for predictive, preventive, and real-time policing, and reflects Singapore's broader ideology of surveillance as a public good. The government's ability to build and sustain public trust has been pivotal to the societal acceptance of its data-intensive policing practices (Rodan, 2014). Furthermore, Singapore's data governance is managed under frameworks such as the Personal Data Protection Act (PDPA) and the Computer Misuse and Cybersecurity Act, which provide general provisions for data use and cybercrime investigation. However, these frameworks are often seen as state-centric, with wide discretion granted to authorities. While the SPF does not typically release detailed information on algorithmic operations, oversight is conducted through internal reviews and inter-agency committees, rather than independent civilian oversight bodies (Rahman, 2021). Unlike countries with strong legal traditions of freedom of information or public protest, Singapore adopts a paternalistic model of governance, wherein the state claims legitimacy through performance and order rather than procedural transparency. As such, the ethics of data science deployment in policing is framed through a security-first lens.

Singapore's efficiency in deploying data-driven policing is globally admired – crime rates are low, public spaces are highly regulated, and emergency response systems are among the fastest in the world. Yet, this comes at a cost. Critics point to the erosion of privacy, the potential chilling effect on public expression, and the lack of legal recourse for citizens subject to algorithmic surveillance or profiling (Lim, 2018; Rodan, 2014). Civil society actors have limited influence over public security policy, and independent academic research on policing practices remains sparse due to restrictions on political expression. Consequently, while the SPF represents a technological ideal, it also embodies an authoritarian model of surveillance, where dissent is discouraged and accountability mechanisms are minimal.

Singapore's success lies in its institutional alignment – where data infrastructure, policy vision, and organisational capacity operate in harmony. For Thailand, the lesson is not to replicate the top-down surveillance model, but rather to understand how technological integration requires strong foundational systems: unified

databases, legal frameworks, and inter-agency protocols. Furthermore, Thailand must weigh civil liberties and political culture in any technological adoption. While the SPF can deploy facial recognition with little public pushback, such an approach may be untenable or counterproductive in Thai society, where trust in public institutions is more fragile and political accountability more contested. Thus, Singapore offers a powerful yet cautionary tale: innovation is most effective when aligned with institutional capacity, but also when tempered by ethical governance and civic participation.

6.4 South Korea

South Korea is often recognised as one of the most technologically advanced societies in the world, with high-speed internet penetration, widespread smartphone use, and a strong digital innovation ecosystem. These features have enabled the country to embed data science into public sector services, including law enforcement. In recent years, South Korea has developed and implemented a "Smart Policing" strategy, combining real-time surveillance, big data analytics, and artificial intelligence (AI) to enhance crime prevention and response capabilities (Joh, 2019). The foundation of South Korea's data-driven policing is its national ICT infrastructure, which connects police, government ministries, local governments, and private platforms. The National Police Agency (NPA) operates integrated systems such as:

- Crime Prevention Information System (CPIS): A platform that collects data from CCTVs, patrol records, emergency calls, and incident reports to generate predictive insights about high-risk areas and times.
- Smart Policing System: This includes mobile platforms for frontline officers, real-time crime data dashboards, and AI-enhanced command centres that coordinate responses across agencies.
- Integrated Dispatch Systems: These systems enable quick coordination between police, fire, and emergency medical services through shared digital channels.
- CCTV Network with AI Surveillance: The use of machine learning in video surveillance allows for the detection of suspicious behaviour patterns, abandoned objects, and crowd anomalies.

The success of these systems is facilitated by a cooperative model between government and industry. Major Korean tech firms such as Samsung, KT, and SK Telecom work alongside public agencies to develop AI and analytics tools, reflecting a public–private partnership (PPP) model of innovation.

While South Korea has embraced the technological promise of smart policing, it has also faced pressure to address issues of data protection and privacy, particularly in response to high-profile data breaches and public concern about government surveillance. The Personal Information Protection Act (PIPA), initially enacted in 2011 and amended several times since, has become the country's primary legislation on data governance. Under the latest amendments, public institutions – including the police – are required to conduct impact assessments before deploying new data-driven tools and to ensure transparency, consent mechanisms, and independent oversight (McDaniel, & Pease, 2021). Furthermore, the Korean National Human Rights Commission has issued guidelines on AI ethics in public administration, including policing, highlighting the need to prevent algorithmic discrimination and to ensure fairness in automated decision-making processes. Nevertheless, tensions remain. Critics argue that legal reforms are not yet fully aligned with practice. Surveillance continues to expand rapidly, often outpacing regulatory safeguards. This "innovation first, governance later" pattern poses potential risks for civil liberties, especially in areas such as facial recognition and crowd control during protests.

South Korea also stands out for its efforts to bridge research and practice. The NPA actively funds criminological research and collaborates with academic institutions to evaluate new technologies and policing strategies (Joo, 2015; Belknap, 2016). For example, the Korean Institute of Criminology and Justice (KICJ) serves as a national think tank that conducts policy analysis and offers guidance on technology integration in policing (Han et al., 2022). These collaborations help ensure that data science is not merely a technical add-on, but is contextualised within broader criminological theories, ethical debates, and empirical evaluation. Moreover, the rise of "digital policing" as an academic field in Korean universities has contributed to the development of a new generation of data-literate police officers and analysts (Moon et al., 2017; Brown, 2020; Kim, 2016). Thailand can draw several important lessons from South Korea's experience:

- National Coordination is Critical: Korea's success is underpinned by central planning and digital interoperability. Thailand may need to develop national standards and interoperable systems across provinces and agencies to enable meaningful data sharing.

- Build Ethical Governance in Parallel: Rather than waiting for scandals or rights violations, Thailand should prioritise the proactive development of data protection laws and AI ethics guidelines, especially as data use becomes more automated.
- Invest in Capacity and Research Translation: Korea's model of police–university collaboration and officer training in data interpretation can be adapted to the Thai context to ensure meaningful and responsible technology use.
- Guard Against Over-Surveillance: The expansion of data tools should not come at the expense of civil liberties. Thailand should be wary of adopting surveillance-heavy models without corresponding oversight.

South Korea's case demonstrates that technological advancement and democratic governance can coexist, but only with deliberate investment in legal frameworks, institutional checks, and public engagement.

6.5 Japan

Japan offers a distinct model of policing in the digital age – one characterised by gradual, measured adoption of technology, strong emphasis on community trust, and deep-rooted cultural sensitivities toward surveillance and privacy. While less aggressive in its use of data science compared to some of its East Asian neighbours, Japan has integrated digital technologies into law enforcement in ways that reflect its institutional conservatism and societal values (Yamamoto, 2021; Broadhurst et al., 2018).

A defining feature of Japanese policing is its community-based model, particularly the kōban system – a network of small, local police boxes staffed by officers who maintain close ties with residents. Officers stationed at kōban engage in foot patrols, neighbourhood visits, and community mediation. This model promotes proactive crime prevention and fosters high levels of public trust (Bayley, 1991; Johnson, 2002). Rather than replacing human judgment with automated systems, Japan has taken a complementary approach**,** using technology to support – rather than substitute – interpersonal policing. For example, officers use tablet-based systems for data entry and reporting during patrols, and precincts share crime statistics and alerts through real-time digital communication networks (Yamamoto, 2021). However, the emphasis remains on the officer's discretion, local knowledge, and face-to-face interaction, reflecting a philosophy of policing rooted in personal trust rather than algorithmic authority.

Japan's National Police Agency (NPA) has implemented several digital initiatives in recent years, including:
- Automated Case Management Systems to improve information sharing across jurisdictions (NPA, 2024).
- Criminal Information Analysis Centres, which apply statistical modelling to identify crime trends and monitor organised crime networks (Broadhurst et al., 2018).
- Cybercrime Countermeasures, which involve AI-assisted monitoring of the dark web, phishing attacks, and digital fraud (NPA, 2024).
- Facial Recognition Technology, used mainly at international ports of entry and within immigration systems, rather than for routine public surveillance (Yamamoto, 2021).

However, the use of predictive policing, algorithmic profiling, or real-time facial recognition in public spaces remains limited. This deliberate restraint is not due to a lack of technological capacity – Japan is a global leader in robotics and AI – but rather reflects a normative stance that values privacy, consent, and procedural legitimacy (Shimpo, 2023).

Japan's incremental approach is also influenced by institutional dynamics. The police bureaucracy is hierarchical and risk-averse, with innovation often occurring within tightly controlled pilot programmes (Johnson, 2002). There is no dominant culture of technological experimentation akin to the startup–police collaborations seen in the U.S. Instead, change is usually driven by internal reviews or national-level strategic planning (Yamamoto, 2021).

Culturally, Japanese society places a premium on privacy, discretion, and social harmony (wa). Public resistance to surveillance is strong, particularly in the wake of past incidents involving unauthorised data access by government bodies. This creates a high threshold for public legitimacy, which police agencies must meet before rolling out invasive technologies (Miyashita, 2022). Moreover, civil society – including academics, journalists, and legal professionals – plays an active role in scrutinising policing practices. Public debate on the use of technology in law enforcement is framed not only in terms of efficiency, but also in terms of democratic values and institutional ethics (Yamamoto, 2021). Japan's model offers vital lessons for Thailand, especially in terms of:

- Trust-Centric Approaches: Like Japan, Thailand has deep traditions of interpersonal policing and informal resolution. Integrating data science in a way that supports – not supplants – these practices could preserve community trust while enhancing operational effectiveness.
- Incremental Implementation: Japan's methodical and evaluative stance towards technology adoption aligns well with Thailand's current capacity. Avoiding "big bang" implementations may be preferable to reduce risk and resistance.
- Balancing Tradition and Innovation: Thailand, like Japan, values hierarchical order and cultural harmony. Embedding data science within existing bureaucratic and cultural logics – rather than imposing foreign models – may yield more sustainable reforms.
- Emphasising Legal and Ethical Infrastructure: Strong legal standards such as APPI ensure public confidence in Japanese policing. Thailand would benefit from similar legislation and independent oversight mechanisms, particularly as surveillance tools become more pervasive.

Japan's experience demonstrates that data science in policing does not require radical disruption. Instead, its gradual, dialogic, and trust-based integration shows how countries can adapt technology to fit their institutional character and social compact (Broadhurst et al., 2018).

7. Opportunities and Challenges for Data Science in Thai Policing

This section also supports the second research objective. It outlines both the enabling potentials and structural limitations that influence how data science can be operationalised within the Thai policing context. Drawing on global evidence and domestic realities, it identifies areas of strategic advantage as well as institutional and legal barriers that should be addressed.

7.1 Opportunities

7.1.1 Enhancing Resource Allocation and Operational Efficiency

The integration of data science into policing presents a significant opportunity to enhance the efficiency of resource allocation and operational planning. Predictive analytics, geospatial mapping, and algorithmic forecasting allow law enforcement agencies to anticipate crime trends and target high-risk areas more effectively (Perry et al., 2013; Meijer, & Wessels, 2019). These tools help shift policing strategies from reactive to proactive, optimising deployment patterns based on both historical data and real-time inputs. In practice, data systems such as CompStat have illustrated the value of performance-based metrics and spatial intelligence in improving policing outcomes (Bratton, & Malinowski, 2008). The application of such models in Thailand could support better coordination across police jurisdictions, reduce response times, and maximise the impact of limited resources - particularly in high-crime districts or areas lacking adequate coverage. Approaches such as hotspot policing and CompStat have demonstrated positive results in reducing crime when combined with problem-oriented strategies (Weisburd et al., 2010). Their success lies in harnessing data to identify recurring patterns and inform targeted interventions, which, if adopted in Thailand, could enhance strategic decision-making within the Royal Thai Police and enable more focused allocation of personnel and assets.

7.1.2 Supporting Evidence-Based Decision-Making

Data science also strengthens the institutionalisation of evidence-based policing (EBP), a model that relies on rigorous empirical research to inform operational and policy decisions. EBP contrasts sharply with traditional practices grounded in intuition or hierarchical orders and instead promotes the use of experimental designs, outcome evaluations, and academic-practitioner collaboration (Sherman, 2013). Globally, the rise of EBP has transformed police culture in countries such as the UK, where institutions like the College of Policing and the What Works Centre have fostered partnerships between police forces and researchers (Telep, & Lum, 2014). These developments align with broader efforts to professionalise policing through systematic knowledge production and evaluation.

In Thailand, the integration of academic research into police decision-making remains limited. However, embedding EBP principles into training institutions such as the Royal Police Cadet Academy could help establish a research-informed culture. As Lum, and Koper (2017) argue, EBP enables policing organisations to move from reactive enforcement to proactive problem-solving, offering strategic advantages and fostering more legitimate practices grounded in effectiveness rather than tradition.

7.1.3 Improving Public Trust and Accountability

The ethical implementation of data-driven policing tools can improve public trust and institutional accountability – particularly in contexts where confidence in law enforcement is low. As Brayne (2021) highlights, digital data systems, when used transparently, can enhance internal monitoring, improve documentation practices, and create accountability mechanisms that limit opportunities for abuse. These systems can produce audit trails, track officer conduct, and standardise decision-making processes, thereby supporting internal investigations and reinforcing procedural fairness.

The importance of procedural justice – where individuals perceive they are treated fairly and with respect – has been shown to significantly impact public trust in the police (Tyler, 2006). By enabling standardised decision-making and reducing discretionary bias, data science can contribute to fairer outcomes. However, this depends on institutional safeguards and clear governance frameworks. Without such safeguards, data tools can become instruments of over-surveillance, particularly against marginalised populations (Longworth, 2021; Ferguson, 2017). Thus, transparency, accountability, and human rights considerations must be central to Thailand's data science integration strategy if it is to build legitimacy and maintain public confidence.

7.1.4 Strengthening Multi-Agency Collaboration

Crimes involving human trafficking, cybercrime, and organised networks often require collaboration across multiple state and non-state actors. Data science provides the technical foundation for enhanced multi-agency cooperation through interoperable systems, shared databases, and real-time information exchange. For instance, smart policing frameworks in countries like South Korea and Singapore rely heavily on integrated platforms that connect law enforcement with other government departments (Joh, 2019; Zhang, 2021). These cross-sectoral infrastructures facilitate joint decision-making, improve emergency response times, and ensure holistic case management.

In Thailand, where trafficking in persons frequently involves overlapping responsibilities among police, immigration, and social welfare services, data science could play a critical role in breaking down institutional silos. As Farrell et al., (2015) emphasise, the success of victim identification and trafficking investigations depends heavily on communication and trust between agencies. Integrated platforms could help harmonise protocols, reduce redundancy, and ensure timely support for vulnerable populations – particularly migrant children, ethnic minorities, and stateless individuals. Moreover, leveraging data to support inter-agency coordination could reinforce Thailand's commitments under regional and international anti-trafficking frameworks, while enhancing institutional responsiveness and efficiency.

7.2 Challenges
7.2.1 Fragmented Data Infrastructure

One of the most pressing challenges facing the adoption of data science in Thai policing is the fragmentation of data systems across different agencies and jurisdictions. Unlike countries with centralised digital infrastructure and interoperability protocols, Thailand lacks a unified architecture that allows seamless data sharing between police departments, ministries, and support agencies. This fragmentation significantly hinders real-time data analysis, predictive modelling, and collaborative case management, reducing the overall efficacy of data-informed strategies (Lum, & Koper, 2017). For instance, while some urban police stations may operate digital case management tools or CCTV analytics, these systems are often not synchronised with national databases or accessible across provinces. This lack of integration impedes the development of standardised practices and makes it difficult to coordinate responses to trans-regional or organised crime threats. The absence of shared platforms also limits the potential of predictive tools, which rely heavily on large, consistent, and clean datasets to generate accurate insights (Perry et al., 2013; Meijer, & Wessels, 2019). In contrast, countries like South Korea and Singapore have demonstrated how centralised infrastructures can drive national-level coordination and enable intelligent policing at scale (Joh, 2019; Zhang, 2021). Without a coherent data ecosystem, Thailand risks reinforcing silos and undermining the transformative potential of data science.

7.2.2 Organisational Culture and Resistance to Change

The successful integration of data science into policing is not merely a technological issue – it is fundamentally about organizational transformation. Police institutions are traditionally hierarchical, rules-based, and resistant to change, especially when innovations are perceived as undermining existing authority structures or professional discretion (Chan, 1996). In Thailand, where decision-making is often centralised and top-down – whether in policing more broadly (Poothakool, & Glendinning, 2013; Poothakool, 2014), in law enforcement and public health approaches (Poothakool, & Meephiam, 2022), or in human trafficking investigations (Mangkhalasiri, 2024) – the introduction of data-driven methods may be met with scepticism or passive resistance from officers unfamiliar with research-led approaches.

This resistance is compounded by limited exposure to empirical research and critical thinking in police training. As Brayne (2021) and Loader, and Sparks (2011) argue, data science introduces new logics of control – statistical, probabilistic, and algorithmic – that may challenge conventional notions of authority and field discretion. Officers may be wary of being monitored or evaluated by metrics they do not understand or control, leading to low uptake or misapplication of tools. Moreover, there is a risk of overreliance on digital outputs without the capacity to interpret them critically, especially in environments where professional development is uneven. Addressing this challenge requires cultural change, leadership engagement, and the institutionalisation of data literacy as a core competency.

7.2.3 Legal and Ethical Concerns

The use of data science in policing raises important legal and ethical questions, particularly in contexts where regulatory frameworks are underdeveloped. Thailand currently lacks comprehensive legislation governing the collection, use, and oversight of algorithmic tools, predictive models, or biometric surveillance. This regulatory vacuum creates significant risks for civil liberties, including the potential for discrimination, wrongful profiling, and unauthorised data sharing (UNODC, 2024; Ferguson, 2017).

Technologies such as facial recognition or risk scoring systems, when deployed without adequate safeguards, can amplify systemic inequalities and erode public trust. As Longworth (2021) notes, algorithmic systems often encode historical biases, particularly when trained on flawed or incomplete data. In the absence of legal mandates for transparency or explainability, decision-making may become opaque and unaccountable – a phenomenon Pasquale (2015) describes as the rise of the "black box society." Furthermore, Thailand's political landscape, where security imperatives often override privacy protections, raises concerns that data science could be misused for social control or political surveillance, rather than public safety. These issues underscore the urgent need for ethical guidelines, impact assessments, and independent oversight mechanisms before data-driven tools are scaled up.

7.2.4 Resource and Capacity Gaps

Another major constraint on Thailand's ability to adopt data science in policing is the uneven distribution of resources and technical capacity across the country. While some centralised units or urban police departments may benefit from access to digital tools and trained personnel, rural and under-resourced stations frequently lack basic infrastructure, such as internet connectivity, secure data storage, or analytical software. This digital divide threatens to exacerbate existing inequalities between regions and limit the scalability of national initiatives (Lum, & Koper, 2017). Moreover, the effective use of data tools requires a skilled workforce capable of interpreting outputs, designing interventions, and evaluating outcomes. These competencies are still rare within Thai policing institutions, where training curricula are often outdated and research is not embedded into professional development pathways. Without sustained investment in capacity-building – both human and technical – the introduction of data science may remain superficial or reinforce existing dysfunctions. The experience of countries like South Korea shows the value of long-term partnerships with academic institutions, dedicated funding for digital innovation, and structured training programmes to build internal expertise (Joh, 2019). Thailand should adopt a similar multi-pronged strategy if it is to move beyond pilot projects and towards institutional transformation.

7.3 Navigating the Path Forward

The literature indicates that successful integration of data science in policing is contingent upon institutional learning, ethical governance, and public engagement. Thailand must avoid viewing data tools as technical fixes and instead invest in building a policing culture grounded in evidence, transparency, and accountability (Brayne, 2021; Tyler, 2006). Drawing on lessons from international contexts, Thailand's path forward should involve the co-creation of a national framework for data-informed policing, involving police leadership, civil society, academics, and policymakers. A balanced approach that values research and procedural justice while recognising on-the-ground challenges is necessary. As Farrell et al., (2015) caution, laws and tools alone are insufficient without changes in practice and inter-agency cooperation.

8. Recommendations

This section addresses the third research objective: To propose recommendations to the Thai government for the development of data science policy in policing. Drawing from the lessons and analyses of previous sections, it presents a forward-looking roadmap to guide the ethical, strategic, and sustainable integration of data science into Thai law enforcement. The recommendations below incorporate the strengths and best practices observed in the international landscape while responding directly to the Thai context.

8.1 Establish a National Framework for Data-Informed Policing

A clear and comprehensive national strategy should be developed to guide data-informed policing in Thailand. This strategy should outline goals, ethical standards, and operational protocols for data-driven policing. Lessons from the United Kingdom are especially relevant here. The UK's coordinated national strategy, spearheaded by the College of Policing and the Centre for Data Ethics and Innovation, provides a model for integrating ethical standards and interoperability into law enforcement (Sherman, 2013; Babuta & Oswald, 2021). Similarly, South Korea's national ICT infrastructure, which connects law enforcement with other public services, offers insight into the importance of digital interoperability and strategic coordination (Joh, 2019). Thailand can benefit from adopting a similar centralised planning framework while ensuring inclusive stakeholder engagement – including police, policymakers, academics, and civil society – to build legitimacy and long-term sustainability (Tyler, 2006).

8.2 Invest in Capacity Building and Research-Led Training

To embed a culture of evidence-based policing, sustained investment in capacity building is required across all levels of Thai law enforcement. This includes integrating data science, critical thinking, and research methodology into police training curricula, especially at institutions such as the Royal Police Cadet Academy. Officers should be trained not only to use tools but to understand the research that underpins them. This supports both operational effectiveness and reflective practice. Experiences from the UK and US highlight that police receptivity to evidence is strengthened through institutional support, mentoring, and continuing professional development (Lum, & Koper, 2017; Telep, & Lum, 2014). Building a knowledge-informed profession is key to sustaining innovation in Thai policing.

8.3 Promote Ethical Use of Surveillance and Predictive Technologies

As predictive tools, facial recognition, and other surveillance technologies gain traction in Thailand, it is vital to ensure ethical and legal frameworks are established. The UK experience with facial recognition and algorithmic impact assessments demonstrates the importance of transparency and independent oversight (Babuta, & Oswald, 2021). Similarly, South Korea's Personal Information Protection Act (PIPA) and AI ethics guidelines show how ethical governance can be embedded early in the innovation process (McDaniel, & Pease, 2021). Thailand should prioritise the development of data protection laws and independent auditing systems to ensure fairness and protect civil liberties (Brayne, 2021; UNODC, 2024).

8.4 Encourage Organisational Reform to Support Innovation

Organisational change is critical for integrating data science into Thai policing. Cultural resistance and hierarchical inertia remain major challenges (Chan, 1996). The United States case illustrates both innovation and caution: while programs like CompStat and PredPol fostered accountability, they also revealed risks of over-

policing and algorithmic opacity (Bratton, & Malinowski, 2008; Pasquale, 2015). The UK's national-level reforms highlight how institutional change can be incentivised through professional development, performance frameworks, and leadership training. Thailand should build incentive systems that reward transparency, experimentation, and cross-rank collaboration.

8.5 Foster Multi-Sectoral and Academic Partnerships

Collaborations between police, universities, and civil society have been central to effective data-driven policing globally. The US's RAND partnerships and the UK's What Works Centre offer models for embedding research into practice (Perry et al., 2013; Sherman, 2013). South Korea's national think tanks, such as KICJ, and public–private innovation with major tech firms also provide replicable frameworks (Han et al., 2022). Thailand should formalise these partnerships through co-funded pilot projects, embedded researcher programmes, and joint training modules to ensure tools are contextually grounded and ethically sound (Farrell et al., 2015).

8.6 Pilot and Scale Through Contextualised Implementation

Rather than adopting foreign models wholesale, data-driven policing in Thailand should prioritise incremental and locally tailored innovation. Small-scale pilot programmes – such as predictive patrol in selected high-crime areas or AI-supported case triaging – should be implemented with rigorous evaluation frameworks. These pilots allow for learning, adaptation, and risk mitigation before national scaling. Successful international experiences suggest that problem-oriented policing, when combined with community engagement and data insights, can yield substantial gains (Weisburd et al., 2010). Thai implementation should therefore be grounded in local realities while learning from global evidence.

The future of policing in Thailand should not be driven solely by tools, but by values: legitimacy, transparency, and justice. With the right strategies and partnerships, data science can serve as a catalyst for building public trust and enhancing safety across Thai society. These policy recommendations provide a roadmap toward such a transformation – one where technological innovation is balanced with democratic accountability, and where data is used not only to predict crime but to promote fairness, equity, and institutional reform. As Taylor (2017) argues, truly just data systems must prioritise social inclusion and ethical governance to avoid reproducing existing inequalities and marginalisations.

9. Conclusion

This paper has critically examined the emerging role of data science in Thai policing, mapping its current status, identifying key opportunities and challenges, and offering strategic policy recommendations informed by international practices. While Thailand has initiated important steps toward digital transformation in law enforcement, these efforts remain fragmented and lack a coherent national strategy. Comparative insights from jurisdictions such as the United States, United Kingdom, Singapore, South Korea, and Japan illustrate that effective integration of data science into policing is not only a technological challenge but a deeply institutional and ethical one. To ensure success, Thailand should adopt a holistic approach that balances innovation with transparency, builds internal capacity, and fosters collaboration across sectors. The pathway forward lies in creating a national framework that embeds data ethics, promotes inclusive reform, and leverages evidence for policy and operational decisions. With sustained political commitment, institutional reform, and public engagement, data science can serve as a transformative tool in building a more accountable, effective, and trusted policing system in Thailand.

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Enhancement of Justice System Interventions for High-Risk Violent Psychiatric Patients

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Abstract

This research aims to investigate problems in the Thai justice system's operations concerning psychiatric patients at high risk of committing violence and develop appropriate and effective operational strategies. The study employed document analysis and in-depth interviews with eighteen key informants. Additionally, a focus group discussion was held with six participants from professional groups.

The research identified several issues within the Thai justice system, categorized into four key areas: 1) Manpower including a shortage of correctional and police officers, a lack of medical professionals with relevant expertise, overburdened staff, inadequate understanding among relatives and the public, and insufficient knowledgeable justice personnel; 2) Insufficient budget (Money); 3) Materials: insufficient inpatient bed capacity due to the limited number of psychiatric hospitals in Thailand, along with a shortage of vehicles, ambulances, and essential operational equipment; and 4) Management: prolonged justice system procedures and treatment duration, limited inter-agency collaboration, inefficiencies in referral and follow-up systems, absence of a dedicated responsible agency, legal constraints hindering law enforcement operations, and lack of data integration and a unified patient information platform.

To enhance the effectiveness of the Thai justice system operations, the research recommended: 1) expanding medical and justice system personnel, including psychiatrists, psychiatric nurses, forensic psychiatric nurses, psychologists, social workers, and related professionals; 2) promoting accurate knowledge of psychiatric patient care among society, communities, and families; 3) promoting accurate knowledge of psychiatric patient care among related personnel; 4) promoting inter-agency collaboration or a collaborative network involving external government and private agencies; 5) establishing an organization specifically responsible for psychiatric patient care to enhance the effectiveness of treatment and the judicial process; 6) streamlining procedures for handling psychiatric patients; 7) improving the sufficiency of bed capacity for psychiatric patients; and 8) increasing budget allocation for relevant agencies.

Keywords: psychiatric patients; psychiatric; violence; justice system

1. Introduction

Over the past years, there has been a marked increase in the number of individuals experiencing mental health problems, particularly those exhibiting violent behaviors toward themselves or others. Self-directed violence encompasses acts such as self-harm and suicide, whereas violence toward others involves causing injury or death to other people. Such incidents occur both within family settings and in the broader community. These trends underscore that mental health problems are critical concerns with significant impacts on individuals' quality of life and on public safety.

In fiscal year 2023, 22,712 psychiatric patients were identified as having a high risk of violence (classified as Serious Mental Illness with High Risk to Violence, SMI-V). This figure represents a substantial increase from 7,500 cases in fiscal year 2022. These high-risk cases can be categorized as follows:

1. Self-harm with violent methods (60.65%) – 4,549 patients had a history of self-harm using violent methods intended to cause death.

2. Violence against others (24.17%) – 1,813 patients had a history of using violence against other people or causing alarm in the community.

3. Homicidal delusions (9.91%) – 743 patients experienced delusions involving intentions to fatally harm specific individuals.

4. Serious criminal offenses (5.27%) – 395 patients had a history of committing serious criminal offenses, including murder, attempted murder, rape, or arson.

Despite the rising number of high-risk psychiatric patients each year, significant challenges remain in the administration of justice processes for these individuals. Agencies such as the Ministry of Public Health, the judiciary, and law enforcement continue to face persistent problems that require further improvement and development in order to handle such cases more effectively.

The literature review encompasses the concepts and theories relevant to the research titled 'Domestic Violence: Its Impact on Thai Youth in the Digital Age,' as follows:

1.1 Schizophrenia

Schizophrenia is a psychiatric disorder characterized by disruptions in brain function, affecting cognitive processes, emotional regulation, and behavior. The severity of symptoms can vary significantly among individuals, and the disorder often presents as a chronic condition with periodic relapses and remissions (Suwanmaitree et al., 2017).

1.2 Administrative Concepts

Effective administration within mental health and justice systems requires the application of foundational management principles, often referred to as the 4Ms:

1. Man – Human resources are critical to achieving operational goals. Efficient allocation and development of personnel are essential to ensure service quality and sustainability.

2. Money – Financial planning and budgeting must support core programs and interventions, with an emphasis on cost-effectiveness and impact.

3. Materials – Adequate tools, equipment, and infrastructure are necessary for service delivery.

4. Management – Strategic coordination, leadership, and oversight are vital to the optimal use of organizational resources.

1.3 Concept of Social Network Collaboration

In the context of mental health and criminal justice, a social network refers to a structured relationship among diverse organizations or institutions. These networks are built upon collaboration through information exchange, shared decision-making, and joint action. Such networks enhance collective capacity to address complex challenges, solve problems, and deliver integrated services. Successful network collaboration is driven by mutual trust, aligned goals, and a shared commitment to achieving defined outcomes.

1.4 The Mental Health Act B.E. 2551 and Its Amendment (No. 2) B.E. 2562

The Mental Health Act B.E. 2551, as amended in B.E. 2562 (2019), is designed to protect the rights and dignity of individuals with mental health conditions and to ensure access to appropriate psychiatric treatment. The law categorizes patients into two groups: General psychiatric patients, who may receive voluntary or involuntary care based on medical evaluation; and Forensic psychiatric patients, who are involved in legal proceedings and require treatment under judicial supervision.

1.4.1. Forensic psychiatric patients

This category includes individuals with psychiatric disorders who are under criminal investigation, prosecution, or have received criminal convictions. The amended Act supplements the Criminal Procedure Code by providing enhanced protocols for appropriate and humane treatment.

The law allows administrative and law enforcement authorities to intervene when individuals demonstrate behavior indicating potential danger to themselves or others. These individuals may be admitted to psychiatric care facilities preemptively, without the need for a criminal offense to occur.

1.5 Medical Model

The Medical Model serves as a foundational framework for understanding and responding to individuals with psychiatric disorders, particularly those at high risk of engaging in violent behavior. In the context of the criminal justice system, a significant challenge in managing this population arises from the comorbidity between

mental illness and substance abuse—an interaction that has contributed to a steady increase in the number of individuals receiving forensic psychiatric care.

This model conceptualizes mental illness as a biological or psychological dysfunction that requires diagnosis and ongoing treatment by qualified medical professionals. It emphasizes that violent behavior exhibited by psychiatric patients is often a manifestation of their underlying illness rather than the result of intentional misconduct. As such, the medical perspective advocates for continuous therapeutic intervention rather than relying solely on punitive legal or social control measures.

However, the application of the Medical Model within the justice system faces several limitations—particularly the lack of alignment between legal and medical definitions of mental illness. Terms such as "dangerousness" or "insanity" are often vaguely defined or entirely omitted from legal statutes, necessitating case-by-case interpretation. This incongruity can result in conflicting understandings between legal professionals and medical practitioners, potentially complicating adjudication processes and the formulation of appropriate treatment plans.

The United Kingdom offers a notable example of the Medical Model's influence. In this context, mental illness is recognized as a clinical condition that can be diagnosed and treated. Accordingly, state responses to offenders with psychiatric conditions are increasingly grounded in rehabilitation rather than punishment, promoting a balance between protecting individual rights and maintaining public safety.

1.6 Justice Model

Currently, Thailand has not yet established a specialized Mental Health Court. Cases involving high-risk psychiatric patients who commit criminal offenses are adjudicated within the general court system. Although Thailand has implemented various measures to protect the rights of individuals with mental disorders—including the provision of mental health services and efforts to promote equitable access to care—significant challenges remain, particularly in terms of inter-agency coordination and the operational effectiveness of procedures within the justice system.

By contrast, the United States has established Mental Health Courts (MHCs), originally developed as an extension of Drug Treatment Courts. These specialized courts aim to divert mentally ill offenders from conventional criminal prosecution into individualized treatment and rehabilitation programs. The typical duration of participation in such programs ranges from 18 to 24 months.

However, Mental Health Courts play a pivotal role in evaluating the mental condition of defendants through interdisciplinary teams comprising psychiatrists, psychologists, social workers, probation officers, and judges. The judicial process within MHCs prioritizes rehabilitation over punishment by implementing individualized treatment plans tailored to the specific clinical and psychosocial needs of each participant. Participation in these programs is voluntary and contingent upon the defendant's willingness to comply. Upon successful completion of the program and demonstrable clinical improvement, the individual may be exempted from further legal penalties.

2. Objectives

2.1 To investigate current challenges in administering justice processes involving psychiatric patients at high risk of violence

2.2 To develop more effective approaches to the administration of justice for psychiatric patients identified as high risk of violence

3. Materials and Methods

This study is qualitative research, utilizing a variety of data collection methods, including document research and fieldwork research through in-depth interviews with eighteen key informants, including police officials experienced in intervening in violent incidents or pressing charges against psychiatric patients committing violent incidents, judges, psychiatrists, psychologists, nurses, and social workers. To collect more data, a focus group discussion was conducted with six participants who were experienced police officials, psychiatrists, psychologists, and nurses.

4. Results
4.1 Problems in the Justice Process
The problems in the justice process concerning high-risk psychiatric patients can be categorized into four main issues:

4.1.1 Manpower
4.1.1.1 Insufficient personnel
The number of psychiatric professionals does not align with the growing number of psychiatric patients, resulting in an excessive workload for the limited staff. Moreover, there is a significant shortage of forensic psychiatric experts.

4.1.1.2 Shortage of correctional and police officers
Not only are medical personnel insufficient, but the number of police officers and correctional staff is also inadequate, impeding the enforcement of regulations.

4.1.1.3 Specialist shortages
There is a shortage of psychiatrists, psychiatric nurses, clinical psychologists, and social workers, as indicated by interview responses:
"There is a critical shortage of psychologists." (Clinical Psychologist No. 1, September 9, 2024, In-depth Interview)
"We lack trained staff. Experienced psychiatric nurses are extremely valuable, but not many want to take on this demanding work." (Psychologist No. 3, September 26, 2024, In-depth Interview)

4.1.1.4 Excessive workloads
Personnel had excessive workloads as expressed by a clinical psychologist:
"Staff shortage, long queues, overwhelming workload. It would be beneficial to have more psychologists." (Clinical Psychologist No. 2, September 11, 2024, In-depth Interview)

4.1.1.5 Training limitations
Heavy workloads prevent staff from attending training programs to enhance their specialized knowledge.
"Therapeutic approaches evolve constantly. It is difficult to find time to attend training, as we are always attending to patients." (Clinical Psychologist No. 1, September 9, 2024, In-depth Interview)

4.1.1.6 Lack of awareness among relatives and society
Limited understanding of psychiatric conditions among families and the public often leads to misjudgments and safety risks.
"Families often don't recognize the importance of psychiatric treatment."

4.1.2 Insufficient budget
Insufficient funding is a critical issue, especially regarding training expenses and long-term psychiatric treatment—often exceeding one month—for patients involved in legal cases.
"If the training is costly, we usually can't attend. For example, some high-quality external programs require self-funding, and even then, participation depends on leave approval. Institutions like Galya Rajanagarindra Institute do offer training, but participation is limited." (Psychiatric Nurse No. 1, September 11, 2024)

4.1.3 Materials
4.1.3.1 Inadequate inpatient bed capacity
Many hospitals cannot meet the demand for psychiatric inpatient care.
"Our hospital only has 500 beds, but right now we have over 700 patients. We've had to place extra beds in corridors, and in some cases, discharge patients early for outpatient monitoring due to space constraints." (Clinical Psychologist No. 1, September 9, 2024, In-depth Interview)

4.1.3.2 Limited number of psychiatric hospitals

In Thailand, only 13 psychiatric hospitals are available, with only three facilities—Srithanya Hospital, Somdet Chaopraya Institute of Psychiatry, and Galya Rajanagarindra Institute—serving the Bangkok area. This limited availability is insufficient to meet increasing patient needs.

4.1.3.3 Limited ambulance and equipment availability

At present, the ambulances designated for psychiatric patients are not specialized, as they are shared with general medical services, leading to operational inefficiencies and safety risks.

4.1.4 Management
4.1.4.1 Prolonged procedures in the justice system

The processing of high-risk psychiatric patients, especially those involved in violent or criminal offenses, demands considerable time and interagency coordination. Legal procedures—particularly those requiring court-ordered mental health evaluations—often result in prolonged hospitalization, with durations ranging from 45 days to over a year. These delays hinder both timely treatment and the resolution of legal proceedings.

4.1.4.2 Lengthy treatment duration

Legal-case psychiatric patients require treatment durations two to three times longer than non-forensic psychiatric patients.

4.1.4.3 Limited inter-agency collaboration

The referral and follow-up system for psychiatric patients remains fragmented. Patients without familial support encounter significant challenges in securing post-treatment placement, as most shelters lack the necessary mental health expertise and are often unwilling to accept them. Moreover, inadequate coordination in follow-up care frequently leads to loss of contact, treatment discontinuation, and a heightened risk of relapse.

4.1.4.4 Absence of a designated coordinating agency

"There's no central coordinating agency. Reporting to the Ministry of Social Development and Human Security (MSDHS) is often futile—they don't follow up. Even the police might not respond promptly to incidents." (Psychologist No. 3, September 26, 2024, In-depth Interview)

4.2 Challenges Identified by Police Officers
4.2.1 Manpower
4.2.1.1 Insufficient personnel

Police officers frequently experience human resource constraints that limit their capacity to manage psychiatric cases effectively.

"We try everything to help families or psychiatric patients. In some cases, I just ride a motorcycle with the patient to the psychiatric hospital. It's risky, but it's the only solution at the time." (Police Officer No. 1, October 3, 2024)

4.2.1.2 Excessive workloads

Apart from their core duties in crime prevention and public safety, officers must manage psychiatric cases, including transportation to psychiatric facilities and providing 24-hour monitoring during treatment.

"We already have too many responsibilities. We can't detain anyone beyond 48 hours, so we just process them and let the courts handle the rest." (Police Officer No. 2, October 21, 2024)

4.2.2 Insufficient budget

Due to limited funding, psychiatric patients who commit offenses are often treated as regular suspects and prosecuted without prior mental health evaluation.

"Everything costs money. Just driving within the district requires fuel—100 to 200 baht. That's why we usually proceed with prosecution instead of taking them to a psychiatric hospital." (Police Officer No. 2, October 21, 2024)

4.2.3 Materials

4.2.3.1 Shortage of vehicles and equipment

Police officers, similar to their medical counterparts, encounter shortages in both operational vehicles and specialized equipment essential for the secure and efficient handling of psychiatric cases.

4.2.4 Management

4.2.4.1 Legal constraints

Thai law provides insufficient support for police operations involving psychiatric offenders. Many officers lack adequate knowledge of mental health legislation and encounter safety risks when transporting patients without appropriate restraints. As a result, prosecution is often pursued as the default course of action, given the legal requirement to detain suspects within 48 hours—leaving little opportunity for proper psychiatric evaluation.

4.2.4.2 Lack of a dedicated agency

During psychiatric crises, there is no designated authority to take over responsibilities.

"There's no lead agency; it has its limitations. When incidents occur outside working hours, no one takes responsibility." (Police Officer No. 2, October 21, 2024)

4.2.4.3 Absence of integrated data systems

The absence of an integrated psychiatric patient information system, combined with inter-agency reluctance to share data, contributes to disjointed and ineffective case management.

4.2.4.4 Complicated admission procedures

The transfer of psychiatric patients to specialized hospitals is frequently delayed or complicated by coexisting physical health conditions. In such instances, police officers must first transport the patient to a general hospital for medical treatment before proceeding to a psychiatric facility. Additionally, the limited admission hours of psychiatric hospitals—typically restricted to daytime—further exacerbate delays in patient care.

4.3 Challenges Identified by Judges

4.3.1 Manpower

4.3.1.1 Limited understanding of mental illness

Across all three groups—medical staff, police, and court personnel—there is a common lack of understanding regarding the legal management of psychiatric patients. For example, many police officers proceed with prosecution without mental health assessment, and court personnel often treat mentally ill offenders as typical defendants.

"Can we even tell if the offender is mentally competent to stand trial? If not, they're just prosecuted like everyone else. It's better for the wealthy who already have a psychiatric history on record. But for the poor, it's very difficult." (Judge No. 1, October 8, 2024)

4.3.2 Management

4.3.2.1 Ambiguity in legal criteria for mental incompetence

Courts rely on psychiatric evaluations to determine if offenders are mentally unfit to stand trial. However, criteria for interpreting mental incompetence are unclear.

"We rely on psychiatric assessments, but how can the psychiatrist be certain the individual was mentally unwell at the time of the offense? It depends on what the doctor's report states." (Judge No. 1, October 8, 2024)

4.3.2.2 Coordination problems with hospitals

Judges encounter the same issues as police: psychiatric hospitals often cannot admit patients due to bed shortages, forcing the court to assign outpatient treatment instead.

"Sometimes the court orders hospitalization, but the psychiatric facility can't accept the patient due to lack of beds. The alternative is outpatient care, but prison staff are already overwhelmed and cannot accompany the patient to every appointment." (Judge No. 1, October 8, 2024)

4.4 Development of Effective Justice Procedures for High-Risk Psychiatric Patients

4.4.1 Increasing the number of medical personnel

To address the rising number of psychiatric patients, particularly those involved in legal cases, it is crucial to increase the number of specialists such as psychiatrists, psychiatric nurses, and psychologists. As one clinical psychologist suggested:

"I believe we need to increase the number of personnel and related staff." (Psychologist No. 1, September 9, 2024)

4.4.2 Promoting mental health literacy among families and community members

Raising awareness among families and community members is essential to improve the reintegration of psychiatric patients post-treatment. Misunderstandings often result in relapse due to inadequate support.

"If communities understood how to monitor psychiatric patients, they could help slow the progression or even prevent incidents by reporting early." (Psychologist No. 1, September 9, 2024)

4.4.3 Enhancing professional training opportunities

Training programs in forensic psychiatry and mental health should be expanded to ensure that personnel working with psychiatric patients have adequate expertise.

"More forensic psychiatric training is needed. Right now, training is limited to one person per hospital per year, which is not enough." (Psychiatric Nurse No. 2, September 12, 2024)

4.4.4 Interagency integration and private sector involvement

A collaborative network involving both governmental and private sector organizations should be established to support the rehabilitation, employment, and reintegration of psychiatric patients into society. Additionally, the implementation of integrated data systems is essential to enhance coordination and operational efficiency across agencies.

4.4.5 Establishing a dedicated coordinating agency

A specific agency should be responsible for managing psychiatric cases to streamline procedures and improve safety.

"There should be a dedicated service like 1669 for these cases to reduce steps and ensure both patients and families are protected." (Psychologist No. 3, September 26, 2024)

4.4.6 Simplifying legal and medical procedures

Redundant processes should be eliminated to improve efficiency.

"When police refer psychiatric patients, hospitals should accept them within 24 hours, not make us wait until the morning." (Police Officer No. 2, October 21, 2024)

4.4.7 Expanding inpatient capacity

The availability of psychiatric beds must be expanded to accommodate the growing demand for inpatient mental health services.

"We need more beds so psychiatric patients can be admitted for proper treatment." (Clinical Psychologist No. 1, September 9, 2024)

4.4.8 Increasing budget allocation

Budgetary constraints limit access to training opportunities and restrict the availability of essential resources, including medical equipment and law enforcement tools.

"We need more funding to train specialists. Currently, there isn't enough budget—only 1 or 2 staff members can attend training each year." (Psychiatric Nurse No. 1, September 11, 2024)

5. Discussion
5.1 Systemic Challenges in the Justice Process for High-Risk Psychiatric Patients
Findings from medical professionals, police officers, and judges highlight similar issues, particularly regarding administrative management:
5.1.1 Manpower
This includes inadequate staffing, excessive workloads, limited professional expertise, restricted access to training, and insufficient public awareness. These issues align with the 4Ms framework—Man, Money, Material, and Management—highlighting the critical role of skilled and adequately staffed personnel in ensuring operational effectiveness. Similarly, Thaiwong (2021) identified structural and systemic barriers to preventing recidivism among forensic psychiatric patients, particularly citing staff shortages and poor coordination between hospitals and correctional institutions. Moreover, social stigma and a lack of understanding within families and communities often lead to rejection, exacerbating patient distress and heightening the risk of violent behavior. These findings are consistent with those of Thavorn and Kulnithes (2017), who observed that the public frequently perceives psychiatric patients as dangerous and unfit for social integration.

5.1.2 Insufficient budget
The lack of budget affects both operational capacity and training opportunities for specialized staff. Furthermore, extended treatment durations exceed the coverage of standard healthcare schemes, leaving hospitals financially burdened.

5.1.3 Materials
Both medical and law enforcement personnel experience equipment shortages, including inpatient beds, ambulances, and police vehicles. These deficiencies delay patient admission and reduce the system's responsiveness. As emphasized in the 4Ms framework, appropriate material support is essential for timely and efficient service delivery.

5.1.4 Management
Long treatment durations, complex procedures, absence of a coordinating agency, and a lack of interagency cooperation result in systemic delays. No centralized database exists, and agencies operate in isolation. This lack of integration hinders patient tracking, leading to loss of follow-up, relapse, or repeat offenses.

5.2 Strategic Recommendations for Justice Process Improvement
5.2.1 Expanding medical workforce
In response to the growing number of psychiatric patients, especially those involved in forensic cases, it is essential to recruit and retain specialized professionals. Thaiwong (2021) emphasizes the importance of workforce development and the establishment of dedicated facilities as key strategies for reducing recidivism.

5.2.2 Promoting public understanding of mental illness
Families and communities must be equipped with knowledge and skills to support reintegration. Without proper care and understanding, relapse and recidivism become likely outcomes. Daff and Thomas (2014) emphasize the importance of understanding mental health within the criminal justice system to ensure appropriate treatment rather than punitive measures.

5.2.3 Fostering interagency collaboration and data integration
Collaboration between government and private sectors is essential. As highlighted by Chareonwongsak (2000), effective networks must involve shared vision, mutual interests, participation, interdependence, and reciprocal interaction. These elements ensure that service delivery is both cohesive and responsive. Ring and De Ven (cited in Inthachuea, 2020) propose a four-step framework for collaboration: negotiation, agreement, implementation, and evaluation. This framework can help streamline cross-sector procedures and reduce systemic fragmentation.

5.2.4 Establishing a specialized agency

A dedicated unit is needed to oversee psychiatric cases, particularly those involving violence or legal conflicts. This would reduce redundant procedures and enhance public and patient safety.

5.2.5 Streamline operational procedures

Redundant referral and admission steps particularly those involving physical comorbidities should be reduced to prevent inefficiencies. As per the 4Ms framework, resource management must prioritize effective use of personnel, budget, and equipment.

5.2.6 Streamlining procedures in the management of psychiatric patients

Currently, the management of psychiatric patients remains more complicated and time consuming compared to that of general patients. The process often involves duplicated tasks, excessive procedural steps, and fragmented coordination among relevant agencies, resulting in prolonged waiting times for psychiatric patients seeking treatment. These inefficiencies hinder timely access to necessary mental health services.

Key informants indicated that operational challenges arise from a lack of shared understanding and standardized procedures among stakeholders such as psychiatric hospitals, general hospitals, and police officers. A frequently cited issue involves cases where police officers escort psychiatric patients to psychiatric hospitals but are unable to admit them due to physical injuries or comorbid medical conditions. As a result, the patients must first be transported back to a general hospital for medical treatment before being referred again to the psychiatric facility. This cyclical process not only delays treatment but also leads to the inefficient use of time, personnel, and resources.

Accordingly, it is recommended that procedural steps be streamlined and inter-agency referral protocols clearly defined. Such improvements would help eliminate redundancy, reduce waiting times, and enhance service delivery efficiency. This approach aligns with the 4Ms principle of effective resource management—Man, Money, Material, and Management—which advocates for the optimal use of human resources, funding, materials, and administrative systems. Ultimately, this would contribute to a more efficient and responsive mental health service system that better addresses the needs of psychiatric patients.

5.2.7 Expanding inpatient facilities

Bed shortages hinder access to timely treatment. Adequate infrastructure is critical to meet increasing demand and support intensive care.

5.2.8 Increasing budget allocation

Budget is a vital factor in the 4Ms framework. It should be allocated strategically to support training, improve material readiness, and meet long-term treatment costs for forensic psychiatric patients.
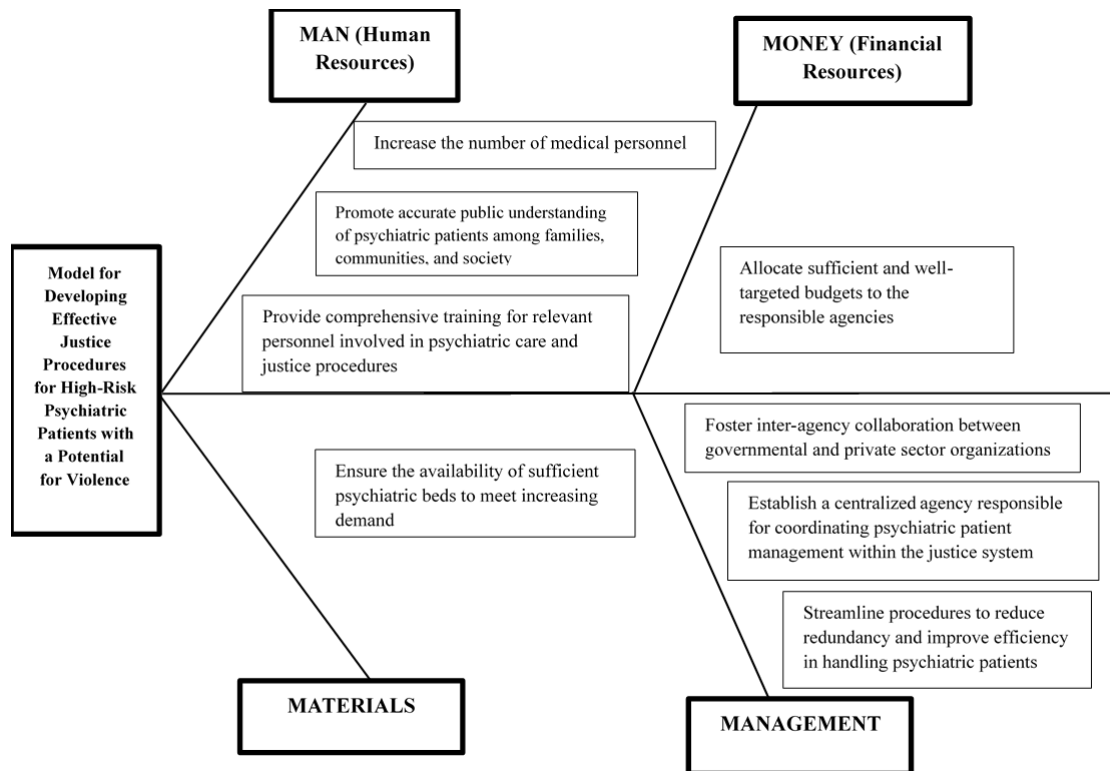
Figure 1 A Model for Developing Effective Justice Procedures for High-Risk Psychiatric Patients with a Potential for Violence

6. Conclusion

6.1 Systemic Challenges in the Justice Process for High-Risk Psychiatric Patients

• Manpower Constraints: This includes insufficient personnel, heavy workloads, limited expertise, limited access to training, and lack of public understanding.

• Financial Limitations: The lack of budget affects both operational capacity and training opportunities for specialized staff.

• Material Shortages: Both medical and law enforcement personnel experience equipment shortages, including inpatient beds, ambulances, and police vehicles.

• Administrative Inefficiencies: Long treatment durations, complex procedures, absence of a coordinating agency, and a lack of interagency cooperation all contribute to systemic delays. No centralized database exists, and agencies operate in isolation.

6.2 Strategic Recommendations for Justice Process Development

• Increase the number of medical and related personnel including psychiatrists, psychiatric nurses, forensic psychiatric nurses, psychologists, social workers, and justice system staff to meet the growing demand for psychiatric care and legal intervention.

• Promote public awareness and education regarding psychiatric conditions to reduce stigma and foster supportive environments. Enhanced understanding among families and communities can play a crucial role in preventing violent incidents and supporting patient reintegration.

• Provide comprehensive training for all personnel involved in the care and management of psychiatric patients, including specialized courses and continuous skill development opportunities.

• Foster interagency collaboration through partnerships with private sector entities to facilitate post-treatment employment opportunities and establish a unified information-sharing platform to improve operational efficiency.

- Establish a dedicated agency responsible for overseeing both the treatment and legal processing of psychiatric patients, thereby streamlining procedures and improving overall safety.
- Streamline procedural workflows to eliminate redundancies and enhance the efficiency of services provided to psychiatric patients across relevant agencies.
- Ensure sufficient allocation of psychiatric hospital beds to accommodate the increasing demand for inpatient care.
- Increase budget allocations to relevant agencies to strengthen operational capacity and address current shortages in staff, equipment, and essential resources.

7. Recommendations
7.1 Policy-Level Recommendations
The government should designate a lead agency or specialized unit responsible for managing psychiatric patients throughout the justice process from initial referral to treatment, follow-up, and interagency coordination.

7.2 Practical Recommendations
- Educate the public to foster accurate understanding and reduce stigma, enabling early intervention and community-based support.
- Provide targeted training for staff who interact with psychiatric patients to ensure appropriate and safe care.
- Simplify operational procedures to reduce delays and improve service efficiency.
- Promote collaboration among government agencies, the private sector, civil society, and local administrative organizations.
- Increase the number of psychiatric beds to meet the growing national demand.
- Allocate additional budgetary resources to psychiatric hospitals to address shortages in staff, equipment, and medical supplies.
- Expand the number of psychiatric professionals with specialized expertise in mental health.
- Support the nationwide expansion of psychiatric hospitals to address geographic and capacity gaps.
- Establish a centralized agency dedicated to overseeing the care and legal processing of psychiatric patients.
- Implement information technology systems that enable real-time data sharing among all relevant agencies.
- Encourage private sector involvement in hiring rehabilitated psychiatric patients to reduce recidivism and promote social reintegration.

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The Impact of Old Age Pension on Subjective Well-being: Evidence from Thailand

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Abstract

In this study, an analysis was conducted on the impact of old age pension on subjective well-being in Thailand for those aged 60 and over. Data was obtained from the Health, Aging, and Retirement in Thailand (HART) survey for the 2015 and 2020 waves. A random-effects ordered logit model was employed as the primary method due to the panel structure of the data, while the ordered logit model was used as an alternative methodology. The results indicated that the old age pension has a minimal impact on subjective well-being, relative to other non-financial factors. Other variables such as age, marital status, residential area, region, health status, and income perception tend to have stronger impacts on subjective well-being. Subjective well-being decreases with age. Marriage, living in urban areas, better health status, and higher perception of income are associated with improved subjective well-being. Interestingly, the findings from this study also demonstrate regional differences in subjective well-being.

Keywords: Subjective Well-Being; Old Age Pension; Ordered Logit Regression Model; Health Economics

1. Introduction

Population aging is becoming a critical concern among many countries around the world. In particular, Thailand is currently one of the fastest aging countries in ASEAN and worldwide. In light of this demographic shift, Thailand now bears a significant responsibility to ensure the well-being of its elderly. One key policy response is the old age pension program, which reflects recognition of the rising demands for financial support due to a lower capacity to work and the increased health and long-term care needs of elderly people.

The Old Age Allowance (OAA) scheme was first implemented in Thailand in 1993 as a non-universal program for low-income elderly individuals. In 2009 the scheme was extended to include a universal cash transfer payment to every citizen aged at least 60 and not currently in receipt of another government pension. Currently, all eligible individuals receive the old age pension, with the amount varying by their age ranging from 600 to 1,000 Thai baht per month. Individuals aged 60-69 receive 600 baht, those aged 70-79 receive 700 baht, those aged 80-89 receive 800 baht, and those aged 90 and above receive 1,000 baht.

As the aging population grows, the challenges encountered extend beyond economic and healthcare issues. It is essential to examine how old age pension policies affect not only material circumstances but also the subjective well-being of older adults. Subjective well-being is defined as individuals' cognitive and affective assessments of their lives, encompassing both emotional responses to experiences and cognitive assessments of satisfaction and fulfillment. Accordingly, the key components of subjective well-being include high life satisfaction, few unpleasant moods, and the experience of positive emotions (Diener, 1984). Subjective well-being is typically evaluated through self-reported scales designed to measure individuals' cognitive and affective judgments regarding their lives. Among the most commonly used instruments in this field are the Subjective Happiness Scale (SHS) by Lyubomirsky, and Lepper (1999), which gauges overall life satisfaction using five items on a 7-point scale; the Satisfaction with Life Scale (SWLS) by Diener et al., (1985), which gauges overall life satisfaction using five items on a 7-point scale; and the Cantril Self-Anchoring Striving Scale (Cantril, 1965) which prompts respondents to position themselves on a ladder ranging from 0 (the worst possible life) to 10 (the

best possible life). These scales have become integral to research on subjective well-being and are often adapted or modified in large-scale surveys to fit specific national frameworks for well-being (OECD, 2013).

In some econometric studies, linear transformations have been employed to convert subjective well-being measures into ordinal categories to enhance statistical analysis interpretation. For example, Milovanska-Farrington, and Farrington (2022) explored how life satisfaction, personal values, and relative perceptions relate to overall subjective well-being. This was achieved by reclassifying an 11-point life satisfaction scale into three distinct categories, low, medium, and high subjective well-being. Similarly, Gurven et al., (2024) utilized a 5-point Likert scale to assess subjective well-being, categorizing those responses as low, average, and high to facilitate analysis across varied populations in developing countries. These instances demonstrate that transforming scales into broader categories is a prevalent and accepted method in subjective well-being research.

Researchers have increasingly directed their attention towards examining how social policies affect subjective well-being utilizing well-established measures of subjective well-being. In particular, the influence of old age pension schemes has been extensively analyzed in various countries regarding their role to improve the quality of life for older adults. In South Korea, Kim (2018) discovered that pensions could enhance older people's life satisfaction. Similarly, in China, Ding (2017) found that the old age pension program improved the well-being of rural elderly people, while also reducing the importance of sons. Abruquah et al., (2019) found that three different old age pension schemes significantly improved retired elderly life satisfaction, where different amounts of impact indicated the existence of inequality between the Government and Institution Pension scheme, the Enterprise Employee Basic Pension scheme, and the Urban-rural Social Pension scheme. In South Africa, Etinzock (2018) found that the state old age pension significantly increased life satisfaction, while Etinzock, and Kollamparambil (2019) also added evidence that the pension benefits were more significantly observed in female recipients rather than male recipients.

There are several channels through which old age pensions could affect subjective well-being, including financial stability, health and well-being, social participation, and psychological impacts. Among these, financial stability appears to be the most important channel, since old age pensions can provide economic security to the elderly. Chen, and Tan (2018) showed that being in receipt of a pension led the beneficiaries to have better life satisfaction, with social ties, household income, and economic satisfaction appearing to be the primary drivers of this effect. Similarly, Pak (2020) showed that the expansion of the old age pension scheme significantly improved the subjective well-being of the beneficiaries by them reporting higher levels of financial satisfaction. Ko, and Möhring (2021) also found a positive relationship between pension benefit receipt and older individuals' subjective well-being in rural China, and further claimed that the pension could provide elderly people a feeling of financial stability and allow them to devote a portion of their income to medical expenses.

In Thailand, existing research on the old age pension has addressed economic or structural aspects. For example, Teerawichitchainan, and Pothisiri (2021), discussing how the expansion of the old age pension scheme had implications on intergenerational support and the well-being of senior citizens in Thailand, found that the reliance on the old age allowance reduced elderly people's financial dependence on their children but was linked to lower income adequacy and well-being, indicating a limited impact on reducing inequality among Thai elderly. Similarly, Rose (2016) highlighted how old age allowance had an influence on well-being of the elderly by conducting interviews with elderly pensioners living in northern Thailand, finding that old age allowance positively influences various aspects of well-being, including peace of mind, resource access, social ties, agency, health, and self-worth. More recently, Thaithatkul et al., (2022) also found that income is a major factor in determining subjective well-being, and financial assistance (such as an old age pension or fund) can both guarantee that seniors can afford the discounted public transportation fares as well as raise their overall satisfaction levels.

Although the existing literature extensively examines the relationship between old age pensions and subjective well-being internationally, there is a lack of research studies in Thailand examining the impact of old age pension and other determinants on subjective well-being, especially when using the ordered logit model to explore these effects. This study examines the impact of old age pension on subjective well-being while also considering other influencing factors in the model. Hence, this study utilizes a linear transformation to convert a self-rated life satisfaction scale from an 11-point Likert scale into a 3-point Likert scale, consisting of low, medium, and high categories of subjective well-being. This adjustment aims to facilitate its use in an ordered logit model, thereby yielding more useful results and policy recommendations which have been performed in fewer studies in the literature.

2. Objectives

1) To explore the impact of old age pension on the subjective well-being of the Thai elderly.
2) To investigate the impact of other socioeconomic-demographic factors on subjective well-being, providing a better understanding of the context of Thailand.
3) To provide a better understanding of evidence-based insights for Thailand's old age pension system, leading to increased subjective well-being and life satisfaction among the Thai elderly.

3. Materials and Methods

3.1 Data

Data was obtained from a biannual panel survey from the Health, Aging, and Retirement in Thailand (HART) for the 2015 and 2020 waves, conducted by the Center for Aging Society Research (CASR) at the National Institute of Development Administration (NIDA). The purpose of this questionnaire is to encourage multidisciplinary study on the aging of the Thai elderly, as well as to advance public policies targeted at improving the health and standard of living of older individuals in Thailand.

Those aged 60 and older were included in this study since such individuals are eligible for Thailand's pension scheme. This study considered both respondents who received the old age pension for the entire year and those who did not receive it at all. Furthermore, this study does not consider those who did not fully complete the subjective well-being questionnaire, as well as other sections of questions regarding self-rated health status and income perception. After the data cleaning process, the net full sample consisted of 5,159 observations. Table 1 presents all variables utilized in the regression analysis.

Table 1 Variables used in the regression model

Variable name	Variable	Definition of variable	Measurement
SWB	Subjective well-being =1 if Low SWB =2 if Medium SWB =3 if High SWB	The self-rated scale range with 3 major categories: Low SWB: Scale range 0-3 Medium SWB: Scale range 4-7 High SWB: Scale range 8-10	Number
Pension	Old age pension receipt	Continuous pension receipt	Number
Age7079 Age80over	Age	3 age categories: Age6069 is omitted (1= Age6069, 0= otherwise) Age7079 (1= Age7079, 0= otherwise) Age80over (1= Age80over, 0= otherwise)	Dummy
Female	Gender	Gender: Male and Female (1=Female, 0= otherwise)	Dummy
Married	Marital status	Marriage status (1=Married, 0= otherwise)	Dummy
Bachelorab	Education level	Attained at least a Bachelor's degree (1= Bachelorab, 0= otherwise)	Dummy
Urban	Residential area	Resides in a municipal area (1=Urban, 0= otherwise)	Dummy
Central East North Northeast South	Region	Regions with 6 dummies: BKK and nearby areas are omitted (1= BKK, 0= otherwise) Central (1= Central, 0= otherwise) North (1= North, 0= otherwise) Northeast (1= Northeast, 0= otherwise) South (1= South, 0= otherwise)	Dummy
Excellenth	Health status	Self-rated physical health evaluated as 'excellent' (1= Excellenth, 0= otherwise)	Dummy
Income	Income perception =1 if Lowinc =2 if Moderateinc =3 if Highinc	Satisfaction with economic status with 3 categories: Lowinc: Scale range 0-3 Moderateinc: Scale range 4-7 Highinc: Scale range 8-10	Number
Year2020	Year	Year Dummy (1= Year2020, 0= otherwise)	Dummy

3.2 Ordered Logit Regression Model

An ordered logit model is an appropriate model for analysis when the dependent variable consists of more than two categories that can be measured on an ordinal scale. Thus, the continuous latent variable (SWB_{it}^*) in the population is equivalent to:

$$SWB_{it}^* = \beta_0 + \beta_1 Pension_{it} + \beta_2 Age7079_{it} + \beta_3 Age80over_{it} + \beta_4 Female_{it} + \beta_5 Married_{it} + \beta_6 Bachelorab_{it}$$
$$+ \beta_7 Urban_{it} + \beta_8 Central_{it} + \beta_9 East_{it} + \beta_{10} North_{it} + \beta_{11} Northeast_{it} + \beta_{12} South_{it} + \beta_{13} Excellenth_{it}$$
$$+ \beta_{14} Income_{it} + \beta_{15} Year2020_{it} + v_i + \varepsilon_{it}$$

This study observes the level of subjective well-being (SWB*), which is an ordered categorical variable, also known as an "observed variable" in the ordered logit model. However, SWB_{it}^* refers to the continuous or latent index that determines what the ordinal variable SWB equals. SWB_{it}^* is considered to have a linear function with parameters, which depends on the various observed explanatory variables, as well as the individual-specific error term (v_i) and the random error (ε_{it}). In this study, we assume individual-specific effect (v_i) to be random variable. This allows us to estimate the coefficients for time-invariant variables, many of which are included in our model such as gender, highest education, and region of residence. Hence, the continuous latent variable (SWB_{it}^*) has several threshold points (κ_j), which is represented as shown below:

$SWB_{it} = 1$ if $SWB_{it}^* \leq \kappa_1$ implying a Low level of subjective well-being
$SWB_{it} = 2$ if $\kappa_1 < SWB_{it}^* \leq \kappa_2$ implying a Medium level of subjective well-being
$SWB_{it} = 3$ if $SWB_{it}^* > \kappa_2$ implying a High level of subjective well-being

Given that the error term has a logistic distribution, the following probability formulas can be obtained:

$$Pr(SWB_{it}=1) = F\big(\kappa_1 - (X_{it}\beta + v_i)\big)$$
$$Pr(SWB_{it}=2) = F\big(\kappa_2 - (X_{it}\beta + v_i)\big) - F\big(\kappa_1 - (X_{it}\beta + v_i)\big)$$
$$Pr(SWB_{it}=3) = 1 - F\big(\kappa_2 - (X_{it}\beta + v_i)\big)$$

Where the cut-off or threshold points (κ_1 and κ_2) will be estimated along with the coefficients. F ($\cdot$) refers to the cumulative distribution function (CDF) of the logistic distribution, which converts the linear combination of the explanatory variables and error terms into a probability value. It is then used to calculate the likelihood that the observed categorical outcome falls within a given threshold range. In addition, the explanatory variables (X_{it}) featured in these probability equations also relate to those identified in the specification model mentioned earlier. These equations will be employed to estimate the likelihood that the unobserved variable (SWB_{it}^*) falls within the specified threshold limits.

Regarding the panel structure of the data, which tracks the same individuals across multiple time periods, the random-effects ordered logit model appears to be more appropriate as the main method of this study. This is because it accounts for some unobserved individual-specific factors that remain constant over time and may influence the subjective well-being, which can lead to within-individual correlation. In contrast, the ordered logit model assumes independence between observations, which may not be appropriate in panel data and could result in biased estimates. As noted by Wooldridge (2010), using a random-effects framework helps improve the reliability of the estimated effects.

4. Results

The main modeling tool in this study is the random-effects ordered logit model, given the panel structure of the data. However, a likelihood ratio test was conducted to check whether the random-effects ordered logit model is appropriate for the data. The random-effects ordered logit model was found to be best suited for Models 2, 4, and 6, whereas Models 1, 3, and 5 are best suited to the ordered logit model. Raw regression results for both random-effects ordered logit models and ordered logit regression models are shown in Tables 2 and 3, respectively. Table 2 displays the odds ratios corresponding to each variable for the random-effects ordered logit model. Meanwhile, Table 3 illustrates the odds ratios for each variable using the ordered logit model.

Table 2 Random-effects ordered logistic model

Variables	Model 1 Odds Ratio	Model 2 Odds Ratio	Model 3 Odds Ratio	Model 4 Odds Ratio	Model 5 Odds Ratio	Model 6 Odds Ratio
Pension	1	0.999994	0.999954	0.9999534	0.9999003*	0.99985***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age7079	0.8527*	0.7474***	0.8790	0.7786***	0.8976	0.8058**
	(0.074)	(0.063)	(0.077)	(0.066)	(0.081)	(0.071)
Age80over	1.0572	0.8034**	1.1103	0.8578	1.1943	0.9566
	(0.109)	(0.081)	(0.117)	(0.088)	(0.145)	(0.113)
Female	1.1964**	1.1201	1.1992**	1.1235	1.1940**	1.1155
	(0.091)	(0.083)	(0.091)	(0.083)	(0.091)	(0.083)
Married	1.5339***	1.4310***	1.5355***	1.4317***	1.5277***	1.4214***
	(0.121)	(0.110)	(0.121)	(0.109)	(0.120)	(0.109)
Bachelorab	1.1787	1.2494	1.1193	1.1904	1.2007	1.2777
	(0.340)	(0.359)	(0.324)	(0.342)	(0.346)	(0.366)
Urban	1.4949***	1.5597***	1.4943***	1.5564***	1.4850***	1.5437***
	(0.128)	(0.132)	(0.128)	(0.131)	(0.128)	(0.131)
Central	1.0033	1.1031	0.5599	0.7135	0.9990	1.0935
	(0.122)	(0.131)	(0.255)	(0.319)	(0.121)	(0.129)
East	2.2260***	2.8249***	1.9200	2.0523	2.2115***	2.7929***
	(0.409)	(0.508)	(1.114)	(1.168)	(0.405)	(0.500)
North	1.2576**	1.4802***	1.2599	1.7660	1.2518*	1.4691***
	(0.144)	(0.167)	(0.560)	(0.764)	(0.144)	(0.165)
Northeast	1.2617*	1.4218***	2.5613*	3.5241**	1.2688**	1.4320***
	(0.151)	(0.168)	(1.435)	(1.978)	(0.152)	(0.169)
South	1.0240	1.0277	0.3813**	0.3716**	1.0174	1.0175
	(0.124)	(0.122)	(0.154)	(0.146)	(0.123)	(0.169)
Excellenth	5.7014***		5.6450***		5.6687***	
	(0.535)		(0.529)		(0.532)	
Income	3.6206***	5.0899***	3.6579***	5.1313***	3.5978***	5.0316***
	(0.297)	(0.424)	(0.300)	(0.427)	(0.295)	(0.418)
Year (=2020)	0.7754***	0.9539	0.7688***	0.9436	0.3258**	0.2775***
	(0.057)	(0.066)	(0.057)	(0.066)	(0.151)	(0.124)
Central_Pens			1.0001	1.000054		
			(0.000)	(0.000)		
East_Pens			1.0000	1.00004		
			(0.000)	(0.000)		
North_Pens			0.9999	0.9999		
			(0.000)	(0.000)		
Northeast_Pens			0.9999	0.9999*		
			(0.000)	(0.000)		
South_Pens			1.0001***	1.0001***		
			(0.000)	(0.000)		
Year_Pens					1.0001*	1.0001***
					(0.000)	(0.000)
Prob>= Chibar2	0.1137	0.0092	0.1415	0.0143	0.1199	0.0112

Note: H_0: The variance of random effects is zero, implying that the ordered logit model (without random effects) is sufficient.

*** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

Table 3 Ordered logistic regression model

Variable	Model 1 Odds Ratio	Model 2 Odds Ratio	Model 3 Odds Ratio	Model 4 Odds Ratio	Model 5 Odds Ratio	Model 6 Odds Ratio
Pension	1	0.9999	0.9999	0.9999	0.9999*	0.999985***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Age7079	0.8606*	0.7658***	0.8859	0.7953***	0.9042	0.8212**
	(0.071)	(0.060)	(0.074)	(0.063)	(0.079)	(0.067)
Age80over	1.0599	0.8200**	1.1118	0.8721	1.1939	0.9691
	(0.105)	(0.076)	(0.113)	(0.084)	(0.140)	(0.106)
Female	1.1890**	1.1107	1.1925**	1.1144	1.1868**	1.1067
	(0.086)	(0.076)	(0.086)	(0.076)	(0.086)	(0.076)
Married	1.5133***	1.4016***	1.5173***	1.4044***	1.5077***	1.3934***
	(0.113)	(0.098)	(0.114)	(0.099)	(0.113)	(0.098)
Bachelorab	1.1649	1.2283	1.1077	1.1730	1.1863	1.2548
	(0.324)	(0.331)	(0.310)	(0.317)	(0.329)	(0.338)
Urban	1.4748***	1.5135***	1.4766***	1.5146***	1.4659***	1.4999***
	(0.120)	(0.117)	(0.120)	(0.117)	(0.119)	(0.116)
Central	0.9997	1.0864	0.5715	0.7267	0.9955	1.0777
	(0.116)	(0.118)	(0.251)	(0.303)	(0.115)	(0.117)
East	2.1701***	2.6749***	1.8665	1.9694	2.1579***	2.6494***
	(0.381)	(0.444)	(1.049)	(1.063)	(0.378)	(0.440)
North	1.2428**	1.4441***	1.2555	1.7200	1.2377*	1.4351***
	(0.136)	(0.149)	(0.540)	(0.699)	(0.136)	(0.149)
Northeast	1.2543**	1.3903***	2.5049*	3.2981**	1.2611**	1.4001***
	(0.144)	(0.150)	(1.361)	(1.748)	(0.144)	(0.152)
South	1.0278	1.0329	0.3903**	0.3878***	1.0211	1.0227
	(0.119)	(0.112)	(0.152)	(0.143)	(0.118)	(0.112)
Excellenth	5.3539***		5.3357***		5.3314***	
	(0.395)		(0.394)		(0.393)	
Income	3.4667***	4.6156***	3.5196***	4.6858***	3.4493***	4.5769***
	(0.246)	(0.309)	(0.251)	(0.315)	(0.244)	(0.306)
Year (=2020)	0.7877***	0.9657	0.7799***	0.9550	0.3377**	0.2946***
	(0.056)	(0.064)	(0.552)	(0.063)	(0.151)	(0.124)
Central_Pens			1.0001	1.0000		
			(0.000)	(0.000)		
East_Pens			1.0000	1.0000		
			(0.000)	(0.000)		
North_Pens			0.9999	0.9999		
			(0.000)	(0.000)		
Northeast_Pens			0.9999	0.9999*		
			(0.001)	(0.000)		
South_Pens			1.0001***	1.0001***		
			(0.000)	(0.000)		
Year_Pens					1.0001*	1.0001***
					(0.000)	(0.000)
Pseudo R-sq.	0.1927	0.1123	0.1951	0.1153	0.1932	0.1134

For Models 2, 4, and 6, which exclude the physical health variable (Excellenth), the results are discussed from Table 2. However, Table 3 will be discussed for Model 1, 3, and 5 with the inclusion of physical health as one of the explanatory variables.

Based on the results from Table 2, the findings from Model 2 indicate that older adults aged 70-79 have 25.26 percent lower odds of reporting a greater subjective well-being, while those aged 80 and over have 19.66 percent lower odds of reporting higher level of subjective well-being compared to those aged 60-69. Married individuals have 43.10 percent higher odds of reporting higher subjective well-being than unmarried ones.

Regarding residential factors, individuals living in urban areas have 55.97 percent higher oods of having higher subjective well-being compared to those living in rural areas. Individuals residing in the East, North, and Northeast have 182.49 percent, 48.02 percent, and 42.18 percent higher odds, respectively, of reporting higher subjective well-being compared to those residing in Bangkok and its vicinity. Hence, income plays a significant role, with higher income perception associated with 408.99 percent higher odds of reporting higher subjective well-being.

In Model 4, the interaction terms for different regions are added to determine regional diversity in receiving pensions. The South region appears to be strongly negative significant, with those in the South having 62.84 percent lower odds of experiencing greater subjective well-being compared to those in Bangkok and its vicinity. Moreover, the results also indicate that pensioners residing in the South have 0.0001 percent higher odds of reporting greater level of subjective well-being in comparison to those residing in Bangkok and vicinity. In contrast, pensioners residing in the northeast have 0.0001 percent lower odds of reporting higher subjective well-being in comparison to those residing in Bangkok and vicinity areas, thus the impact is very small. Besides, some variables such as Age7079, Married, Urban, Northeast and Income all maintain their significance and direction similar to Model 2.

To explore whether there is a distinct impact on subjective well-being in different years, Model 6 includes an interaction term of year dummy (2020) and pension. The results reveal that the pension variable became highly significant compared to the other variables, implying that the odds of reporting a better subjective well-being category decrease by about 0.0015 percent with each one-baht increase in pension amount, though the effect is too small. This negative association might reflect age-related declines in subjective well-being that align with higher old age pension amounts, even though age is being controlled in the model. The year dummy (2020) appears to be highly significant and is associated with lower subjective well-being, with individuals in this period having 72.25 percent lower odds of reporting higher subjective well-being, compared to 2015. Thus, the interaction term between the year dummy (2020) and pension also indicates that the odds of reporting improved subjective well-being increase by 0.001 percent in 2020 for every one-baht increase in pension amount. Furthermore, other remaining variables, including Age7079, Married, Urban, Region influences (East, North, and Northeast), and Income, show similar results to Model 2.

Moving on to the results from Table 3, the results from Model 1 indicate that older adults aged 70-79 have 13.94 percent lower odds of reporting a higher category of subjective well-being compared to younger individuals (aged 60-69). Being female is associated with 18.9 percent higher odds of reporting a higher level of subjective well-being compared to being male. Being married has higher odds of reporting higher subjective well-being by 51.33 percent compared to unmarried individuals. Regarding residential factors, individuals living in urban areas have higher odds of having higher subjective well-being by 47.48 percent compared to those in rural areas. Individuals living in the East, North, and Northeast have 117.01 percent, 24.28 percent, and 25.43 percent higher odds of reporting higher subjective well-being, respectively, compared to those living in Bangkok and vicinity areas.

Health and income perception also play significant roles. Individuals with excellent self-reported health status have higher odds of reporting higher subjective well-being by 435.39 percent compared to those who have worsened health status. Higher income perception is associated with 246.67 percent higher odds of reporting higher subjective well-being. Furthermore, the odds of reporting higher subjective well-being are 21.33 percent lower in 2020 compared to 2015.

The results from Model 3, which adds the interaction terms between different regions and pension, indicate that residing in the South has a highly negative impact on subjective well-being, with the individuals in this region experiencing 60.97 percent lower odds of experiencing greater subjective well-being, compared to those in Bangkok and its vicinity. In addition, the interaction term between living in the South and pension slightly suggests that pensioners living in the South have 0.001 percent higher odds of reporting higher subjective well-being compared to those in Bangkok and its vicinity. Hence, other variables, including Female, Married, Urban, Region influences (Northeast), Excellenth, Income, and the year dummy (2020), remain consistent with Model 1.

Table 4 Robustness check - coefficients from random-effects panel data estimation

Variables	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient	Model 5 Coefficient	Model 6 Coefficient
Pension	-0.00000517 (0.000)	-00000907.0 (0.000)	-0.0000344* (0.000)	-0.0000367* (0.000)	-0.0000547* (0.000)	-0.0000914*** (0.000)
Age7079	-0.0391 (0.046)	-0.1126** (0.048)	-0.0274 (0.046)	-0.0969** (0.049)	-0.0129 (0.048)	-0.0686 (0.051)
Age80over	-0.0021 (0.055)	-0.1472** (0.057)	0.0156 (0.056)	-0.1227** (0.058)	0.0584 (0.065)	-0.0459 (0.068)
Female	0.0917** (0.040)	0.0591 (0.042)	0.0923** (0.040)	0.0603 (0.042)	0.0905** (0.040)	0.0573 (0.042)
Married	0.2226*** (0.041)	0.2003*** (0.044)	0.2205*** (0.041)	0.1980*** (0.044)	0.2208*** (0.041)	0.1974*** (0.044)
Bachelorab	-0.0584 (0.139)	-0.0418 (0.147)	-0.0635 (0.140)	-0.0522 (0.148)	-0.0474 (0.139)	-0.0236 (0.147)
Urban	0.1334*** (0.045)	0.1749*** (0.048)	0.1327*** (0.045)	0.1738*** (0.048)	0.1308*** (0.045)	0.1703*** (0.048)
Central	-0.1039 (0.066)	-0.0437 (0.069)	-0.4572* (0.243)	-0.3655 (0.256)	-0.1067 (0.066)	-0.0486 (0.069)
East	0.6200*** (0.084)	0.7787*** (0.088)	0.2985 (0.276)	0.3794 (0.292)	0.6190*** (0.084)	0.7761*** (0.088)
North	0.1723*** (0.060)	0.2747*** (0.064)	0.0190 (0.224)	0.2334 (0.237)	0.1697*** (0.060)	0.2698*** (0.064)
Northeast	0.0934 (0.064)	0.1651** (0.068)	0.3362 (0.270)	0.5126* (0.285)	0.0955 (0.064)	0.1682** (0.068)
South	-0.1527** (0.066)	-0.1503** (0.070)	-0.6543* (0.217)	-0.7082*** (0.230)	-0.1565** (0.066)	-0.1567** (0.070)
Excellenth	0.9797*** (0.040)		0.9759*** (0.040)		0.9763*** (0.040)	
Income	0.6577*** (0.035)	0.9296*** (0.035)	0.6603*** (0.035)	0.9321*** (0.035)	0.6557*** (0.035)	0.9247*** (0.035)
Year (=2020)	0.0388 (0.039)	0.1257*** (0.041)	0.0334 (0.039)	0.1192*** (0.041)	-0.3902 (0.247)	-0.5879** (0.260)
Central_Pens			0.00004 (0.000)	0.00004 (0.000)		
East_Pens			0.00004 (0.000)	0.00005 (0.000)		
North_Pens			0.00002 (0.000)	0.000005 (0.000)		
Northeast_Pens			-0.00003 (0.000)	-0.00004 (0.000)		
South_Pens			0.00007** (0.000)	0.00007*** (0.000)		
Year_Pens					0.0001* (0.000)	0.00009*** (0.000)
Cons	5.7172 (0.128)	5.6041 (0.135)	5.9398 (0.193)	5.8096 (0.204)	6.1139 (0.259)	6.2642 (0.274)
R-sq. (Overall)	0.2475	0.1593	0.2493	0.1619	0.2480	0.1606

For Model 5, which includes the interaction term between pension and the year dummy (2020), the results are largely consistent with Model 1, with only minor differences. The pension variable is statistically significant, implying that with each one-baht increase in the pension amount, the odds of reporting a higher subjective well-being category slightly decrease by approximately 0.001 percent, although the effect size is very small. As discussed previously, this may be related to the pension amount increasing for older pension groups and could therefore be an indication that subjective well-being decreases with age, rather than necessarily due to a

higher pension payment. The interaction term between pension and the year dummy (2020) also appears to be significant, suggesting that with each one-baht increase in pension amount, the odds of reporting improved subjective well-being increase by 0.001 percent in 2020 compared to 2015. Accordingly, other variables, including Female, Married, Urban, Regions influences (East, North, and Northeast), Excellenth, Income, and year dummy (2020), still maintain similar results to Model 1.

Across all models, age differences persist as older elderly are likely to have lower odds of reporting higher subjective well-being. Subjective well-being can therefore deteriorate with age, as key significant life events and experiences during the aging process tend to reduce the life satisfaction of elderly people (Chen, 2001). For marital status, married individuals consistently have higher odds of reporting higher subjective well-being compared to non-married ones. This implies that marriage may bring potential emotional benefits and support, resulting in a higher level of subjective well-being (Haring-Hidore et al., 1985). Urban residents are extremely likely to have higher odds of reporting higher subjective well-being compared to rural residents, meaning that urban areas could be attributed to more opportunities for social mobility than rural areas (Navarro et al., 2020).

There is also evidence of regional differences, which shows minor changes in pension receipt by location. However, general patterns remain largely consistent for the Northeast, North, and East regions, as individuals appear to have higher odds of reporting higher subjective well-being across the models, where those living in the South exhibit lower odds of reporting higher subjective well-being compared to Bangkok and vicinity areas. This finding may be linked to exposure to violent events and insecurity in the South region, as noted by Ford et al., (2022). Interestingly, the positive interaction term between pension and the South region suggests that the old age pension may play a buffering role, helping to enhance subjective well-being among elderly individuals living in the South despite the region's underlying insecurity. In addition, health status appears to be one of the most influential variables. Better health status is associated with higher subjective well-being. This could be because those with better health tend to be more psychologically resilient and feel more supported by others (Carandang et al., 2020; Xu et al., 2019; Zhu et al., 2020).

Income perception is also considered as another crucial variable for subjective well-being, with higher income perception being associated with higher odds of reporting higher subjective well-being, which resonates with the results from Park, and Joshanloo (2021). The year 2020 continues to have a negative impact on subjective well-being, as individuals in that year had lower odds of reporting higher subjective well-being. This implies that some external circumstances and economic disruptions in that specific year, such as the COVID-19 pandemic, may potentially have a substantial negative impact on subjective well-being, hence the subjective well-being might fluctuate over time.

To ensure reliability of the results from the main models, robustness checks were performed to confirm the findings from different specification models. In particular, we used raw subjective well-being scores ranging from 0 to 10 as the dependent variable and employ random-effects panel data estimation as an empirical technique in this section. The results indicate that the relevance of the pension remains very small, implying that while pensions do play a role in one's subjective well-being, it may be due to other factors. Age differences continue to exist with older individuals aged 70-79 exhibiting lower subjective well-being, while those that are aged 80 years and older do so but with mixed effects, indicating that the relationship between age and well-being varies within this age group. Married status still emerges as one of the strongest predictors of subjective well-being, with married individuals likely to have higher subjective well-being. Individuals in urban areas continue to be associated with higher subjective well-being. Among regional differences, the elderly in the East and North region indicate significantly higher subjective well-being, while those living in the South appear to have lower subjective well-being compared to Bangkok and vicinity areas.

Hence, excellent health is significantly associated with higher subjective well-being compared to those with worsened health, while higher perception of income is consistently associated with higher levels of subjective well-being. In addition, even though the overall effects of pensions remain very small, they appear to be more evident in the South region, indicating potential regional differences in how pensions impact the subjective well-being of the elderly population. Lastly, the Year 2020 contains mixed results across models – while some years show a positive association with higher well-being, others exhibit a negative relationship. This suggests that the impact of time-related factors is not consistent.

5. Conclusion

This paper used a random-effects ordered logit model as the primary method when analyzing the impacts on subjective well-being given the panel structure of the data, while the ordered logit model was used as the alternative method. The analysis was based on the 2015 and 2020 waves from the Center for Aging Society Research (CASR) at the National Institute of Development Administration (NIDA), which was restricted to respondents who received the old age pension for the entire year and those who did not receive it at all, as well as those who had completed the subjective well-being and other section questions.

The results indicate that the old age pension has a minimal impact on subjective well-being, relative to other non-financial factors. Nonetheless, the old age pension appears to have a small positive impact for the elderly who live in the South. Along with pensions, other variables such as age, marital status, residential areas, regions, health status, and income perception tend to have stronger impacts on subjective well-being. Subjective well-being decreases with age. Marriage, living in urban areas, better health status, and higher income perception are all associated with improved subjective well-being. Meanwhile, the findings of this study demonstrate regional differences in subjective well-being.

In conclusion, the findings of this study highlight several important policy implications for enhancing the subjective well-being and life satisfaction of elderly people in Thailand. Given the minimal impact of the old age pension on subjective well-being, this raises questions about the adequacy of pension benefits. Revising the pension amounts to ensure they provide sufficient support for improving the subjective well-being of older adults should be considered. In light of the negative impact of age on subjective well-being, policies that could help elderly people to increase their subjective well-being include the promotion of more social engagement opportunities and provision of mental health support. Such initiatives can foster social relationships among older adults and preserve their subjective well-being.

Considering the positive impact of income perception on subjective well-being, allowing for a more flexible retirement period may help elderly individuals feel more satisfied with their income by reducing financial concerns and enabling them to accumulate sufficient wealth for retirement. Furthermore, although living in the South is negatively associated with subjective well-being, the significant positive interaction term between the old age pension and the South region indicates that pensions may partially offset the effects, contributing to improved subjective well-being among the elderly in this area. Therefore, enhancing pension benefits or providing additional support in regions affected by conflict or insecurity could be an effective policy tool to reduce regional disparities in subjective well-being among older adults. Lastly, since good physical health is highly associated with higher subjective well-being, policies promoting more healthy aging programs, such as those focusing on nutrition and exercise, should be addressed for the elderly population in order to maintain their excellent health.

This study also acknowledges several limitations. First, endogeneity and selection bias remain potential concerns in estimating the causal impact of old age pensions on subjective well-being. Although instrumental variable (IV) techniques are commonly used to address such issues, identifying a valid and strong instrument in this context proves challenging. Second, the researchers did not employ fixed-effects estimation, as it would eliminate time-invariant variables, such as gender and highest education, which are important factors for explaining subjective well-being among the elderly. Future research could address these limitations by identifying valid instrumental variables or employing estimation methods that allow for the inclusion of time-invariant factors. This will thus provide more comprehensive insights regarding the impact of the old age pension on subjective well-being. Finally, despite age being controlled in the model, the effect found in this study – in which each one-baht increase to the pension amount resulted in a decline of subjective well-being – may reflect age-related declines in subjective well-being since older pension-receiving age groups receive a larger pension amount. Future research should seek to isolate these two variables further to clarify this finding.

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The Role of Clean Energy and Clean Transportation in Mitigating Climate Change: A Case Study of BTS Skytrain in Bangkok, Thailand

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Abstract

This research paper examines the vital role of clean energy in mitigating climate change, with a focus on the BTS Skytrain system in Bangkok, Thailand. By analyzing this prominent clean transportation infrastructure, the study aims to identify both challenges and opportunities for integrating renewable energy sources into public transit networks. The objectives are to assess how the Bangkok Mass Transit System (BTS) contributes to climate change mitigation and to evaluate the effects of clean energy and transportation policies in the city. The researcher conducted interviews with six participants: three BTS personnel and three government officials specializing in energy, climate, and transportation. Findings reveal that the BTS is Thailand's first carbon-neutral rail service, significantly reducing greenhouse gas emissions through electric-powered operations. The BTS supports the government sustainability goals and promotes clean mobility, playing a crucial role in Thailand's transition to carbon neutrality by 2050. Moreover, the study highlights that clean energy and transportation policies in Bangkok are essential for combating climate change by reducing emissions and enhancing energy efficiency. These policies facilitate the adoption of renewable energy and electric vehicles, improving air quality and public health. Ultimately, Thailand's initiatives align with global efforts, demonstrating significant progress toward achieving carbon neutrality and fostering sustainable urban development.

Keywords: Clean Energy; Climate Change; BTS Sky Train; Bangkok; Clean Energy Policies

1. Introduction

Although the climate can change naturally over time, human activities like deforestation and the use of fossil fuels have sped up the rate of change over the past few decades (National Aeronautics and Space Administration, 2023c). This rapid change has brought about numerous issues. The first of these issues is rising temperatures. As you can see in Figure 1, the temperature was steady until it started to rise rapidly in the 1970s. The figure shows that the past decade has been the warmest on record (National Aeronautics and Space Administration, 2023b).
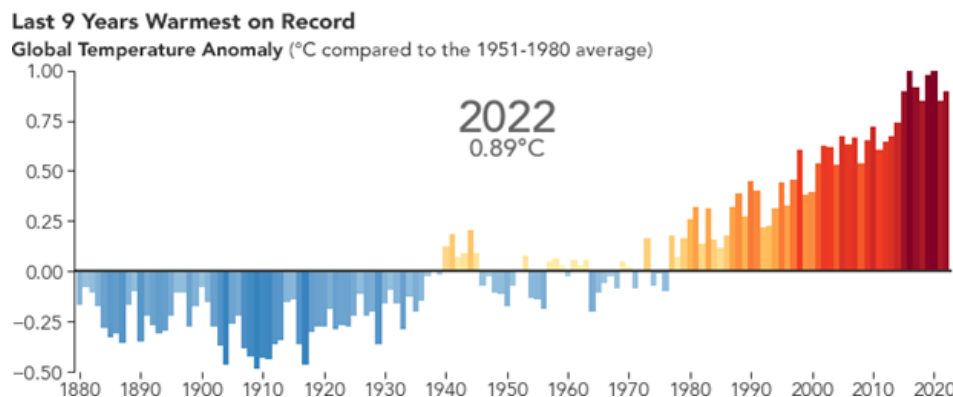
Figure 1 Global temperature anomaly through the year (National Aeronautics and Space Administration, 2023b)

SATELLITE DATA: 1993-PRESENT

Data source: Satellite sea level observations.
Credit: NASA's Goddard Space Flight Center

RISE SINCE 1993
↑ 96.7
millimeters
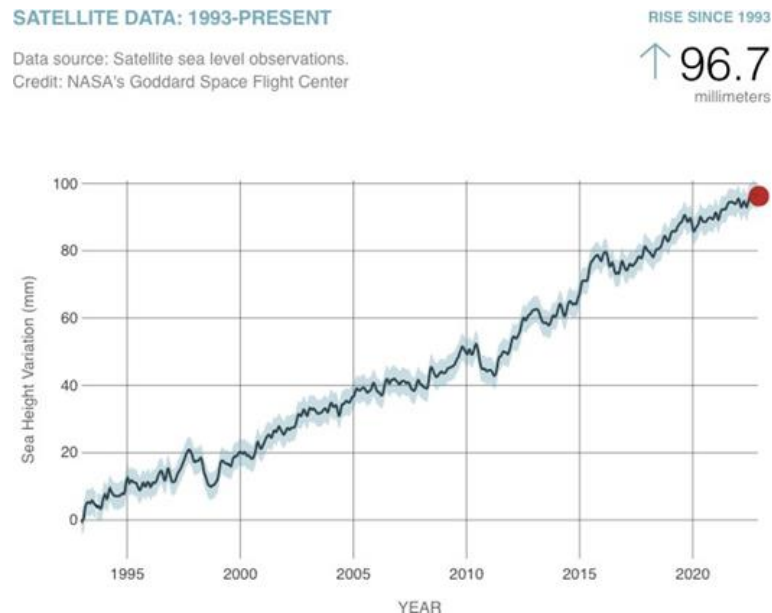
Figure 2 Rise in sea levels through the years (National Aeronautics and Space Administration, 2023a)

Another issue is that of the rise in sea levels. Figure 2 shows that the sea level has risen continuously since 1993; to this day, the sea has risen over 96 millimeters (National Aeronautics and Space Administration, 2023a). Other issues include extreme weather conditions, loss of biodiversity, health concerns, and acidification of the oceans (United Nations, 2023a; National Ocean Service, 2023). Apart from environmental and health issues, climate change is problematic for the economy and society as well (The World Bank, 2022). According to the "Global Risk Report 2024", environmental risk ranks highly across the charts and has held the 2nd place for two consecutive years. In addition, recent research predicts that by the early 2030s, long-term changes that may be irreversible will likely begin. Moreover, the current efforts to adapt to climate change cannot keep up with the rapid change (World Economic Forum, 2024). Therefore, it is significant that climate change and mitigation are further studied in hopes that arising knowledge will be able to present a solution to slow down climate change.

Clean energy helps reduce greenhouse gas emissions and air pollution, which are causes of climate change. According to Figure 3, there is a clear link between the amount of carbon emissions and renewable energy consumption. As renewable energy consumption started to rise around the 2010s, the number of carbon emissions gradually decreased; this shows that the use of renewable energy helps reduce carbon emissions (Ponce, & Khan, 2021). As clean energy is more widely used these days, the cost of technologies has dropped. However, there are still some challenges that need to be addressed. Firstly, developing infrastructure for clean energy can face challenges of limited resources and difficult areas of development (Toh, 2021). Another difficulty is the unpredictable weather patterns; while energy-storing technologies can solve this issue, they can be expensive and still need to be further researched (Energy Education, 2023; Roberts, 2019). In addition, legislation and laws can significantly help or impede the growth of renewable energy. Unpredictability in policies may deter investments in sustainable energy technologies (World Economic Forum, 2020). Lastly, even if clean energy emits fewer carbon emissions, its production and disposal still affect the environment (Union of Concerned Scientists, 2013).
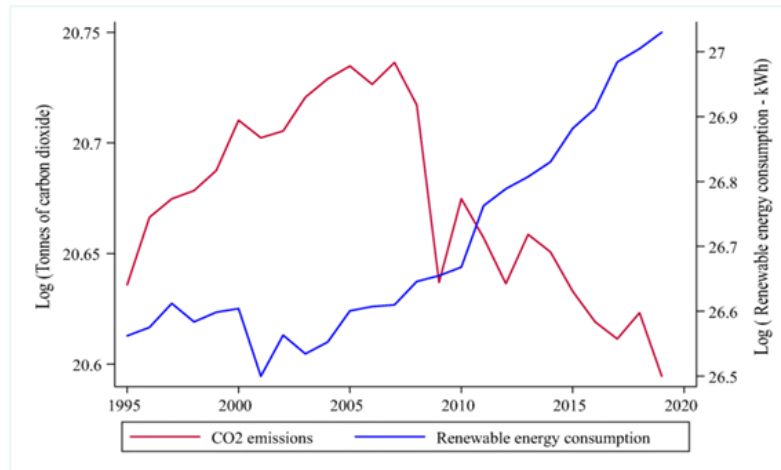
Figure 3 The link between renewable energy consumption and the number of carbon emissions (Ponce, & Khan, 2021)
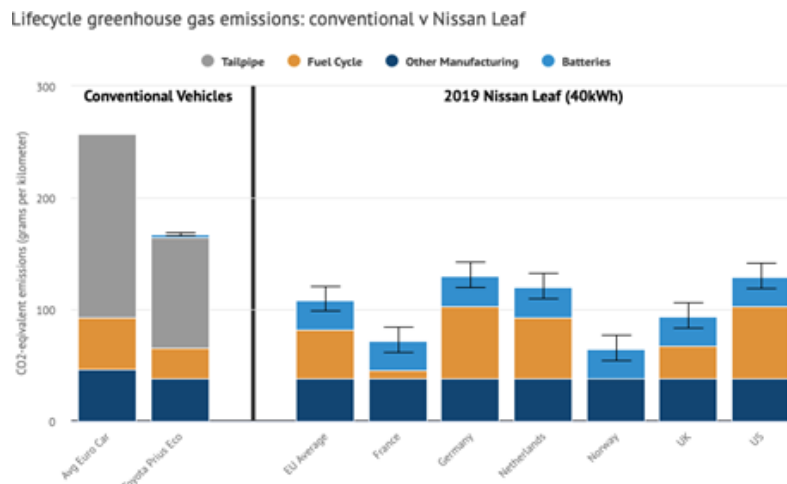
Figure 4 Comparison between conventional vehicles and clean energy vehicles' greenhouse gas emissions (Huasfather, 2019)

One of the main causes of climate change and air pollution is transportation. Clean transportation can help lessen the negative effects of transportation on the environment and promote sustainable development. According to Figure 4, conventional vehicles emit almost 300 grams per kilometer of greenhouse gases, while electric vehicles emit no more than 150 grams per kilometer (Huasfather, 2019). Therefore, the use of clean energy for transportation is crucial for reducing climate change (United States Department of Energy, 2023).

However, switching to clean energy for transportation still presents many challenges. According to Figure 5, the main challenge for electric vehicles is their shorter driving range. This, coupled with the insufficient charging stations, leads to competition for available spots and range anxiety (Glandorf, 2020). Other challenges mentioned in Figure 5 are that of the overall cost and battery cost. In addition to the challenges mentioned in Figure 5, there are also challenges regarding consumer awareness and policies. There is a lack of awareness among consumers, as most continue to have misconceptions about cost and effectiveness (Johnson, 2022). In terms of policy, while some nations have policies encouraging the use of environmentally friendly transportation, others do not. This leads to uncertainty among investors and results in delayed development (World Economic Forum, 2020). Even though switching to clean energy still presents many challenges, it is vital to mitigate climate change. Therefore, these challenges must be solved swiftly.
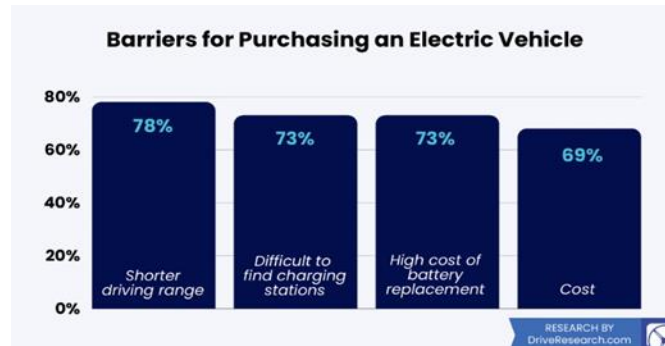
Figure 5 Barriers for purchasing an electric vehicle (Rodgers, 2023)

Climate change must be mitigated as it is a serious issue that requires urgent attention. Its consequences are already being felt strongly throughout the world. The primary contributor to climate change is the release of greenhouse gases as a result of the burning of fossil fuels. Clean energy emits minimal to no hazardous gases or pollutants. Therefore, one of the best ways to slow down climate change is by switching to clean energy; this will help the energy sector grow and lead to the discovery of new technologies. As a result, the demand for fossil fuels will decline and energy sources will be more diverse. The development of more effective policies and strategies for energy and the environment can be aided by research on the role of clean energy in reducing climate change. In studying how clean energy affects climate change, areas that require additional research and development can also be pointed out; this could result in technology that is more useful, affordable, and accessible (Jaiswal et al., 2022). Additionally, it aids in maintaining the accuracy of information about new regulations and technologies.

As one of the largest and most populous cities in Southeast Asia (ASEAN Up, 2017), Bangkok plays a significant part in climate change and mitigation. The effects of climate change, such as flooding, rising temperatures, and air pollution, are already being felt in Bangkok (Boyle, 2020; Gluckman, 2019). Bangkok is a party to the United Nations Framework Convention on Climate Change and has taken part in international climate change negotiations (Ministry of Foreign Affairs, Kingdom of Thailand, 2022). Nonetheless, Bangkok also contributes to greenhouse gas emissions, with transportation being one of the contributors. Most of those emissions come from vehicles used for transportation on roads, including cars and motorbikes (Phakdeetham, 2022). In addition to converting to clean energy vehicles, encouraging the use of public transit, particularly those powered by clean energy, can help lessen the effects of climate change associated with transportation in Bangkok.

While there are numerous ways to get around in Bangkok with public transport, only some services use clean energy. For taxis, the majority still use gas, while only a small number use electric cars. The project for electric buses started in recent years; however, the project is still ongoing, and only some routes have been covered. In comparison, trains appear to be the most ecologically sustainable, as the majority of lines use electric trains. However, this research will focus on the BTS and how it mitigates climate change in Bangkok. The reason that BTS is used as a case study in this research is because it has been certified by the Thailand Greenhouse Gas Management Organization (TGO) as the world's first and only carbon-neutral mass transit rail company (BTS Group, 2021). Moreover, the corporation is dedicated to increasing its energy efficiency by pursuing alternative energy sources and also intends to work with all sectors to achieve carbon neutrality by 2050 and net-zero emissions by 2065 (BTS Group, 2022a).

The role of clean energy and BTS in mitigating climate change is closely related to the Sustainable Development Goals 7 and 13. The usage of clean energy technology can aid in the reduction of greenhouse gas emissions and the improvement of air quality. It also grants communities access to inexpensive and dependable electricity; therefore, it is connected to Goal 7 "Affordable and Clean Energy" (United Nations Department of Economic and Social Affairs, 2023a). The BTS is also active in Goal 7 as the company studies and implements energy-saving measures, as well as follows environmental rules and regulations (BTS Group, 2022b). For Goal 13's "Climate Action", clean energy technology can help minimize the effects of climate change by reducing greenhouse gas emissions, and it also increases resilience and adaptive ability to climate-related hazards and natural disasters (United Nations Department of Economic and Social Affairs, 2023b). The BTS plays a role in

Goal 13 by developing a long-term climate strategy, managing climate risks and opportunities per the corporation's strategic priorities, as well as remaining a carbon-neutral corporation (BTS Group, 2022b).

With the threat of severe climate change looming, the study of clean energy and clean transportation has become crucial. To lower greenhouse gas emissions and mitigate climate change, it is important that clean energy becomes accessible and new technologies are developed. The role of clean energy in mitigating climate change is closely related to many areas of development. By lowering greenhouse gas emissions, enhancing air quality, as well as lessening the effects of climate change, clean energy technologies can contribute to environmental development (Acciona, 2019). The advancement of clean energy technologies can also open up new economic opportunities that can boost the economy. Finally, it can promote social development by strengthening energy security, lowering energy poverty, and expanding access to energy in remote and rural areas (Verma, 2023).

This research paper is divided into six sections. The first section describes literature reviews on clean energy, clean transportation, and government policies. The second section describes the main research objectives. The third section focuses on the methodology by describing detailed information about the participants in this research. The fourth section identifies research results, and the fifth section discusses findings from the research questions. The last section includes the conclusion and recommendations for this research.

1.1 Definition
1.1.1 BTS Skytrain
The BTS Skytrain is an elevated rapid electric railway in Bangkok, Thailand. It provides fast and convenient transportation across the city, which helps commuters avoid traffic congestion.

1.2 Climate Change in Thailand
Climate change has had a significant impact on Thailand, as it has on the entire world. The country is experiencing rising temperatures, altered rainfall patterns, and increased frequency of extreme weather events. For instance, according to the Office of Natural Resources and Environmental Policy and Planning (ONEP), from 2011 to 2021, Thailand's average temperature rose by 0.09°C annually, while the number of days above 35°C grew dramatically (ONEP, 2024). Thailand's climate change is mostly driven by global greenhouse gas emissions, with local factors worsening the situation (ONEP, 2024).

Rapid urbanization, particularly in cities like Bangkok, contributes to the urban heat island effect, which causes higher temperatures in built-up areas due to heat absorption by buildings and roads (ONEP, 2022). Furthermore, deforestation and land conversion for agriculture reduce carbon sinks and disrupt local climates (ONEP, 2022).

In addition, Thailand's agricultural sector, particularly rice agriculture and cattle rearing, produces a substantial amount of methane, which contributes considerably to Thailand's greenhouse gas emissions. Traditional practices, such as open burning of agricultural residue, increase greenhouse gas emissions (TGO, 2021). In addition, according to the Thailand Development Research Institute (TDRI), overuse of chemical fertilizers in agriculture can cause the release of nitrous oxide (N_2O), a powerful greenhouse gas (Kaosa-ard, & Pednekar, 1996).

Furthermore, Thailand's industrial activities, particularly energy generation and manufacturing, contribute significantly to the country's CO_2 emissions. The high percentage is due to the use of fossil fuels for energy generation and the expansion of industrial zones without proper environmental regulations (ONEP, 2022).

Moreover, the increasing number of automobiles, especially in metropolitan areas, leads to higher fossil fuel use and CO_2 emissions. Inadequate public transportation infrastructure worsens the dependency on private vehicles (Kaosa-ard, & Pednekar, 1996). Transportation accounts for nearly 30% of Thailand's total carbon emissions, which surpass 80 million metric tons per year (TDRI, 2024). Without intervention, emissions might rise to 110 million tonnes by 2030 and double 2.5 times by 2050 (Kaosa-ard, & Pednekar, 1996).

Finally, inefficient waste management methods in Thailand, such as open dumping and inadequate landfill operations, have a substantial impact on methane emissions and local pollution. The lack of comprehensive waste segregation and recycling systems adds to the problem (ONEP, 2022). Furthermore, the Pollution Control Department (PCD) states that poor landfill operations can cause leachate leaks, damaging soil and water resources and contributing to environmental degradation (Ramungul, & Boontongkong, 2017).

In conclusion, Thailand's climate change research reveals a complex interplay of global effects and local actions. Key contributors include emissions from the energy, industrial, transportation, agriculture, and waste sectors, all of which are exacerbated by unsustainable development and inadequate infrastructure.

1.3 Clean Energy

As the world faces worsening climate conditions and the threat of an energy crisis, it is vital to shift away from traditional energy sources and toward more sustainable ones. Clean energy is one of the primary solutions to this problem (Iberdrola, 2023). According to the latest International Energy Agency (IEA) (2023) data, global renewable energy capacity is forecast to increase by one-third this year, with solar power accounting for more than two-thirds of the increase. This is due to a variety of policies, rising traditional energy prices, and concerns about energy security. It is expected that growth will continue in the coming year, with global renewable energy capacity reaching 4,500 gigawatts (IEA, 2023).

On a smaller scale, the Southeast Asia region faces decarbonization challenges as the economy expands. Higher energy consumption and energy affordability present challenges for the region. To solve these issues, as well as the increased occurrence of natural disasters and extreme weather due to climate change, the region has to invest more in renewable energy (Fallin et al., 2023). However, these investments will be extremely costly, and while the private sector has undertaken certain projects, these large-scale investments are too expensive for them to carry out on their own. Even still, regional governments are unwilling to incur additional debt, especially after the pandemic (Fallin et al., 2023).

Thailand's energy production is primarily reliant on traditional sources. The Thai government has declared, however, to be carbon neutral by 2050 and to achieve net-zero greenhouse gas emissions by 2065. Its national energy strategy for 2022 likewise seeks to produce half of its electricity with clean energy by 2040 (Fallin et al., 2023). Furthermore, Thailand has significant potential for generating energy through solar power. According to the country's Power Development Plan 2018–2037, solar power is predicted to account for more than half of the country's energy by 2037. The world's largest solar farm, the first of 16 planned, began operations in the country's northeastern province in 2021. Furthermore, Thailand has extensively promoted the Bio-Circular-Green Economy, which entails the possibility of producing renewable energy from agricultural waste (Fallin et al., 2023).

1.3.1 Clean Energy and Climate Change Mitigation

Since the 1880s, climate change has been occurring at a faster rate than natural rates, due to human activities such as the burning of fossil fuels to generate energy. The combustion of fossil fuels leads to a rapid rise in CO_2, while the emission of greenhouse gases traps heat in the earth's atmosphere (Intergovernmental Panel on Climate Change (IPCC), 2011; United Nations, 2023b). Therefore, traditional energy sources are unsustainable and play a big role in climate change (IPCC, 2011; Suman, 2021).

For this reason, worldwide frameworks and agreements such as the Sustainable Development Goals and the Paris Agreement have been formed to mitigate climate change. These frameworks and agreements refer to three crucial actions that aid in the fight against climate change: reducing emissions, adapting to climatic impacts, and financing necessary modifications (United Nations, 2023b).

The progressive development of clean energy has reduced carbon dioxide emissions and greenhouse gas emissions (IPCC, 2011; Suman, 2021). In addition, IPCC. (2011) and Suman (2021) pointed out that clean energy can reduce air pollution and other environmental repercussions, as well as enhance general health. Therefore, the effects of climate change can be mitigated by shifting to renewable energy and limiting the use of fossil fuels (White, 2021). Apart from environmental benefits, clean energy also has positive effects on the social, economic, and health sectors (IPCC, 2011; Suman, 2021). Clean energy sources play a significant role in sustainably delivering energy; the benefits of clean energy are large at all levels (IPCC, 2011; Suman, 2021).

However, according to IPCC. (2011), for clean energy supplies to be sustainable, they must be inexhaustible, economical, and aligned with societal needs and values. White (2021) pointed out that while renewable energy was formerly more expensive, it has become more affordable. As a result, this should aid in the economy's transition away from traditional energy sources. However, clean energy today accounts for only a small portion of total energy output. More must be done, and its contribution must expand for it to make a difference (White, 2021).

1.3.2 The Advantages and Disadvantages of Clean Energy

The usage of renewable energy can help reduce carbon emissions and combat climate change, among other things. According to Papathanasiou (2022) and the United Nations (2023c), renewable energy can assist countries in managing climate change. It improves health and air quality. Large-scale renewable energy also delivers significant economic advantages to investors, governments, and consumers (International Renewable Energy Agency, 2017; Papathanasiou, 2022). By switching to clean energy, countries will also be able to broaden their economies. They can expand their energy access, protect themselves from erratic energy price fluctuations, and cut energy costs (International Renewable Energy Agency, 2017; Papathanasiou, 2022; United Nations, 2023c) Furthermore, it will increase job opportunities and overall employment in the energy sector (International Renewable Energy Agency, 2017; United Nations, 2023c).

However, it is crucial to recognize that renewable energy has some drawbacks. Kramarz et al. (2021) identified displacement consequences such as displacement by dispossession, displacement by degradation, and displacement through dependent development as an issue. This is due to the global increase in demand for the metals and minerals needed in renewable energy systems. Hayward (2022) also mentioned some issues with sustainable energy. According to the author, clean energy might cause floods and kill animals. A large amount of land is required, and the materials will jam landfills. The author further claimed that renewable energy is unstable and cannot be completely relied on. Furthermore, the way green energy is collected might even contribute to climate change. While Zehner (2012) discussed some of the benefits of clean energy, the author emphasizes that shifting to clean energy is not the solution to the problem, but rather a distraction from the true issue of energy overconsumption.

1.4 Clean Energy Policies

Since energy production accounts for more than one-third of global greenhouse gas emissions, energy generation methods must improve (Green Economy Tracker, 2023). Clean energy policies are critical for the world to transition from traditional to clean energy sources. This will help mitigate climate change and satisfy rising energy demand. These policies call for both methods to discourage the use of traditional sources and financial support for clean alternatives (Lu et al., 2020; Green Economy Tracker, 2023).

According to the research by Lu et al. (2020), feed-in tariffs have proven to be effective in boosting clean energy in a variety of countries. This, in turn, discourages the use of traditional energy sources. In terms of financial support, both Lu et al. (2020) and the Organization for Economic Cooperation and Development (2013) suggested that investment in clean energy will need to expand to encourage the use of clean energy and help mitigate climate change. However, the lack of supportive regulations, as well as the outstanding barriers to international trade and investment, are primary impediments to clean energy investment flows. Therefore, governments and stakeholders must develop clear strategies to enhance the level of investment (Lu et al., 2020; Organization for Economic Cooperation and Development, 2013).

To develop effective policies, in-depth studies on clean energy policies must be done. While there are many studies on specific clean energy policies, very little is known about how successfully these various policies interact with one another (Fisher, & Preonas, 2010). According to Fisher, and Preonas (2010), these policies have overlapping jurisdictions and purposes. As a result, it is critical to examine these policies together rather than independently to determine if they complement or contradict each other.

1.4.1 Clean Transportation Policies

Transportation is a major contributor to carbon emissions. Currently, the majority of transportation is powered by traditional energy sources, such as fossil fuels. Shifting the transportation industry from traditional energy to clean energy sources is a critical step toward reducing carbon emissions and mitigating climate change (One Earth, 2023). A well-coordinated and integrated set of clean transportation policies is required to transition to a sustainable transportation system. In addition to reducing emissions, these strategies can enhance economic accessibility and improve quality of life (IEA, 2023).

There is widespread support for putting sustainable mobility at the top of the political agenda as policies encouraging the development of electric vehicles are critical to reducing CO2 emissions (Bardal et al., 2020; Nunes et al., 2019). Policy packages that include both push and pull measures, as well as policies boosting convenience in the usage of electric vehicles (EV), may be the most effective types of strategy. Monetary

incentives, as well as other measures such as road tax reductions and traffic regulations, could encourage the sales of EVs, while implementation of repressive laws, penalties, and taxes pushes consumers away from traditional vehicles. Furthermore, environmental concerns also play a significant role in consumer decisions (Bardal et al., 2020; Wang et al., 2017; Lieven, 2015). Additionally, the strategic use of communication, trials, as well as the implementation of the strategy step by step, can all be essential aspects of leading to a large success (Bardal et al., 2020).

However, there are challenges in establishing and executing these policies. The type and strength of challenges are influenced by the size of cities as well as the type of policies implemented. These initiatives and policies are insufficient to promote the widespread adoption of EVs because customer demand appears to be minimal. This demonstrates the need to investigate the relationship between policies and the acceptance of electronic vehicles (Bardal et al., 2020; Wang et al., 2017).

According to Heliox (2022), the Netherlands is an excellent example of clean transportation. The Netherlands came out on top in their study of intent and efforts toward the green transportation transition in the United States and Europe, with the most EV charger infrastructure and the lowest use of fossil fuels. Thailand, while on a different scale than leading countries in clean transportation, has increased its efforts to transition to more sustainable modes of transportation. The growth of the domestic electric vehicle (EV) industry is a critical pillar in this transition, with Thailand's EV market currently accounting for more than 60% of the region's market share. Furthermore, the government has issued numerous incentives to encourage the manufacturing and use of EVs (Fallin et al., 2023).

1.4.2 Thailand's Clean Energy and Clean Transportation Policies

Thailand has made a concerted effort to advance sustainable transportation and renewable energy regulations to lower greenhouse gas emissions and enhance air quality. Thailand aims to achieve carbon neutrality by 2050 and net-zero emissions by 2065. Achieving carbon neutrality by 2050 will require significant cuts in emissions from all economic sectors and steps to improve carbon removal from the atmosphere through carbon capture and storage, afforestation, and reforestation. In comparison to carbon neutrality, net-zero emissions aim to completely eradicate greenhouse gas emissions. Thailand's goal of having net-zero emissions by 2065 suggests that it intends to eliminate its greenhouse gas emissions (United Nation Climate Change, 2022).

The Ministry of Energy has launched several Renewable Energy Development Plans (REDP) to encourage the use of renewable energy sources like solar, wind, biomass, and hydropower. The REDP establishes targets for increasing the percentage of renewable energy in the country's energy mix (Ministry of Energy, 2015a). In addition, the Ministry of Energy has undertaken energy efficiency programs to minimize energy usage in a variety of sectors, including industry, transportation, and construction. These programs include energy efficiency regulations and labeling, energy audits, and incentives for environmentally friendly technologies (Ministry of Energy, 2015b). Furthermore, the Ministry has adopted a biofuels mandate, which requires the blending of ethanol with gasoline and biodiesel with diesel to boost biofuel use and reduce greenhouse gas emissions from the transportation sector (Ministry of Energy, 2004).

The Ministry of Transport (2019) developed a strategy that encompasses several key priorities. Firstly, there is a focus on creating a comprehensive and environmentally friendly public transportation system. This involves developing infrastructure that is accessible to all, while also working towards reducing energy consumption and embracing clean energy solutions to minimize environmental impact. Secondly, the strategy emphasizes the importance of ensuring safety and security within the transportation sector. This entails enhancing and implementing standards and regulations to safeguard passengers and goods during transit. Thirdly, efforts are directed towards improving efficiency and capacity building within transportation systems. This includes initiatives to enhance competitiveness and drive economic growth through the optimization of transportation networks and services. Lastly, the strategy recognizes the significance of driving factors such as legal frameworks, regulations, and technological innovation. By refining legal systems and fostering innovation in transportation technologies, the Ministry aims to further advance the effectiveness and sustainability of the transportation sector.

In addition, Thailand's Energy Regulatory Commission introduced a Feed-in Tariff (FiT) system to encourage investment in renewable energy installations. To stimulate the growth of renewable energy sources, this system guarantees producers a fixed price for the power they create that is greater than the market price (Santos, 2022). Furthermore, Thailand's Board of Investment has been supporting the use of electric vehicles

(EVs) to reduce reliance on fossil fuels and minimize air pollution. The government provides incentives such as tax cuts, subsidies, and infrastructure development to encourage the production and usage of electric vehicles (Thailand Board of Investment, 2017)

Overall, Thailand's pledge to achieve carbon neutrality by 2050 and net-zero emissions by 2065 indicates its acknowledgment of the critical need to combat climate change, protect the environment, and create a sustainable future for current and future generations. Achieving these objectives will necessitate coordinated efforts, collaboration, and innovation from society, the economy, and the government.

All of these literatures emphasized the significance of implementing environmentally friendly transportation modes and technology to solve climate change and global warming. Some of the papers explored approaches for achieving sustainable transportation systems. They addressed the possible economic benefits of green transportation and emphasized the need for technical innovation and good management practices. Most emphasized the significance of taking into account external variables such as law, economics, and geography. However, this research will focus on how clean and sustainable energy helps minimize the effects of climate change in Bangkok, Thailand, as well as the influence of national and local policies on climate change and clean energy. The study will also examine how green public transportation, particularly the BTS, is better for the environment. In addition, the importance of renewable energy to Thailand's energy security will be investigated in this study as well.

2. Objectives

1) To examine how the Bangkok Mass Transit System helps mitigate climate change in Bangkok, Thailand.
2) To understand the effects of clean energy and clean transportation policies on climate change mitigation in Bangkok, Thailand.

3. Methods

The qualitative method was used to examine the role of clean energy and the BTS, as well as the effects of clean energy and clean transportation policies in mitigating climate change. This study used both primary sources from interviews and secondary data sources. Interviews with participants in the field of clean energy were conducted. Interviews are crucial for several reasons. Firstly, interviews allow for in-depth explorations. They offer the flexibility to probe and follow up on responses, facilitating a richer understanding of the subject matter. Interviews also allow the researcher to capture diverse perspectives by interviewing participants with different backgrounds, experiences, and viewpoints. Secondly, interviews can give the researcher insight into the context surrounding a particular phenomenon or issue. Lastly, interviews provide an opportunity for researchers to build trust and rapport with participants, which can encourage openness and honesty in their responses (Creswell, & Poth, 2017).

3.1 Participants

The researcher interviewed six participants who have either theoretical or practical expertise in clean energy and climate change. There are two groups of participants: Bangkok Mass Transit System (BTS) personnel and government officials.

3.1.1 Bangkok Mass Transit System (BTS) Personnel

The Bangkok Mass Transit System personnel participants were chosen based on three criteria. First, participants must have direct experience or knowledge related to clean energy or clean transportation, as their insight must contribute to the research. Secondly, the researcher seeks to include participants with diverse work backgrounds and experiences; this can enrich the data by providing multiple perspectives and capturing a broader range of insights. Lastly, participants must have at least 5 years of experience working in the company. Participants with extensive experience are relevant to the research topic as they can provide valuable insights and rich data.

Three participants were chosen from the Bangkok Mass Transit System. The first participant works as a project manager and oversees the projects for the BTS. The second participant works on planning environmental policies regarding clean energy. The last participant is a mechanic who specializes in electric trains.

3.1.2 Government Officials

The government official participants were chosen based on three criteria. First, participants must have direct experience or knowledge related to clean energy or clean transportation policies, as their insight must contribute to the research. Secondly, the researcher seeks to include participants with diverse work backgrounds and experiences; this can enrich the data by providing multiple perspectives and capturing a broader range of insights. Lastly, participants must have at least 10 years of experience working in the governmental sector. Participants with extensive experience are relevant to the research topic as they can provide valuable insights and rich data.

Three participants were chosen from the government's official category. The first participant is a government officer in the Department of Climate Change and Environment. The second participant is a government officer in the Department of Alternative Energy Development and Efficiency. The last participant is a government worker in the Bangkok Metropolitan Administration.

Table 1 List of Interviewees

No.	Participant	Position	Organization	Category
1	Participant A	Director	Department of Climate Change and Environment	Government Officials
2	Participant B	Renewable Energy Specialist	Department of Alternative Energy Development and Efficiency	Government Officials
3	Participant C	Head of Railway Project Group	Traffic and Transportation Department Bangkok Metropolitan Administration	Government Officials
4	Participant D	Project Manager	Bangkok Mass Transit System	BTS Personnel
5	Participant E	Environmental Policy Planner	Bangkok Mass Transit System	BTS Personnel
6	Participant F	Train Mechanic	Bangkok Mass Transit System	BTS Personnel

3.2 Data analysis

This research employed a thematic analytic technique to examine the ways in which clean energy and clean transportation policies, as well as the Bangkok Mass Transit System, contribute to climate change mitigation in Bangkok, Thailand. Thematic analysis is one of the techniques used for examining qualitative data. It identifies recurring themes and patterns in textual data, such as transcripts or interviews (Braun et al., 2022). After carefully reviewing the information gathered from secondary research and interviews, the researcher identified recurring themes, subjects, concepts, and patterns.

4. Results

The results look into the participants' responses and are divided into 6 sub-topics, which demonstrate the relationship between climate change and clean energy, as well as the role of policies in mitigating climate change.

4.1 The Growing Threat of Climate Change

The dangers posed by climate change have increased in severity throughout the years. Climate change is causing two key rising threats: an accelerated rate of climate change and more frequent and severe natural disasters.

The first threat is that the climate is changing more rapidly than anticipated. In the past, the climate changed gradually. However, in recent years, the climate has noticeably changed at a faster rate. All participants agreed that the environment has dramatically changed and is changing faster than anticipated. Participants explained that this is due to increased greenhouse gas emissions from fossil fuels and deforestation. All participants believed that climate change has a substantial impact on Bangkok, Thailand. Participant D (Personal Communication, April 5, 2024) explained that "Since Bangkok is a metropolis, it uses more natural resources and energy. This accelerated the rate of climate change". The faster rate of change is not only a dangerous threat in itself but also the root cause of four other threats: continuous temperature rise, variations in rainfall, rising sea

levels, and an increase in air pollution. Participant A (Personal Communication, March 25, 2024) explained that "The Industrial Revolution severely impacted climate change. The rapid growth of climate change began during the Industrial Revolution, and since then greenhouse gas emissions have increased by two to three times".

As the climate changes more rapidly, the temperature continues to rise at a faster rate. This is due to the heat that is trapped by greenhouse gases. All participants agreed that the temperature has continued to climb and is becoming increasingly dangerous. According to Participant C, the average temperature did not reach the 1.5°C limit last year; however, it is quickly approaching it this year. Participants A and C went on to explain that temperatures in some areas have risen by 1.5 - 1.7 degrees Celsius over the last year, while the world average temperature has risen by 1.1 degrees Celsius this year. Participant A (Personal Communication, March 25, 2024) also stated, "While the temperature has been increasing each year, it has gotten much more severe this year. The heat rays have become stronger to the point where they are now burning upon contact".   In addition to the rising temperature, there are also noticeable changes in rainfall and sea levels. The amount of rainfall has become unpredictable, and sea levels have risen. Participants A and E explained that as temperatures rise, glaciers are melting. This, along with excessive rainfall in some areas, has resulted in rising sea levels, which impact coastal towns and cause flooding and erosion. According to Participants A, B, and F, the constant rise in temperature causes turbulence and unpredictable weather. This causes rainfall changes, which have varying effects on different regions. Participant C (Personal Communication, March 29, 2024) stated, "Some regions receive more rainfall, causing sudden floods. Others face droughts, resulting in a lack of water".

Furthermore, the rapid rate of climate change leads to an increase in air pollution. Pollutants such as greenhouse gases, CO2, and PM2.5 directly affect the quality of the air. Participants C, D, E, and F stated that burning fossil fuels and starting forest fires increase air pollution and PM2.5 levels. This leads to increased greenhouse gas emissions, which further trap heat. Participant D (Personal Communication, April 5, 2024) explained that "The increase in greenhouse gases, CO2, and PM 2.5 is causing environmental and health issues. The dangerous quality of air is causing a variety of illnesses, including respiratory ailments and cancer".

The second threat is frequent natural disasters. As the climate changes more rapidly, natural disasters are becoming more frequent and severe. All participants agreed that natural disasters are becoming more dangerous as the effects of climate change worsen. According to Participants A and F, climate change causes severe weather occurrences such as thunderstorms, typhoons, and hurricanes. According to Participant C (Personal Communication, April 29, 2024), hot and dry weather can cause forest fires: "The continual rise in temperature, combined with the drought caused by rainfall fluctuations, results in more intense and frequent fires".

To summarize, the rising challenges of climate change pose a major global concern, as evidenced by two different threats that require immediate attention and action. From the rapid rate of change that leads to a rise in temperatures, shifts in rainfall patterns, rising sea levels, and the surge in air pollution to the frequency and severity of natural disasters, each threat highlights the complex relationship between human activity and environmental consequences.

4.2 The Role of Clean Energy and Clean Transportation in Mitigating Climate Change

The use of fossil fuels, particularly in transportation, emits a considerable amount of CO2 and greenhouse gases, contributing to climate change. As a result, climate change mitigation depends significantly on clean energy and transportation. Clean energy and clean transportation play two important roles in climate change mitigation: reducing greenhouse gas emissions and lowering energy prices. All participants believed that switching from fossil fuels to clean energy sources would help to reduce climate change.

The first role is to reduce greenhouse gases. By switching from fossil fuels to clean energy, greenhouse gases will be reduced. In addition, the temperature will decrease, and overall health will improve. Energy derived from the combustion of fossil fuels emits large amounts of greenhouse gases, including CO2, which participants agreed are the primary causes of climate change. One of the biggest contributors to this is transportation powered by fossil fuels, as Participant C (Personal Communication, April 29, 2024) pointed out: "Bangkok faces the problem of excessive CO2 and greenhouse gas emissions as a result of its heavy traffic". According to Participant F, as more fossil fuels are used, more greenhouse gases that trap heat from the sun in the atmosphere are produced. This causes the temperature to rise. As stated by Participant E, using fossil fuels emits hazardous gases and pollutants. Participant E further explained that these gases and pollutants, such as PM 2.5, can cause a variety of health issues, including respiratory illnesses. Participant C (Personal Communication, March 29, 2024) stated that

"Clean energy and transportation do not emit CO2, greenhouse gases, or pollution. Therefore, they will reduce health risks and improve people's quality of life". According to Participant A (Personal Communication, March 25, 2024), "While the current trend of clean energy is focused on electric vehicles, the future will be in natural energy sources such as hydropower or solar cells". Switching from fossil fuels to clean energy in all industries, particularly transportation, will drastically reduce greenhouse gases and, in turn, global temperature. Additionally, it will result in less carbon and pollutants being emitted into the atmosphere. Therefore, it has benefits for the population's health.

The second role is lowering energy prices. Aside from the environmental benefits, using renewable energy can reduce energy costs. While switching to clean energy may increase short-term energy expenses, Participant A believes it will save money in the long run. As the market for clean energy and transportation expands, new technologies emerge, resulting in lower production and consumption costs. According to Participant A, new nuclear technology is now in development. Participant A (Personal Communication, March 25, 2024) reported that:

> There have been recent efforts to produce small- particle nuclear technology that is not
> dependent on large nuclear plants. These small- particle nuclear technologies could be utilized
> in homes. However, the technology is still new and, therefore, a long way from being fully
> developed.

In conclusion, the transition from fossil fuels to clean energy and transportation systems plays an important part in the efforts to mitigate climate change. As all participants agreed, this change has the potential to reduce greenhouse gas emissions, lower global temperatures, improve public health, and reduce energy costs. Notably, the transportation industry, a major source of emissions, stands to benefit considerably from this transformation. Embracing sustainable energy solutions can drastically reduce emissions and contribute to a more sustainable future.

4.3 BTS Involvement in Mitigating Climate Change in Bangkok

The Bangkok Mass Transit System (BTS), often known as the BTS Skytrain, is critical to decreasing greenhouse gas emissions and combating climate change in Bangkok, Thailand. To help mitigate climate change, the BTS has developed three key climate change policies: reducing greenhouse gas emissions via electric-powered trains, monitoring greenhouse gases using the ISO 14001 standard, and conserving and managing energy.

The first policy is to reduce greenhouse gas emissions by implementing electric-powered trains. The BTS is a public transportation system that runs on electricity; as a result, it produces fewer pollutants than vehicles that run on fossil fuels and has a lower carbon footprint. According to Participant D, the BTS runs fully on electricity, including lighting, air conditioning, and engines. However, according to Participant F, since the electric system is turned off for maintenance, the rails are maintained using fossil fuel-powered vehicles. In addition, Participant E (Personal Communication, March 25, 2024) stated that "The BTS serves to minimize private car usage, which relieves traffic congestion and lowers CO2 emissions, PM 2.5, nitrogen oxide, and sulfur dioxide". Furthermore, Participant D (Personal Communication, March 25, 2024) stated that:

> BTS is the first and only rail transportation company that is carbon neutral. It is ranked first in
> the Dow Jones Sustainability Indices (DJSI). According to the S&P Sustainability Yearbook
> 2024, BTS also leads the transportation industry in terms of sustainability.

The second policy involves monitoring greenhouse emissions using the ISO 14001 standard. The BTS has an energy committee, which oversees the company's energy use. This committee works with the Ministry of Energy to mitigate climate change. According to Participant D, the committee has accepted ISO 14001, an internationally recognized standard that provides the requirements for an environmental management system. The participant further explained that ISO 14001 assists the BTS in keeping track of its greenhouse gas emissions to not exceed the guideline limits. In addition, Participant D (Personal Communication, April 5, 2024) stated that "Through the ISO 14001 system, BTS measures the use of energy and oil, the output of waste, as well as the carbon emissions from employees' methods of transportation to work".

The third policy is energy savings and management. The BTS has made efforts to lower the use of energy as well as switch to cleaner sources. As mentioned by Participant E, the BTS challenges itself monthly to lower

the building's power usage to conserve energy and battle climate change. Additionally, preparations are underway to replace purchased electricity with solar cells for the buildings' electrical systems. However, Participant F stated that using solar cells to power trains is currently unfeasible due to the high energy that is required.

In conclusion, the BTS plays an important role in sustainability in Bangkok, Thailand, with its policies aimed at reducing greenhouse gas emissions. The BTS demonstrates a commitment to mitigating climate change by using electric trains, adhering to ISO 14001 standards, and promoting energy conservation. The BTS's proactive approach highlights its critical role in promoting a greener urban environment that benefits overall health and serves as an example of sustainable transportation.

4.4 Clean Energy Policies

Clean energy is crucial to climate change mitigation; therefore, policies that promote it must be developed. These policies should focus on five areas: the industrial sector, energy production and consumption, technology and infrastructure, transportation, and the environment.

The first area is the industrial sector. The industrial sector is a sector that requires a huge amount of energy. Therefore, it is crucial to switch from fossil- generated energy to clean energy. Participant A claimed that a mandatory carbon market that demands clean technologies to avoid taxation would help cut carbon emissions. Additionally, green industries, green bonds, and green taxation policies can help the industrial sector switch to renewable energy. Participant A (Personal Communication, March 25, 2024) said that the industrial sector has undergone a rapid transformation: "Because of the need to conduct business on a global scale, the industrial sector is currently moving faster toward clean energy than the government sector". However, Participant A believes that because SMEs are having problems transitioning, the government should support them.

The second area is energy production and consumption. The production of energy must be done through means that are sustainable for the energy consumption to be clean. Participant B believes that by increasing renewable energy consumption to at least 50% of total electricity generation, the cost of renewable energy will likely fall. This, paired with the use of energy-storage devices, can help mitigate climate change without increasing the long-term cost of electricity production. Participant B (Personal Communication, March 26, 2024) explained that:

> This goes in line with our 4D1E plan, specifically the first, third, and fourth D. The first D stands for decarbonization, which promotes the production and use of clean energy to reduce air pollution and greenhouse gas emissions. The third D is decentralization, which encourages the spread of energy manufacturers and distributors as well as the development of local power plants. The fourth D is deregulation, which involves changing the laws and regulations so that the private sector can invest in power station businesses while also assisting local energy firms and releasing energy produced by the civil sector into the transmission system.

Furthermore, Participant C noted that the Bangkok Metropolitan Administration (BMA) promotes energy-efficient architecture and industry practices to reduce energy consumption and greenhouse gas emissions. The BMA also has initiatives to promote alternative energy consumption, including crop-based biofuel production and solar energy in buildings.

The third area is technology and infrastructure. To switch to clean energy, new technologies as well as sufficient infrastructure are needed. Participant B claimed that using modern energy management technologies and innovations can improve energy efficiency by 30%, hence improving energy management efficiency. Participant B (Personal Communication, March 26, 2024) went on to clarify that:

> This fits into the department's 4D1E plan, especially the second D and the one E. The second D is digitalization, which is to promote infrastructure investment and administration, elevate the electrical transmission line network into a smart system, and develop energy-storing systems. The E refers to electrification, which includes transforming the energy usage format to increase electricity usage, developing a modern electricity system infrastructure (grid modernization) managed by smart grid technology, modernizing electricity system prediction and control, and supporting energy production technologies.

The fourth area is transportation. As transportation is one of the leading sectors in greenhouse gas emissions, it is important that policies support the switch to clean transportation. Participant B claimed that increasing electric vehicle manufacturing by 30% by 2030 will transform transportation energy from fossil fuel-based to electricity-based. This will lower greenhouse gas emissions, increase energy efficiency in the transportation sector, and also combat PM2.5 air pollution.

The fifth area is the environment. Policies targeting environmental management can help lower the temperature as well as improve air quality. According to Participant C, the BMA supports having more green spaces, such as public parks and open spaces, to prevent heat accumulation and greenhouse gas emissions. Furthermore, the BMA has been working on waste management strategies to mitigate the consequences of climate change, such as pollution control and air quality management, in the region.

In conclusion, strong policies on clean energy and transportation are essential for combating climate change, particularly in the areas of industry, energy production and consumption, technology and infrastructure, transportation, and the environment. Carbon markets, renewable energy expansion, and green infrastructure are all important steps toward lowering greenhouse gas emissions and promoting sustainability. By tackling these critical issues thoroughly, Thailand can work towards a greener future while minimizing the effects of climate change.

4.5 Clean Transportation Policies

The emissions of greenhouse gases from fossil fuels used in transportation are a major contributor to climate change. As a result, strategies aimed at lowering fossil fuel consumption and alleviating transportation congestion are crucial. Four types of clean transportation policies can help alleviate climate change, including promoting electric vehicles and energy-efficient automobiles, supporting public transit development, encouraging energy conservation, and enacting traffic restrictions.

The first type of policy encourages electric vehicles and energy-efficient automobiles. By switching to electric and energy-efficient vehicles, greenhouse gas emissions will be reduced. Participant C suggested that policies should encourage the use of electric vehicles by assisting with the switch from a conventional vehicle to an electric vehicle. This can increase efficiency and minimize energy consumption in the transportation sector. Additionally, Participant C (Personal Communication, March 29, 2024) noted that "Bangkok Metropolitan Administration encourages the use of energy-efficient automobiles, and by approving traffic management plans and establishing more bicycle lanes to reduce private vehicle use, greenhouse gas emissions will be lower".

The second type of policy supports the development of public transportation. To reduce the use of private cars, public transportation must be efficient, easy to access, and cover all areas. Therefore, the development of this sector is crucial. Participant C believes that developing transportation networks is one of the major solutions. Participant C (Personal Communication, March 29, 2024) stated that "By constructing a clean and efficient public transportation system, such as expanding the BTS and MRT rail systems, the use of public transit will increase while the use of private vehicles, which contribute to greenhouse gas emissions, will reduce".

The third type of policy promotes energy conservation. While clean energy is essential for sustainability, energy conservation cannot be overlooked. Participant B explained that the implementation of mandatory energy conservation measures for all means of transportation can help reduce energy use while supporting climate change mitigation.

The fourth type of policy helps to enact traffic laws that can reduce heavy traffic, which significantly contributes to climate change mitigation. Participants B and C believe that policies managing traffic management, road traffic safety, and the use of private cars, such as limiting the number of private cars allowed into the city per day or collecting entry fees, can help reduce climate change.

In conclusion, addressing the significant contribution of transportation to climate change requires the implementation of effective policies. Promoting electric vehicles, funding for public transportation expansion, encouraging energy savings, and enacting traffic laws are critical for reducing greenhouse gas emissions and air pollutants.

4.6 Challenges in Implementing Clean Energy and Clean Transportation Policies

Mitigating climate change in Bangkok can be difficult due to the city's high pollution levels and greenhouse gas emissions. To overcome this issue, policies that promote clean energy and transportation are vital.

However, there are six challenges to establishing and implementing policies, including data collection difficulties, technological and financial constraints, insufficient connecting points for rail systems and commute fares, opposition to policy development, a lack of public support and engagement, and the unexpected outcomes of climate change.

The first challenge is the difficulty of gathering data since the information must be collected through various measures, including scientific sources. Policies must be formed based on credible and complete data. However, Participants A and C believed it may be difficult to gather clear and sufficient data to make educated decisions on climate change management.

The second challenge is technological and financial constraints. Developing new technology and infrastructure requires a substantial budget, which is not always feasible. Participant D (Personal Communication, April 5, 2024) explained that while electricity is generally cleaner than fossil fuels, not all sources of electricity are clean. "Some electricity is produced using fossil fuels or transported via vehicles powered by fossil fuels. As a result, it is critical to ensure that the entire process is clean". Furthermore, Participants A, B, and C noted that climate change mitigation solutions necessitate investment and infrastructure improvements, which can be costly in some cases or restricted by financial constraints. The government sector lacks sufficient funds, while the private sector needs profitable returns on investment.

The third challenge is a lack of connecting points for the rail system and commute fares. Convenience and affordability are important factors in promoting the use of public transportation; however, there are certain limitations. Participant F mentioned that connecting points for the rail system are not always possible because infrastructure development must follow the municipal plan to prevent damage to roads, buildings, and other essential infrastructure. Participant F (Personal Communication, April 5, 2024) also stated that "The public rail system cannot breach the roofs of people's houses or undermine building foundations simply to establish a connection to other rail stations". Due to a lack of connecting points, passengers must change routes more frequently, resulting in expensive commute fares in some cases. This creates a problem in which the rail companies cannot lower their fares, which makes it unaffordable for many passengers. Because of this, the government occasionally must depend on taxes to cover the gap in commute fares.

The fourth challenge is opposition to policy establishment. The process of policy establishment requires cooperation and agreement from many sectors. Nevertheless, there might be dissent and opposition from those negatively impacted by the policies and those encountering challenges in their businesses. According to Participants A and C, climate change policies take time to establish, and there may be pushback from people in the corporate sector who are affected by the policy. Participant B explained that promoting electric vehicles may have an impact on traditional automotive enterprises that rely on internal combustion engines, with ramifications for related industries such as automotive component production and associated labor forces.

The fifth challenge is a lack of public support and engagement. Meeting carbon reduction targets and improving environmental conditions necessitates public support and participation. As stated by Participant B, for policies to be effective, the general population must be prepared to adjust and change their behavior. Participant A mentioned that previously, many people denied the existence of climate change, believing it to be merely normal weather fluctuations that occur gradually. Fortunately, people have become more aware of the reality of climate change and its significant impact on their lives. In addition, Participant C pointed out that because climate change issues affect the environment and human health, it is imperative to raise public awareness of these issues.

The sixth challenge is the unforeseen consequences of climate change. Although there are regulations and initiatives aimed at mitigating the effects of climate change, it is uncertain if these will be sufficient to address the current problems. As such, it is unclear what the future will bring, given how quickly climate change is accelerating. Participant A (Personal Communication, March 25, 2024) stated, "It remains uncertain whether these measures and policies will aid in restoring the climate to its former condition. Consequently, besides efforts to mitigate climate change, it is imperative to devise adaptation strategies, such as employing heat-reflective materials or selecting sites located in areas less prone to disasters".

In summary, implementing clean energy and transportation policies in Bangkok faces significant challenges, such as difficulties in data collection, technological and financial constraints, a lack of connecting points for the rail system and commute fares, policy opposition, a lack of public support and engagement, and unforeseen consequences of climate change. Although overcoming these challenges may be difficult, it is

necessary. To encourage sustainable behaviors and build resilience, these difficulties need to be addressed with cooperation and involvement from all stakeholders.

5. Discussion

In this section, the research findings will be discussed to answer the research questions. The primary source of this research will also be inserted to further explain and support the arguments of the research objectives.

5.1 The role of the Bangkok Mass Transit System in mitigating climate change in Bangkok, Thailand

The BTS's main role in mitigating climate change is to reduce greenhouse gas emissions and pollution. Its contribution to sustainable mobility is consistent with international efforts to tackle the pressing issues caused by climate change. Transportation powered by fossil fuels is one of the biggest contributors to greenhouse gas emissions. Therefore, it is crucial to switch to electricity-powered transportation. According to One Earth (2023), transportation significantly contributes to carbon emissions, primarily by burning fossil fuels. Ribeiro (2020) and Fallin et al. (2023) pointed out that shifting from traditional energy sources to clean energy sources in transportation can help energy conservation and management, as well as substantially reduce greenhouse gas emissions. Ribeiro (2020) further explained that the increase in electric transportation reduces carbon dioxide emissions while also increasing GDP in the long run. In addition, clean transportation leads to a reduction in air pollution by decreasing emissions of harmful pollutants, which have detrimental effects on human health (IPCC, 2011; Suman, 2021). Shah et al. (2021) also believed that clean transportation is critical in developing smart cities and smart tourism and should be viewed as the most efficient approach for attaining sustainable development.

Throughout the interview, it can be noted that BTS is aware that fossil-fuel transportation is one of the main contributors to greenhouse gas emissions and pollution. Therefore, the BTS made a conscious decision to power their train via electricity. According to Participant D (Personal Communication, March 25, 2024), the BTS is a public transportation system that runs on electricity; as a result, it produces fewer pollutants than vehicles that run on fossil fuels and has a lower carbon footprint. Furthermore, Participant D explained that BTS is the first and only rail transportation company that is carbon neutral and also leads the transportation industry regarding sustainability. Participant D further revealed that the BTS Energy Committee has accepted ISO 14001, which assists the BTS in keeping track of its greenhouse gas emissions to not exceed the guideline limits. In addition, Participant E (Personal Communication, March 25, 2024) stated that the BTS serves to minimize private car usage, which relieves traffic congestion. This, in turn, lowers greenhouse gas emissions and reduces air pollution. Participant E also mentioned the BTS's efforts to challenge itself monthly to lower building power usage and explore the use of solar cells for building electrical systems.

There is an effort worldwide to use electric vehicles to help reduce the effects of climate change. The Netherlands, Malaysia, the European Union, and China have each implemented notable initiatives in clean energy and transportation. The Netherlands stands as a pioneering model in clean transportation, boasting extensive EV charger infrastructure and a notably low reliance on fossil fuels. Through strategic investments and policies, the Netherlands has fostered a robust environment for electric mobility, facilitating widespread adoption of electric vehicles and reducing carbon emissions from transportation (Heliox, 2022). Similarly, Malaysia's 'Low Carbon Cities Framework' exemplifies a comprehensive approach to reducing carbon emissions and promoting sustainable urban transportation. By implementing initiatives aimed at enhancing public transportation infrastructure and encouraging the adoption of green vehicles, Malaysia seeks to create low-carbon urban environments conducive to sustainable living (Senin et al., 2021). The European Union's focus on promoting electric vehicles and reducing emissions from the transportation sector aligns closely with Thailand's clean energy and transportation policies. By incentivizing the adoption of electric vehicles and investing in public transportation infrastructure, the EU has made significant strides in reducing carbon emissions and combating climate change (Ribeiro, 2020). Furthermore, China's integration of energy and transportation industries underscores the importance of holistic approaches to carbon neutrality. By aligning energy and transportation policies, China aims to achieve carbon neutrality by 2060, emphasizing the role of clean energy and transportation in mitigating climate change (Teng et al., 2022).

In parallel with these global efforts, Thailand has made significant strides in transitioning to sustainable modes of transportation through initiatives like the Bangkok Mass Transit System (BTS). Operating solely on electricity, the BTS minimizes environmental impact by reducing emissions and pollution associated with

traditional fossil fuel-powered transportation. This commitment to clean mobility has positioned the BTS as a trailblazer in the transportation industry, garnering recognition as the first and only carbon-neutral rail transportation company in Thailand. The BTS Energy Committee's adoption of ISO 14001 certification underscores its dedication to monitoring and mitigating greenhouse gas emissions, aligning closely with Thailand's broader clean energy goals and policies (Participant D, Personal Communication, March 25, 2024). As Thailand aims to achieve carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065, initiatives like the BTS play a crucial role in realizing these ambitious goals. Through its support for electric vehicle adoption and the development of public transportation infrastructure, exemplified by initiatives like the BTS, Thailand stands poised to make significant contributions to global climate action.

In Thailand, the government's policies play a pivotal role in driving the transition towards clean energy and sustainable transportation. Thailand's ambition to achieve carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065 necessitates significant shifts in energy consumption and transportation. The government's proactive measures, including incentives for renewable energy adoption and the promotion of clean transportation, provide a robust framework for addressing climate change challenges. In alignment with the government's policies, the BTS serves as a key player in promoting clean and sustainable mobility. The BTS's operation on electricity and its commitment to environmental sustainability, as evidenced by initiatives like obtaining the ISO 14001 certification, resonate with Thailand's renewable energy goals (Fallin et al., 2023). By adhering to government directives and embracing clean energy initiatives, the BTS contributes directly to the reduction of carbon emissions and the mitigation of climate change impacts. Furthermore, the government's focus on energy efficiency and clean technologies finds support in the BTS's efforts to minimize its carbon footprint. The BTS's implementation of energy-saving measures and exploration of solar cells for building electrical systems are in line with the government's broader clean energy objectives (Organization for Economic Cooperation and Development, 2013). Through these collaborative efforts, the BTS actively supports the government's vision for a sustainable future by providing environmentally friendly transportation options and reducing reliance on private vehicles.

5.2 The Effects of the Clean Energy and Clean Transportation Policies on Climate Change Mitigation in Bangkok, Thailand

The adoption of clean energy and transportation policies in cities like Bangkok is critical to reducing climate change and its related effects. These policies are vital instruments in the battle against climate change. Two major effects of clean energy and transportation policies on mitigating climate change are the decrease of greenhouse gas emissions and pollution, as well as the enhancement of energy efficiency and security.

The first effect is a reduction in greenhouse gases and pollution. These policies significantly reduce pollution and greenhouse gas emissions by encouraging the use of sustainable modes of transportation and shifting away from traditional energy sources like fossil fuels (One Earth, 2023; United Nations, 2023b). To lessen dependency on fossil fuels, clean energy policies promote the transition to renewable energy sources, including solar power and bio-circular-green energy. This will lessen the release of greenhouse gases, which are a primary cause of climate change (Fallin et al., 2023; United Nations, 2023b). Additionally, since clean energy sources produce fewer pollutants than traditional energy sources, clean energy policies help reduce air pollution. In addition to enhancing Bangkok's inhabitants' quality of life, this decrease in air pollution also lessens the negative effects of climate change on public health (IPCC, 2011; Suman, 2021; United Nations, 2023b).

Furthermore, these policies cover transportation in addition to the energy sector. To mitigate climate change, clean transportation policies are crucial. They support Thailand's domestic electric vehicle (EV) industry, provide incentives for the adoption of EVs and the development of EV infrastructure, and support sustainable modes of transportation (Bardal et al., 2020; Fallin et al., 2023; One Earth, 2023). Clean mobility regulations help to lessen the city's carbon footprint and mitigate rising temperatures by lowering emissions from the transportation sector (IEA, 2023; One Earth, 2023). These policies help to enhance air quality and minimize vehicle-related pollution by putting in place measures like financial incentives, reduced road taxes, and traffic rules to encourage the use of EVs and other clean transportation modes (Bardal et al., 2020; Wang et al., 2017).

Moreover, green infrastructure initiatives are frequently incorporated into clean energy and transportation regulations, which increases their effectiveness in reducing climate change (Fallin et al., 2023; IEA, 2023). Urban places such as Bangkok can experience lower temperatures because of the cooling benefits and

shade that come with green infrastructure (Fallin et al., 2023; IEA, 2023). In addition, They also help to improve air quality and reduce air pollution (Fallin et al., 2023; IEA, 2023). For these reasons, the BMA has various policies that support having more green spaces, such as public parks and open spaces.

According to all participants, clean energy policies are essential in supporting the transition from fossil fuels to renewable energy sources across various sectors. The significance of encouraging the use of renewable energy in industries through mechanisms such as carbon markets and green taxation policies was highlighted by Participant A (Personal Communication, March 25, 2024). Furthermore, initiatives supporting alternative energy sources and architecture and industry energy efficiency have a critical role in lowering emissions and promoting sustainability (Participant C, Personal Communication, March 29, 2024).

At the same time, measures related to clean transportation are essential to reducing emissions from the transportation industry. To lower greenhouse gas emissions, Participant C (Personal Communication, March 29, 2024) emphasized the importance of promoting electric vehicles (EVs) and energy-efficient cars. Participant C further explained that a crucial tactic to promote a transition away from private vehicles is the development of effective and accessible public transportation networks. Furthermore, according to Participant C, enforcing legislation intended to lessen traffic congestion and promoting energy conservation measures help to reduce transportation-related emissions.

Through the shift from non-renewable energy sources to renewable ones and the encouragement of electric vehicles, these measures successfully lower emissions and minimize pollution. Reducing emissions related to energy production and consumption is made possible by the use of renewable energy in industries and the transportation sector (Participant A, personal communication, March 25, 2024; Participant B, personal communication, March 26, 2024). In addition, the implementation of traffic management techniques and the promotion of energy efficiency measures are factors that lead to a reduction in overall emissions (Participant C, March 25, 2024; Participant B, March 26, 2024).

The second is the enhancement of energy efficiency and security. The implementation of clean energy policies has been instrumental in driving the transition from fossil fuels to cleaner alternatives, thereby enhancing energy efficiency. These policies create economic opportunities, enhance energy security by reducing reliance on imported fossil fuels, lower pollution levels by investing in renewable energy infrastructure, and offer incentives for its use (International Renewable Energy Agency, 2017; Papathanasiou, 2022).

Moreover, the promotion of renewable energy sources facilitates greater energy access and affordability, particularly in underserved regions, therefore contributing to sustainable community development and poverty alleviation (United Nations, 2023c). Additionally, focusing on greener and more effective energy technology reduces energy waste, which raises overall energy efficiency (White, 2021).

In cities like Bangkok, energy consumption and traffic are further reduced by promoting energy-efficient modes of transportation like electric vehicles (EVs) and developing sustainable urban mobility solutions (Bardal et al., 2020; IEA, 2023). Furthermore, efforts centered around demand-response programs and smart grid infrastructure improve the efficiency of energy delivery and consumption, reducing energy waste in transportation and energy generation (Lu et al., 2020).

According to all participants, clean energy and transportation policies play a pivotal role in enhancing energy efficiency and security. Transitioning to clean energy sources and adopting cleaner transportation methods contribute to energy efficiency by reducing waste and optimizing resource utilization. For instance, Participant B (Personal Communication, March 26, 2024) stated that using modern energy management technologies and innovations can improve energy efficiency by 30%. Additionally, Clean energy technologies such as smart grids play a crucial role in enhancing energy efficiency by enabling better management and distribution of electricity. They allow for more efficient monitoring and control of energy flow, improving overall energy utilization. By incorporating advanced technologies, smart grids help integrate renewable energy sources more effectively into the grid.

As explained throughout the section, clean energy and transportation policies implemented by various countries serve as crucial instruments in mitigating climate change. The Netherlands stands out as an exemplary model in this regard, with extensive EV charger infrastructure and minimal usage of fossil fuels (Heliox, 2022). Similarly, Malaysia's "Low Carbon Cities Framework" initiative underscores the importance of sustainable transportation in reducing carbon emissions (Senin et al., 2021). Within the European Union, studies highlight the benefits of electric vehicles in curbing carbon dioxide emissions (Ribeiro, 2020). Additionally, China's ambitious

goal of achieving carbon neutrality by 2060 emphasizes the integration of energy and transportation industries (Teng et al., 2022). These international efforts collectively showcase the effectiveness of prioritizing sustainable modes of transportation and shifting away from traditional energy sources.

While Thailand might not be on the same scale as leading countries in clean transportation, has increased its efforts to transition to more sustainable modes of transportation. The growth of Thailand's domestic electric vehicle (EV) industry, currently holding more than 60% of the region's market share, showcases a commitment to reducing reliance on fossil fuels. Government incentives have been instrumental in promoting the manufacturing and usage of EVs (Fallin et al., 2023). Thailand's initiatives align with global trends in clean energy and transportation policies, emphasizing the importance of transitioning to renewable energy sources and promoting the adoption of clean transportation modes. By setting ambitious goals, implementing targeted policies, and investing in sustainable practices, Thailand is making significant strides towards achieving its climate objectives while contributing to global climate action.

Moreover, as previously highlighted, Thailand's clean transportation policies play a crucial role in mitigating climate change and reducing greenhouse gas emissions. By promoting electric vehicle adoption and investing in public transportation infrastructure, the government aims to minimize private vehicle usage and alleviate traffic congestion. These efforts are complemented by initiatives to manage traffic effectively and encourage energy conservation measures across all modes of transportation. Overall, Thailand's government-led initiatives and policies in clean energy and transportation align with international efforts to combat climate change (Fallin et al., 2023). By setting ambitious goals, implementing targeted policies, and investing in sustainable practices, Thailand is making significant progress towards achieving its climate objectives while contributing to global climate action.

6. Conclusion

The Bangkok Mass Transit System (BTS) emerges as a key player in mitigating climate change in Bangkok through its innovative use of electric-powered trains and strong commitment to sustainability. By significantly reducing greenhouse gas emissions and air pollution compared to traditional transportation methods, the BTS aligns with global climate initiatives and demonstrates the potential benefits of transitioning to clean energy in urban transit. The system's proactive measures, such as achieving carbon neutrality and implementing strict monitoring protocols, underscore its dedication to environmental protection. Moreover, the implementation of clean energy and transportation policies in Bangkok plays a vital role in enhancing public health and improving air quality, while also fostering energy security and efficiency. These policies support the adoption of renewable energy sources and promote sustainable mobility solutions, helping to alleviate traffic congestion and reduce overall carbon footprints. By reducing dependency on imported fossil fuels, these initiatives contribute to economic growth and resilience. Collectively, the BTS and the clean transportation policies it exemplifies not only support Thailand's ambitious goals for carbon neutrality by 2050 but also set a commendable standard for sustainable urban mobility on a global scale. As cities around the world grapple with climate challenges, the BTS serves as a model for integrating clean energy and transportation strategies, paving the way for a more sustainable future.

7. Recommendations

Climate change poses significant threats to the planet, impacting ecosystems and communities worldwide. Mitigation efforts are essential to reduce greenhouse gas emissions and curb the effects of climate change. This involves transitioning to clean energy sources, implementing sustainable practices in sectors such as transportation, and promoting conservation and adaptation measures. Clean energy and transportation policies are essential for effective climate change mitigation. These policies not only contribute to mitigating climate change but also foster economic growth, improve public health, and enhance energy security. Implementing comprehensive clean energy and transportation policies is vital for achieving climate goals and ensuring a sustainable future for generations to come. Therefore, the following recommendations are made to further aid in climate change mitigation.

Governments should prioritize the implementation and enforcement of clean energy and transportation policies, setting ambitious targets for renewable energy adoption and emissions reduction. Strong regulatory frameworks and incentives should be established to encourage investment in clean energy projects and the

adoption of electric vehicles. Additionally, public awareness campaigns should be launched to educate communities about the importance of these policies in mitigating climate change.

Resources for research and development in clean energy technologies and sustainable transportation systems should be allocated. Innovation and collaboration between government, academia, and the private sector should be supported as well. Furthermore, pilot projects and demonstration initiatives to test the feasibility and scalability of clean energy and transportation innovations should be invested in. In addition, international cooperation and collaboration on clean energy and transportation initiatives, including sharing knowledge, technology, and best practices to address climate change on a global scale, should also be fostered.

Local communities need to be empowered to participate in the planning, implementation, and monitoring of clean energy and transportation projects, fostering partnerships between government agencies, community organizations, and businesses. Equity and inclusivity in decision-making processes also need to be prioritized, ensuring that vulnerable and marginalized communities have a voice in shaping policies. Moreover, the social, economic, and environmental implications of interventions need to be considered, striving for equitable outcomes for all members of society.

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Art-Led Approach to Intangible Heritage Education:
Wooden Boat Craftsmanship in Ayutthaya

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Abstract

Ayutthaya, historically a vibrant port city, preserves the intangible heritage of wooden boat craftsmanship; however, this tradition faces challenges in its intergenerational transmission in the modern era. As young people's lives become increasingly disconnected from wooden boats, the education system provides limited opportunities for engagement with this heritage. In response, this research investigates approaches for integrating contemporary educational practices with heritage conservation strategies. The study employs participatory, art-led methodologies to foster awareness and cultivate youth engagement in preserving this traditional craft. Conducted with 25 upper primary students from Wat Phanan Choeng School, it involved field visits to Sri Charoen Shipyard, Phra Nakhon Si Ayutthaya's oldest and only remaining shipyard that still employs traditional techniques, along with drawing exercises and questionnaires. Findings indicate that art-led activities effectively mediated students' limited interaction with rivers and boats, fostering curiosity and enhancing appreciation for Ayutthaya's identity as a *"City of Water."* Recurring elements in their drawings included boats, water, and cultural landmarks, with Krachaeng boats prominently featured. Despite having limited prior familiarity with the shipyard, participants developed a sustained interest in wooden boat craftsmanship and envisioned their role in its future conservation. This study underscores the transformative potential of integrating creative and experiential pedagogies into heritage education, advocating for sustained academic-community partnerships to safeguard the continuity of traditional knowledge and skills.

Keywords: Intangible Heritage; Wooden Boat Craftsmanship; Ayutthaya; Art-Led Approach; Community Engagement; Heritage Education

1. Introduction

Ayutthaya, the former capital of Thailand, thrived as an international hub for maritime trade (Breazeale, 1999; Baker, & Phongpaichit, 2017; Krailassuwan, 2019; Champapant, & Momotaro, 2023). Historical records depict it as a riverine island bustling with vessels from various nations and smaller local boats. This vibrant trade fueled the city's prosperity and facilitated the integration of diverse foreign knowledge, skills, and technologies, including expertise in shipbuilding. Ayutthaya underwent a significant boom in shipbuilding. The royal shipyards were established to produce ships not only for domestic use but also for export to international markets (Boonprasert, n.d.).

Two primary types of vessels used for transoceanic travel during this period were the Sampan and the Kampan. The Sampan, predominantly employed by Chinese merchants, and the Kampan (or kapal in ancient Malay language), which originated from Arabian dhows, were initially utilized by Arab merchants and later adopted by European traders. The European Kampan was larger, better equipped, and more heavily armed than its Arabian counterpart. Consequently, European shipbuilding technologies rose to prominence among Southeast Asian states, including Ayutthaya. Advancements in technology eventually rendered Chinese sampans inadequate for oceanic navigation. Similarly, while steam engines replaced the sails of Western Kampans, these vessels were ultimately supplanted by modern giant iron-hulled ocean liners, which rendered both types of wooden ships obsolete.

Despite these changes, wooden boats continue to play a significant role in the daily lives of Thai people, particularly those residing along rivers, including the inhabitants of Phra Nakhon Si Ayutthaya Province. Although

water transportation has declined in importance, Ayutthaya continues to maintain a vital role in navigation, shipbuilding, and ship repair. Its geographic position as a water-based city and a transit hub where three rivers converge ensures its continued relevance. Many boats passing through the province are serviced and repaired at local shipyards before continuing their journeys. As a result, Ayutthaya remains a key center for shipbuilding and repair, evidenced by the numerous shipyards still operating in the region.

However, passing down the knowledge of wooden boat building and repair is increasingly challenging due to several interrelated factors. Changes in lifestyles, including a decline in waterway usage, have rendered boat travel less common. Additionally, most skilled craftsmen are elderly, while younger generations show little interest in boatbuilding due to uncompetitive wages. Exacerbating the issue, modern education does not prioritize this traditional knowledge, restricting its transmission primarily to craftsmen's families (Personal communication, January 22, 2023).

This research aims to raise youth awareness of traditional wooden boat craftsmanship, based on the belief that intangible heritage conservation must be integrated into modern education. While cultural heritage is often confined to history lessons, studies suggest that integrating heritage education with experiential, hands-on learning provides a more sustainable approach (Immonen, & Sivula, 2024). Art-based learning activities have been identified as an effective method for bridging the gap between traditional and modern education. Through art, learners can transform intangible knowledge into tangible expressions, fostering engagement in a natural and enjoyable manner (Lovtsova et al., 2021; UNESCO, 2024; Chen, 2024).

This approach aligns with growing academic interest in art-led education as a means of heritage preservation. Over the past two decades, scholarship in this field has developed at the intersection of cultural studies, education, and participatory arts. Foundational theoretical work by Eisner (2002) and Smith (2006) laid the groundwork by emphasizing the cognitive and emotional potential of the arts in learning, and by redefining heritage as a dynamic, community-based process rather than a static object. Eisner's theory of artistic cognition supports the idea that creativity enhances perception and cultural awareness, while Smith's critique of the "Authorized Heritage Discourse" opened space for inclusive, locally grounded approaches. Silverman (2010) and Chatterjee, and Hannan (2016) further advanced the field by positioning museums and object-based learning as key platforms for heritage education, where sensory experiences and emotional engagement enhance cultural understanding.

In more recent years, scholars have turned their attention to practical, community-engaged art practices that empower participants to co-create and transfer cultural knowledge, particularly for intangible heritage such as oral traditions and traditional crafts. Kind, de Cosson, Irwin, and Grauer (2007) illustrate how artist–teacher partnerships create "in-between" spaces where intergenerational learning and creative collaboration strengthen collective identity and agency. Similarly, Springgay, Irwin, and Kind (2005) present a/r/tography as a living, participatory inquiry method that integrates art-making, teaching, and research, fostering deep engagement with community knowledge. Kalay et al., (2008) extend this discourse by integrating digital media and contemporary art into heritage learning, adapting methods to evolving cultural and technological contexts. This progression from theoretical framing to participatory and digital application illustrates how art-led education has become a versatile and impactful tool for preserving both tangible and intangible heritage in the 21st century.

To explore this potential in a specific local context, the present research utilized art-led methods within an actual site of cultural heritage. Art activities were the core method used in this research. The Sri Charoen Shipyard, one of the oldest in Phra Nakhon Si Ayutthaya Province and notable for being the only one that continues to repair wooden boats using traditional techniques, generously offered its premises for the activities. The location of this shipyard also holds historical significance, as it was once the site of a Dutch village or VOC trading station during the Ayutthaya period. The target group for these activities consisted of upper primary school students from Wat Phanan Choeng School, located nearby.

The art-led approach was selected over other heritage preservation strategies because it fosters direct, emotional, and creative engagement with intangible heritage-making it especially suitable for younger learners. Unlike conventional strategies such as textual documentation, static exhibitions, or digital archiving, art-based learning transforms traditional knowledge into an active experience. As highlighted in the literature, this method supports intergenerational dialogue, nurtures cultural empathy (Eisner, 2002), and promotes agency and identity-building among participants. Conducted within a living heritage site and through hands-on interaction, the activities enabled students to connect meaningfully with traditional craftsmanship, making the knowledge both

accessible and memorable. This research, therefore, contributes to the growing body of innovative educational models that integrate traditional wisdom with creative pedagogy to ensure the sustainability of intangible cultural heritage.

2. Objectives

    1) To understand youth perceptions of Ayutthaya as a water-based city and the role of boats in their lives.
    2) To raise awareness and inspire youth participation in the conservation of wooden boat craftsmanship through art-based activities.
    3) To bridge the gap between traditional knowledge and modern education by integrating hands-on experiences with community collaboration.
    4) To explore sustainable strategies for safeguarding and passing on intangible heritage, ensuring its continuity for future generations.

3. Materials and Methods

This study adopted an action research approach to explore how art-based learning can raise youth awareness of wooden boat craftsmanship as intangible cultural heritage. The project was conducted in collaboration with the Sri Charoen Shipyard, a historic and operational shipyard in Phra Nakhon Si Ayutthaya Province, which provided a real-world environment for the learning activities. The methodology combined field immersion, artistic expression, and mixed-method analysis to capture student perceptions and engagement.

3.1 Participants

The participants consisted of 25 upper primary school students (6 males and 19 females) from Wat Phanan Choeng School, located adjacent to the Sri Charoen Shipyard. Participation in the activity was voluntary. The number of participants was limited by the physical space and safety constraints of the shipyard, which could only accommodate a small group at a time. Wat Phanan Choeng School was selected due to its immediate proximity to the site, making it an ideal first step for piloting community engagement. The researchers prioritized starting with the nearest educational institution to foster a close, sustainable relationship between the school and the shipyard as part of a long-term conservation and learning initiative. Most students had limited prior exposure to boat culture, with varying degrees of familiarity with the shipyard.

3.2 Procedures

The research was structured around a two-part experiential learning process: a hands-on field visit followed by a creative drawing activity. In the first phase, students visited the Sri Charoen Shipyard, where they observed traditional wooden boats up close and examined the details of boat construction and repair. This site-based encounter aimed to provide a sensory and spatial understanding of Ayutthaya's boatbuilding heritage. Following the visit, students participated in a drawing activity on the theme *"Ayutthaya, the City of Water and My Dream Boat."* Each student was given two hours to reflect on their experience and express their perceptions and imagination using A4 paper and colored pencils. This activity provided a tangible medium through which students could process and communicate their understanding of the site and its cultural significance.

3.3 Data Collection and Analysis

A mixed-method approach, as shown in Figure 1, was employed to assess participants' experiences and perspectives, combining qualitative and quantitative tools: drawing analysis, structured questionnaires, informal interviews, and direct observation.

Drawing analysis was used as a visual method to interpret student perceptions. Inspired by established visual research practices (Havigerová et al., 2021), the analysis identified recurring elements and themes in the drawings, such as representations of boats, water, landscape, and cultural symbols. Frequency counts and thematic categorization helped reveal how students understood and connected with Ayutthaya's identity as a river-based city.

Questionnaires were administered to evaluate students' prior familiarity with the shipyard, previous experiences with boats, and their level of interest in boat-related knowledge. The data were analyzed using descriptive statistics to highlight general trends.
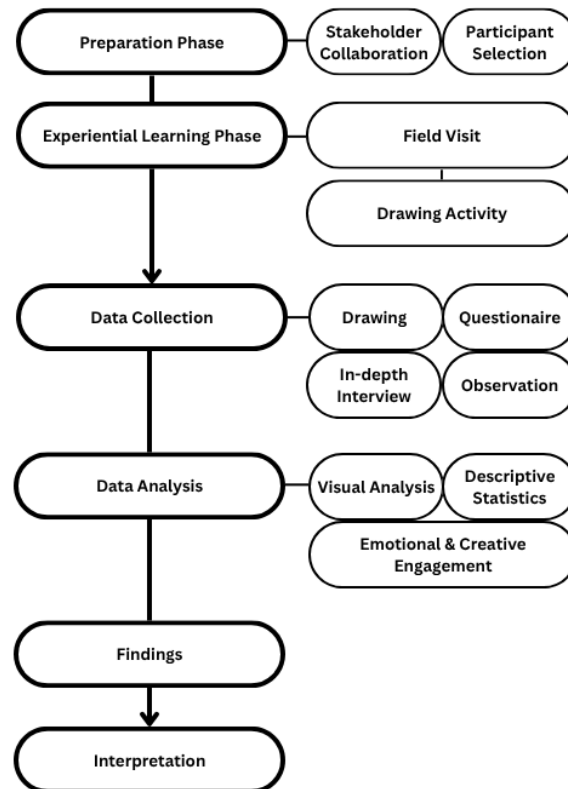
Figure 1 The research process includes a field visit and site-based art activity, followed by multi-method analysis to understand youth perceptions of intangible heritage

Informal interviews conducted during and after the activities allowed students to voice their thoughts and emotional reactions, providing narrative insights that complemented the visual and statistical findings.

Field observations were recorded through notes and photographs, documenting student engagement, curiosity, and behavior during the site visit and drawing session. These observations supported the interpretation of how the experiential setting influenced learning outcomes.

Together, these methods offered a rich, triangulated perspective on how art-led activities can support heritage awareness and intergenerational cultural understanding among youth.

4. Results

By examining the 25 drawings and coding them, six categories of elements were identified: boats, water, sky, community, people, and way of life, as shown in Table 1. A total of 92% of the drawings featured wooden boats floating on water, more than half of which resembled Krachaeng boats (traditional covered boats), most of which are found in the Sri Charoen Shipyard. Further analysis of the boat details revealed that 24% of the drawings included lifebuoys, and 80% showed a relationship between boats and waves, both small and large, in the river.

When analyzing the relationships between the boats and their context, it was found that five drawings depicted only the relationship between the boats and water (see Figure 2). These included both close-up and distant perspectives, most often portraying boats on calm waters viewed from afar, with orange-yellow skies resembling an evening atmosphere. Only one drawing depicted a boat rocking amid large waves in a close-up perspective.

Nineteen drawings illustrated the relationship between boats, water, and structures that reflect Ayutthaya's identity (see Figure 3). These were divided into four groups:

1) Group 1: Depictions of boats, rivers, and structures such as stupas and houses, in which the boats appeared as speedboats or sailing boats

2) Group 2: Depictions of boats, rivers, and structures such as stupas, houses, and piers, in which the boats resembled Krachaeng boats, the most common type found in the Sri Charoen Shipyard

3) Group 3: Depictions of boats, rivers, and structures such as stupas, incorporating everyday activities like boat noodles or fish feeding as part of the scenes

4) Group 4: Depictions of boats, rivers, and structures such as stupas and temples, incorporating imaginative elements such as boats with balloons or pirate ships

Only one drawing depicted the student herself standing on a boat with her siblings, while the majority of the drawings do not show anyone standing on the boat.

When considering the results of the questionnaire data, which included five preliminary questions about the Sri Charoen Shipyard and the importance of rivers and boats in the youths' perception, as shown in Table 2, the study found that 80 percent of the participants were not familiar with the Sri Charoen Shipyard, and 72 percent had never visited the area. Those who had visited the area did so on foot, mainly to the Dutch House Museum, located next door. Regarding the question about seeing a large boat up close, 44 percent of participants said they had seen one. However, when asked if they had ever been on a boat, only two people (8 percent) reported having this experience. The final question about the participants' interest in learning about boat building or repair revealed that 84 percent were interested, aligning with the 88 percent who felt that rivers and boats remained important to their lives.

Table 1 Categorization of visual elements

Category	Subcategory	Description	Frequency	Percent
Boats	Types	Wooden boat	23	92
		Steel boat	1	4
		Speedboat	1	4
	Location of boats	On dry dock	1	4
		Floating in the water	24	96
	Boat equipment	Canopy/sunshade	13	52
		Steering wheel	2	8
		Lifebuoy	6	24
		Thai flag	3	12
	Decoration	Fish	1	4
	Imaginary	Boat with wings	1	4
		Balloon boat	1	4
		Pirate ship (influenced by popular Japanese anime, One Piece)	1	4
Water	Waves	Still water	4	16
		Water with slight waves	13	52
		Water with strong waves	7	28
	Fish	Fish swimming in the water	4	16
Sky	Colors	Blue tone	13	52
		Orange tone	7	28
	Components	Sun	13	52
		Clouds	10	40
		Bird	4	16
Community	Structures	Temple	2	8
		Stupa	18	72
		House	5	20
		Pier	1	4
People	Roles	The participants themselves	1	4
		Boat driver	1	4
		Navy sailor	1	4
		Pirate	1	4
Way of life	Activities	Fish feeding	1	4
		Boat noodle	2	8

Table 2 Questionnaire Responses

Question	Answer	Percent
Know the Sri Charoen Shipyard	Yes	20
	No	80
Have been to the Sri Charoen Shipyard	Yes	28
	No	72
Have seen a large boat up close before	Yes	44
	No	54
Interested in learning about boats, boatbuilding, or repair	Yes	84
	No	16
Consider rivers and boats important to themselves and their families	Yes	88
	No	12

Figure 2 Drawings depicting only the relationship between boats and the river

Figure 3 Drawings illustrating the relationship between boats, water, and structures that reflect Ayutthaya's identity

5. Discussion
5.1 Limited Interaction with Cultural Heritage

The drawings of 25 participants revealed six recurring elements: boats, water, sky, community, people, and way of life. These elements reflected the participants' perceptions and understanding of Ayutthaya's sense of place. Ayutthaya's identity was prominently represented by golden or brown stupas, which appeared in more than 18 drawings, while riverside houses were depicted in only five. This pattern suggests that the participants perceive Ayutthaya as a "City of Water" rooted more in its historical context than in the present day. Stupas symbolize Ayutthaya's past, whereas houses represent its modern identity.

Figure 4 shows the only drawing in which the participant depicted herself alongside siblings, while the majority of drawings did not include any figures standing on the boats. When cross-referencing with data from questionnaires and informal interviews, the researchers concluded that the participants' daily lives are relatively disconnected from rivers and boats. Although some students had seen boats passing along the river, only two out of 25 participants had ever ridden a boat as their families' occupations were not related to boats.

Regarding the types of boats depicted, half of the participants illustrated wooden boats resembling Krachaeng boats, consistent in form, style, and details. This likely resulted from their field trip to the Sri Charoen Shipyard, where they observed a variety of Krachaeng boats. Interestingly, lifebuoys appeared in 24% of the drawings, making them the second most frequently depicted element. This detail suggests a focus on safety, likely influenced by modern educational efforts that emphasize lifebuoys as essential for safe boat travel.

Another noteworthy observation was the inclusion of daily activities such as boat noodles and fish feeding, which connected the participants' experiences to the riverine and boat context. These activities highlight the influence of direct experiences on the participants' memory formation and their potential future appreciation of such elements. Conversely, the absence of personal engagement or indirect exposure to rivers and boats in daily life could limit young people's ability to recognize their significance or diminish their motivation to engage in cultural heritage preservation in the future.

Figure 4 The only drawing depicting the participant herself on the boat

5.2 Enhancing Community Engagement Through Educational Activities

While the drawings served as tools to reflect participants' integrated understanding of Ayutthaya's urban context and the boat-related knowledge gained from the short field trip, the questionnaires and informal interviews provided insights into community engagement in cultural heritage conservation.

Data from the questionnaires revealed that more than half of the students attending a school adjacent to the Sri Charoen Shipyard had no prior knowledge of its existence. Over 70% had never entered the shipyard and were unaware of its educational value despite its proximity. This indicates a lack of existing community engagement and collaboration.

However, the organized activity bridged this gap. Students were given the opportunity to closely observe and study the boats, even for a short period, which provided them with a basic understanding of the boats' physical characteristics, as reflected in their drawings. Importantly, this activity inspired students to pursue further learning about boat construction processes. This curiosity extended to scientific questions, such as, "*How do boats float?*"

These findings strengthen the researchers' confidence in the potential of integrating modern educational approaches both artistic and scientific to support the preservation of intangible cultural heritage in tangible ways. Art activities in the early stages serve as more effective tools for raising awareness and inspiring young people, particularly late primary school children, as they encourage the use of imagination to initiate learning and ask concrete questions to deepen their understanding.

5.3 Challenges and Pathways in Integrating Modern Education for Intangible Heritage Conservation

The conservation of intangible cultural heritage requires tangible support from modern education systems and collaboration across various sectors. Establishing a network of cooperation is, therefore, the first crucial step emphasized by this research project. Encouragingly, the project has successfully acted as a mediator, fostering collaboration between the shipyard and the school to take this important initial step. However, this effort is only the beginning. While art-based activities can raise awareness and inspire engagement, their impact may fade over time if not reinforced by sustained initiatives and deeper involvement.

Thus, although art-based activities serve as a valuable and engaging approach to safeguarding intangible heritage, they should be integrated into a broader and more comprehensive strategy. To ensure their long-term sustainability, these initiatives must be supplemented with ongoing education, hands-on learning opportunities, and stronger engagement with elder practitioners. This will provide students with a more holistic understanding of traditional practices and promote lasting cultural conservation.

The Thai National Strategy 2018–2037, particularly its focus on the development and strengthening of human resources during the school age, recognizes that poverty often leads to educational inequality (National Strategy Secretariat Office, 2018). To address this, a new educational management approach emphasizes community participation, encouraging local communities and all sectors of society to engage in education. One strategy for tackling limited access to education due to financial constraints is to promote career-oriented learning, allowing students to develop vocational skills while studying. This helps generate additional income, eases family burdens, and prepares students for future employment.

Currently, many lower secondary schools are increasingly interested in incorporating vocational skills courses, driven by the need to equip students with practical competencies. This has led to the introduction of elective subjects under career and technology learning groups, as well as the establishment of student clubs dedicated to vocational training. Some schools have successfully expanded these initiatives into specialized courses, officially certified by relevant government organizations.

Building on this trend, integrating cultural heritage learning into vocational skills education presents a promising pathway for sustainable heritage conservation. By embedding intangible cultural heritage within modern education systems, heritage preservation can become a dynamic, living practice rather than a relic of the past. This approach ensures that cultural traditions remain relevant in contemporary society, fostering both economic opportunities and cultural continuity for future generations.

While integration into formal education is essential for long-term impact, the versatility of the art-led model also makes it suitable for diverse learning environments and age groups. To test this adaptability, a follow-up activity was conducted with university students and local artists.

5.4 Scalability and Adaptation of the Art-Led Model

The success of the workshop with primary school students at the Sri Charoen Shipyard highlights the potential of art-led, site-based education to foster meaningful engagement with intangible heritage. To assess the model's adaptability and broader application, a follow-up workshop was conducted with university students and local artists. While the target demographic differed, the core objective remained the same: to raise awareness of traditional wooden boat craftsmanship and stimulate intergenerational interest in heritage preservation.

This second activity demonstrated that the art-led model is highly scalable. University students, already equipped with more advanced critical thinking and creative skills, were able to explore deeper interpretations of cultural significance and historical identity through collaborative artworks and reflective dialogue. Artists, on the other hand, brought their own interpretive frameworks and mediums, further diversifying how heritage could be expressed and communicated to the public.

The structure of the model combining field immersion, artistic interpretation, and reflective discussion proved both flexible and effective across age groups and educational backgrounds. This suggests strong potential for replication with other forms of intangible cultural heritage, such as traditional music, culinary practices, festivals, or oral storytelling. Key to the model's adaptability is its emphasis on creative, learner-centered experiences rooted in real-world settings. By allowing participants to interact with cultural spaces, artifacts, or practitioners, and then translate those experiences into creative outputs, the model supports both cognitive and emotional engagement with heritage.

As cultural heritage conservation increasingly calls for bottom-up, participatory approaches, this model offers a practical, low-cost, and emotionally resonant strategy for diverse educational and community contexts. Future applications may benefit from partnering with institutions such as universities, art schools, museums, or local cultural groups to tailor the model for different themes, regions, or age levels.

6. Conclusion

The study explored the perceptions of 25 participants regarding Ayutthaya's identity as a "city of water" and the cultural significance of boats through their drawings, questionnaires, and informal interviews. The drawings revealed six recurring themes: boats, water, sky, community, people, and way of life. Ayutthaya's historical identity was represented through depictions of stupas, while riverside houses were less frequently shown, suggesting that participants associated the image of the water-based city with its historical past rather than with its present-day reality. The drawings highlighted a strong connection to traditional wooden boats, especially Krachaeng boats, and included symbols like lifebuoys, indicating concerns about safety. Some depictions also incorporated activities such as boat noodles and fish feeding, linking the drawings to the participants' experiences.

However, the findings from the questionnaires and interviews indicated that many participants had limited exposure to boats and the local heritage. Most were unaware of the Sri Charoen Shipyard's existence or significance, and over 70% had never visited it, reflecting a lack of community engagement with nearby cultural heritage sites. Despite this, the field activity allowed students to closely observe and learn about the boats, sparking curiosity and a desire to explore boat construction and scientific questions like, "*How do boats float?*"

These insights highlight the potential of integrating both artistic and scientific educational approaches to preserve intangible cultural heritage. While the drawings and activities effectively raised awareness, sustained engagement, and hands-on learning are crucial for fostering a deeper understanding and long-term cultural preservation.

Future research directions stemming from this study can be categorized into three areas:

1) Expanding Stakeholder Engagement: Broaden participation to include groups such as secondary and tertiary students, local communities, boat-building and repair entrepreneurs, and businesses utilizing boats. This approach aims to foster collaboration and opportunities for diverse populations to actively contribute to the preservation and transmission of cultural heritage.

2) Long-Term Monitoring and Evaluation: Track outcomes and gather long-term feedback on the integration of modern education and intangible cultural heritage education.

3) Application of Findings in Environmental Design: Apply research findings to inform the design of physical environments that support and enhance learning experiences related to cultural heritage conservation.

7. Acknowledgements

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Research on the Inheritance and Dissemination of Hakka Culture in the Digital Age: A Case Study of Fujian's Shen Yuan Tulou

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Abstract

This study explores the inheritance and dissemination of Hakka culture in the context of the digital era, taking Fujian Shen Yuan Tulou as a case study. The study analyses the philosophical connotation of Hakka culture, especially the influence of Taoism's 'unity of heaven and mankind' and Confucianism's 'people-oriented' concepts on Tulou culture. Through the literature review, the historical origins, architectural features of Hakka culture, and its application in digital preservation are examined. A digital design scheme using 3D modelling, virtual reality (VR) and augmented reality (AR) technologies is proposed, aiming to provide an immersive experience for tourists and enhance the interest of the younger generation in Hakka culture. The results of the study show that digital technology can effectively promote the global dissemination and preservation of Hakka culture and provide a new path for the sustainable development of traditional culture. This paper innovatively combines the philosophical nature of Hakka culture with modern digital technology, which is of great significance to the inheritance of Hakka Tulou culture and provides a reference for the digital inheritance of traditional culture in other regions.

Keywords: Hakka Culture; Digital Heritage; Fujian Tulou; Philosophy

1. Introduction
1.1 Research Background

Hakka clan culture is an important part of traditional Chinese culture, with a deep historical heritage and unique regional characteristics. Tulou, as an important manifestation of Hakka culture, are mainly located in the southeastern provinces of Fujian, Jiangxi and Guangdong, and are a kind of residential architecture that combines the functions of residence and defense (Figure 1). Most of these earth buildings were built by the Hakka people in Fujian, and are therefore also known as 'Hakka Earth Buildings'. With their long history, rich humanistic connotations and unique modelling features, they are regarded as the 'jewels of Fujian's residential buildings'.

Figure 1 Distribution Map for Tulou in China

The people of the Central Plains who migrated southward to escape the war brought the advanced culture of the Central Plains to Fujian and integrated with the local aborigines, gradually forming a native architectural style that reflects the Confucian ideal of living in the heart of a large family and includes a defensive function. Tulou are structured in a variety of ways, and the design of the internal space takes into account the factor of livability, reflecting the harmony between human beings and nature. The development of digital technology has provided new ways for the protection and dissemination of cultural heritage, such as the digital display project of the Forbidden City. However, existing studies have insufficiently explored the combination of Hakka clan culture and digital technology, especially at the philosophical level.

1.2 Research Significance

The significance of this study lies in exploring how to effectively inherit and disseminate Hakka clan culture in the digital age, particularly its philosophical ideas. By analyzing the philosophical connotations of Hakka culture and the application of digital technology, this study aims to provide new perspectives and methods for the protection and dissemination of traditional culture. This is crucial for engaging the younger generation in Hakka culture and for promoting and preserving this unique cultural heritage globally. Additionally, this study will offer valuable references for the digital inheritance of traditional culture in other regions.

1.3 Literature Review

1.3.1 Hakka Culture and Traditional Folk Houses

In the 1980s, Japanese scholar Shizuo Asakawa initiated the study of traditional folk dwellings from a genealogical perspective by classifying building types based on dialects. Academician Changqing inherited and developed this viewpoint, proposing the method of dividing the genealogy of terroir architecture based on the dialects of ethnic and folk families, and examining the five matrix features: village morphology, plan form, building materials, building structure, and building decoration (Chang, 2016). Zhiyao categorised the architectural genealogy using the dialect as a clue (Zhiyao, 2014). Yizhi clarified the subordination of the terroir system in Fujian region and explored the matrix characteristics of the terroir architectural genealogy in the core area of the Min system (Yizhi, 2019).

Huang Hanmin's 1988 Examination of Round Buildings in Fujian shows more comprehensively the apparent evolution of round buildings in Zhangzhou from castles to castles to round buildings (HanMin, 1988). In 2012, he published a book entitled Fujian Tulou Architecture, in which he argued that 'Tulou' originated from the coastal area of Zhangzhou from the perspective of both historical data and existing cultural relics, thus creating a new understanding of the formation of Tulou (HanMin, & Limu, 2012). More recent scholars have used new technologies to produce data combining dwellings and villages with cultural geography, arguing that there is no inevitable relationship between the three places in terms of transmission and origin. *Translated with DeepL.com (free version)*

1.3.2 The Application of Digital Technology in the Conservation and Dissemination of Hakka Traditional Houses

Under the background of information technology and intelligence, the protection and development of traditional houses face new requirements and the research horizon needs to be expanded. The application of digital technology in the protection and dissemination of cultural heritage is becoming increasingly widespread. At present, the domestic digital protection projects for tangible cultural heritage have made some achievements that have attracted global attention. For example, the 'Digital Dunhuang' project of the State Key Laboratory of CAD & CG of Zhejiang University. As can be seen in the digital conservation cases of the Jingjiang King's Tomb mausoleum site and the Yungang Grottoes, digital technology has formed a relatively perfect system (Wang, 2019). The digital technology for ancient architectural sites and collections of cultural relics has further visualised information and established information system, which is conducive to the all-round management of the specifics of ancient architecture (Ran Kongkong, 2021). Through the establishment of three-dimensional virtual technology models, the information management of cultural relics buildings has been realised, which further promotes the maintenance of cultural relics buildings. Three-dimensional virtual technology has more advantages in protecting ancient buildings compared with the traditional methods.

The medium on which Tulou culture depends has shifted from architectural forms to digital media, reaching a wider audience and realising a shift towards 'spatial bias' (WeiJian, & Jun, 2023). Cases of digital

design applications in Tulou include the 'Hakka Tulou Trilogy', which showcases the cultural elements of Tulou, i.e., the symphonic music 'Echoes of Tulou', the large-scale original song and dance drama 'Tulou Charm', the opera 'Tulou', the animated film 'Big Fish - Begonia' and other Tulou cultural derivatives. However, the problems of insufficient excavation of the cultural connotation of Tulou and insufficient integration of communication resources (WeiJian, & Jun, 2023) still remain.

1.3.3 Global Applications of Virtual Reality (VR) / Augmented Reality (AR) in Cultural Heritage Preservation

In recent years, virtual reality (VR) and augmented reality (AR) technologies have been widely applied in the field of cultural heritage preservation globally. For instance, Pompeii in Italy has utilized VR technology to recreate the ancient city's prosperity, allowing visitors to immerse themselves in the charm of ancient civilizations. The Sydney Opera House in Australia employs AR technology to provide visitors with detailed information about the internal structure and historical background of the building, enhancing the visitor experience. These projects not only demonstrate the potential of digital technology in cultural heritage preservation but also offer valuable references for this study.

2. Objectives

The primary objective of this study is to conduct an in-depth analysis of the philosophical connotations of Hakka culture, explore the application mechanisms of digital technology in the inheritance of Hakka clan culture, and propose feasible digital design solutions. The specific objectives include:

1) Analyzing the philosophical connotations of Hakka culture, especially the impact of Taoist "unity of heaven and mankind" and Confucian "people-oriented" concepts on Tulou culture.
2) Investigating the application mechanisms of digital technology in the inheritance of Hakka clan culture, with a focus on virtual reality (VR) and augmented reality (AR) technologies.
3) Developing specific digital design solutions, including 3D modeling, VR, and AR technologies, to enhance tourists' cultural experiences and the interest of the younger generation in Hakka culture.
4) Evaluating the effectiveness of the proposed digital design solutions, including user feedback and technical performance assessments.

3. Materials and Methods
3.1 Extraction of Hakka Cultural Elements from Shen Yuan Tulou
3.1.1 Historical and Cultural Background: The Manifestation of Clan Culture in the Spatial Layout and Ritual Activities of Shen Yuan Tulou
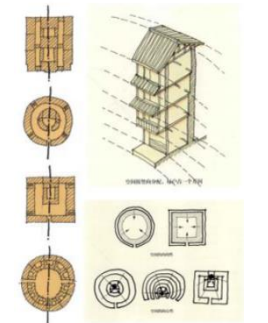
ShenYuan Tulou, as the case study object of this paper, is located in Jintou, Guzhu Village, Guzhu Township, and is a typical Hakka inner-passageway-type round earth building. With a diameter of 81 metres, it is the largest earth building in the current measurement data, with four concentric circles. The outer circle is four storeys high, with 54 openings. It was once inhabited by more than 90 households and 500 people. Its architectural form, humanistic connotation, preservation, and development are representative of research. Hakka people pay attention to the harmonious coexistence with nature, Taoism's 'unity of heaven and man' (Table 1) thought is reflected in Hakka culture, especially obvious in the site selection and architectural layout of the ShenYuan Tulou. The Tulou buildings are built alongside the mountains and the water, and are skilfully integrated into the natural environment. It has formed a unique landscape interdependence with the surrounding mountains and water systems, which has formed a unique philosophical connotation.

The Confucian concept of 'people-oriented' (Table 2) permeates all aspects of Hakka society, emphasising family unity and harmony, which is fully reflected in the form of Tulou settlement and clan cultural activities. The broad central floor of ShenYuan Tulou, which has been in existence for more than a hundred years, is the main venue for the residents' red and white ceremonies as well as living and leisure activities. The internal spatial layout has the ancestral hall as the core (Figure 2), followed by the ancestral hall, the perimeter corridors, and the outermost ring for the clan members to reside in. Emphasis is placed on close ties and mutual support among family members, reflecting the importance placed on family and social order in Confucian culture. This custom of gathering clans and living together fully reflects the strong family ethical system of the Hakka people, as well as their identification with the traditional culture of the Central Plains.

Table 1 Taoist Philosophy in Tulou Culture

Traditional Philosophy	Philosophical Thought	Specific Manifestation	Photos
Taoism	Harmony with Nature	Layout adapted to the functional and ecological requirements of housing	
	Sublimation from "Objective" to "Situation" to "Context"	Tulou settlements along the mountains and rivers are staggered and echoed as a landscape.	

Table 2 Confucian Philosophy in Tulou Culture

Traditional Philosophy	Philosophical Thought	Specific Manifestation	Photos
Confucianism	Family Ethics	The Human Ecology of Clustering: Single-Storey Clustering of Large Families	
	Doctrine of the Mean	Symmetrical layout: a central axis running through the gate and the ancestral hall, left-right symmetry	
		Equal distribution system: Vertical allocation, with essentially the same number, size and orientation of rooms, without hierarchical distinction	
		The encircling core layout of "dots and lines" symbolises the unity of the clan.	
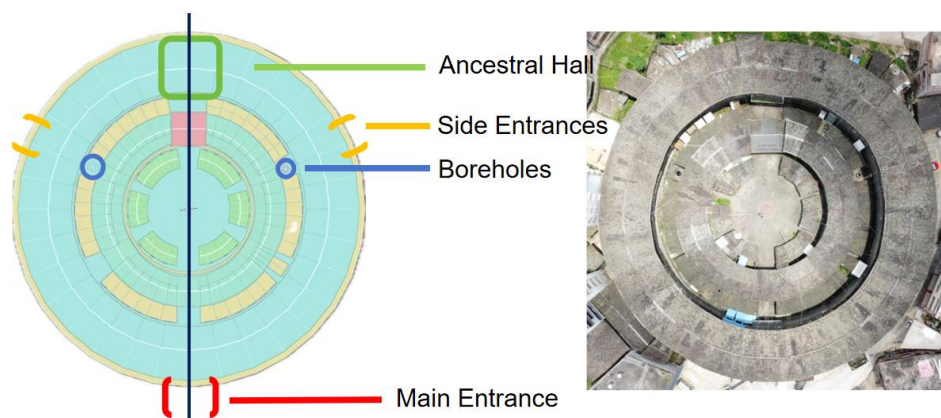
Figure 2 Layout of Shen Yuan Tulou

3.1.2 Cultural Value: The Role of Shen Yuan Tulou in Strengthening Clan Cohesion and Cultural Identity

Genealogy, as an important carrier of Hakka culture, records the harmonious history of the Hakka folk lineage. The Hakka people pay special attention to the genealogy of their own lineage, which is the most prominent cultural feature of the Hakka folklore. For example, the Sioux family, which lives in a remote earthen building, also has a complete genealogy of its family (Figure 3). Among them, the Su family rules (Figure 4), which are an important part of the family culture, embody the Hakka people's moral concepts and code of conduct. The family rules cover filial piety to parents, respect for elders, solidarity with brothers, and diligence and thrift, and are an important basis for Hakka family education and inheritance. The most distinctive feature in the Su family tree is the Su family song (Figure 5), which, with its unique melody and lyrics, carries on the cultural memory and family spirit of the Su family. The lyrics not only express admiration for ancestors, but also reflect the desire for family unity and harmonious life. The family songs are sung at family gatherings and important festivals, enhancing the cohesion and sense of identity among family members.

Figure 3 Genealogy of the Su family
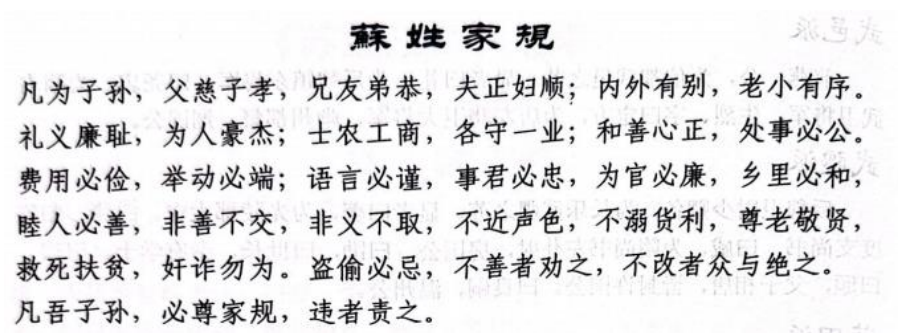
Figure 4 Su family rules
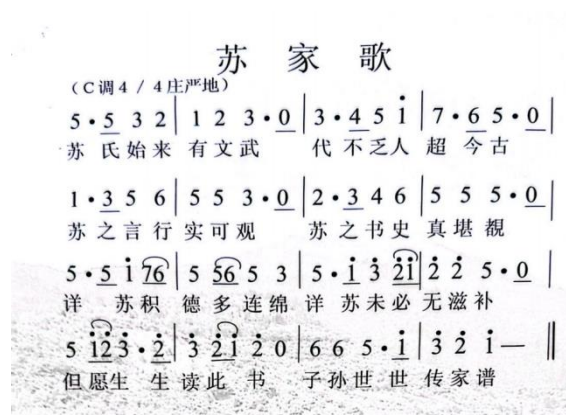
Figure 5 Su family song

Data collection is the initial stage of the research, while the screening, integration, organization, and analysis of data constitute the core of the research. To validate the model's effectiveness, various mathematical analysis methods are employed to process the data. Conducting field surveys in the local area involves analyzing the surrounding environment of Shen Yuan Tulou, interviewing residents, and examining historical genealogies. A survey was designed to assess Fujian Tulou residents' understanding of Tulou culture, satisfaction with living conditions, acceptance of preservation technologies, and attitudes towards development.

A total of 70 valid responses were collected. Using cross-analysis based on "age" (Table 3) and "length of residence" (Table 4), the survey identified differences and commonalities in participants' involvement in Tulou preservation, living satisfaction, and attitudes towards new technology applications. The findings indicate that residents with longer tenures are more likely to engage in preservation efforts. Living condition satisfaction is influenced by multiple factors, not solely residence duration. New technologies, as a means of preservation and display, are widely accepted and supported by residents, offering new possibilities for Tulou protection. These insights provide crucial references for formulating effective Tulou protection policies, improving living conditions, and promoting new technology adoption.

3.1.3 Current Status of Inheritance: The Weakening of Clan Culture in Modern Society and Challenges
Table 3 Cross-Analysis Results Chart – Age

Question	Answers	Age					Sum
		Under 18	18-30	31-45	46-60	60 0r more	
Will you participate in the preservation and maintenance of Shen Yuan Lou?	No	0(0%)	10(76.923%)	2(15.38%)	0(0%)	1(7.692%)	13
	Yes	1(1.754%)	23(40.351%)	20(35.088%)	12(21.053%)	1(1.754%)	57
Sum		1	33	22	12	2	70
Do your current living condition (e.g., space, facilities) meet your daily needs?	Very satisfied	0(0%)	13(65%)	5(25%)	2(10%)	0(0%)	20
	Basically satisfied	1(4%)	8(32%)	5(25%)	2(10%)	1(4%)	25
	Dissatisfied	0(0%)	4(66.667%)	2(33.333%)	0(0%)	0(0%)	5
	Very dissatisfied	0(0%)	8(42.105%)	5(26.316%)	5(26.316%)	1(5.263%)	19
Sum		1	33	22	12	2	70
Are you open to the use of new technologies (such as digital tools: VR/AR, etc.) for the preservation and presentation of the Tulou?	No	0(0%)	7(77.778%)	1(11.111%)	1(11.111%)	0(0%)	9
	Yes	1(1.639%)	26(42.623%)	21(24.426%)	11(18.033%)	2(3.279%)	61
Sum		1	33	22	12	2	70

Table 4 Cross-Analysis Results Chart - Duration of Residence

Question	Answers	Duration of Residence				Sum
		Less than 1 year	1-5 years	5-10 years	More than 10 years	
Will you participate in the preservation and maintenance of Shen Yuan Lou?	No	3(23.077%)	5(38.462%)	2(15.385%)	3(23.077%)	13
	Yes	6(10.526%)	18(31.579%)	9(15.789%)	24(42.105%)	57
Sum		9	23	11	27	70
Do your current living condition (e.g., space, facilities) meet your daily needs?	Very satisfied	4(20%)	6(30%)	6(30%)	4(20%)	20
	Basically satisfied	2(8%)	8(32%)	2(8%)	13(52%)	25
	Dissatisfied	1(16.667%)	4(66.667%)	0(0%)	1(16.667%)	6
	Very dissatisfied	2(10.526%)	5(26.316%)	3(15.789%)	9(47.368%)	19
Sum		9	23	11	27	70
Are you open to the use of new technologies (such as digital tools: VR/AR, etc.) for the preservation and presentation of the Tulou?	No	3(33.333%)	4(44.444%)	0(0%)	2(22.222%)	9
	Yes	6(9.836%)	19(31.148%)	11(18.033%)	25(40.984%)	61
Sum		9	23	11	27	70

3.2 Digital Design Concepts

In the digital display process, greater emphasis is placed on the embodiment of cultural connotations. Virtual reality (VR) technology offers users an immersive experience, such as virtually walking into the interior of Tulou to observe architectural details and participate in cultural activities. Augmented reality (AR) technology superimposes virtual information onto the real world to enhance cognition and interaction, such as visiting Tulou to learn about the history and cultural stories through AR devices. Digital narrative technology makes cultural information vivid, interesting, and easy to disseminate, such as the production of Tulou cultural documentaries to showcase the construction process and cultural inheritance, and to enhance audience interest and sense of identity. The digital shift in cultural communication focuses on digital technology to change the mode and path of communication and to achieve inter-temporal communication through digital platforms to expand influence. These theories provide a basis for the study and guide how to combine Hakka cultural elements with digital technology to design effective communication programmes.

After referring to numerous cases, the plan is to design and develop an interactive tour system, using VR technology to develop a virtual ShenYuan Tulou roaming project, where visitors can explore every corner of ShenYuan Tulou in virtual space and learn about its history and cultural background. The tour interactive point design (Figure 6) is based on the tour sequence of each floor and introduces the function of each space through short stories, which are extracted through pre-interviews and questionnaires.

Through digital narrative technology, philosophical stories embedded in Hakka culture, such as the history of the southward migration of Hakka ancestors and the construction process of the Tulou, can be told so that users can understand the philosophical ideas behind the cultural stories. In addition, the digital platform can also be used to carry out online cultural exchange activities, such as Hakka cultural forums and virtual exhibitions, to promote exchanges and collisions between different cultures and further disseminate and promote the philosophical connotations of Hakka culture.
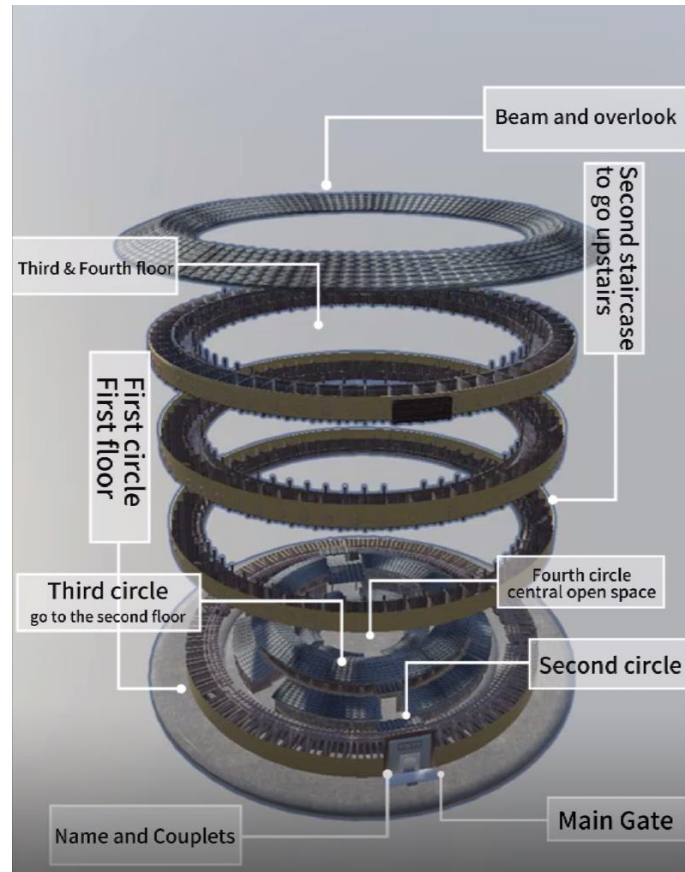
Figure 6 Tour Interaction Point Planning and Design

3.3 Integration of Digital Technology and Philosophical Nature of Hakka Culture

In the context of digital transformation, the digital preservation of traditional villages is of great significance. By employing technologies such as 3D scanning, digital modeling, and virtual reality (VR), it is possible to digitally document and reproduce the architecture of traditional Hakka villages like Luodai Old Street, thereby providing a scientific basis for their protection and offering immersive tourism experiences for visitors. With the development and popularization of digital tourism platforms, the use of high-tech means for cultural and tourism projects has become a trend.

The integration of digital technology and the philosophical nature of Hakka culture can be explored at multiple levels. First, in the experiences of virtual reality and augmented reality, philosophical ideas of Hakka culture can be incorporated, allowing users to feel the concepts of "unity of heaven and man" and "people-oriented" during their experience. For example, in the virtual Tulou environment, natural landscape changes such as the transition of seasons and weather events can be simulated, enabling users to experience the harmony between humans and nature.

Second, through digital narrative technology, philosophical stories embedded in Hakka culture, such as the history of the southward migration of Hakka ancestors and the construction process of the Tulou, can be told. This allows users to understand the philosophical ideas behind the cultural stories while learning about the history of Hakka culture.

Additionally, digital platforms can be utilized to conduct online cultural exchange activities, such as Hakka cultural forums and virtual exhibitions, to promote exchanges and collisions between different cultures, and further disseminate and promote the philosophical connotations of Hakka culture.

Figure 7 Interactive display conceptual diagram

4. Results

Preliminary Data Collection: Through data collection and literature review, the architectural form and artistic style of Shen Yuan Tulou were analyzed and determined.

Resident Interviews and Questionnaire Surveys: Data were collected through interviews and questionnaires with residents of Shen Yuan Tulou and then organized and summarized. (This includes user feedback and technical performance assessments to enhance the practical relevance of the study).

Data Acquisition: Based on the data of the facade and surrounding environment of Shen Yuan Tulou captured by drones, a 3D model of the building was completed, meticulously restoring the architectural structure, historical traces, and material details of the Tulou.

Model Processing: The model was imported into the Unreal 4 engine for light, material, and volume processing to achieve a visually realistic restoration and showcase the historical sense of the ancient architecture of Shen Yuan Tulou. (In terms of modeling technology, we employed high-precision 3D scanning techniques combined with professional modeling software to accurately restore the architectural structure and details of Shen Yuan Tulou. Through these technical means, we ensured a high-quality presentation of the digital model in terms of visual effects and historical accuracy).

Interactive Guided Tour System Development: Using VR technology, a virtual Shen Yuan Tulou roaming project was developed, allowing visitors to explore every corner of Shen Yuan Tulou in virtual space and learn about its history and cultural background. (Unity 3D was chosen as the development platform, leveraging its powerful graphics rendering capabilities and cross-platform support to effectively implement virtual reality (VR) and augmented reality (AR) functions).

Display and Interaction: Shen Yuan Tulou was transformed into a living museum, with a digital display platform set up at the entrance to replace the original introduction plaque. Additional screens were installed to support scanning and on-site tours, reducing the reliance on human and material resources such as tour guides without affecting the lives of the Tulou residents.

5. Discussion

In exploring the application of digital technology in the transmission and preservation of Hakka culture, there are still many practical challenges and problems to be solved. Further exploration of potential issues in the digitalization process, such as technological limitations and cultural misunderstandings, and comparison with other global digital heritage projects, are necessary to highlight the strengths and weaknesses of this study. At the same time, a more detailed description of how to ensure historical accuracy in digital modeling is provided. During the digital modeling process, we strictly followed historical data and archaeological research results to ensure that every detail of the model conformed to historical facts. In addition, comparisons with other global digital heritage projects revealed that this study is innovative in terms of technological application and cultural presentation, but there are also some shortcomings, such as the need for further in-depth exploration of cultural connotations.

The development of virtual clan cultural activity scenarios requires us to delve into and accurately restore the details of Hakka culture to enhance user participation and cultural experience. The development of digital experience tours, with the help of AR and VR technologies, is expected to enhance the attractiveness of tourism and the effect of cultural inheritance. However, in practical applications, the stability and compatibility of the technology, the optimization of user experience design, and the application of big data analytics in the optimization of tourism products all need to consider user privacy protection and data security. At the same time, simplifying the process of obtaining tourist information and improving the accuracy and timeliness of information are also urgent issues to be addressed.

Meanwhile, it is also necessary to establish a digital heritage education mechanism. Recording traditional handicrafts and folklore activities and conducting online education are effective ways to attract young people to participate in cultural heritage. However, ensuring the quality and attractiveness of educational content, assessing educational effectiveness, and establishing and maintaining a smart management system all require professional technical support. Enhancing the digital skills of relevant personnel, strengthening cooperation with universities and research institutes, and introducing professional talents and advanced technologies are crucial for the effective operation of the mechanism. In addition, how to use digital means to protect intangible cultural heritage and prevent cultural distortion and over-commercialization is also a problem that we must pay attention to.

6. Conclusion

In the context of cultural and tourism integration, how to use digital technology to achieve living protection has become an important issue for the sustainable development of traditional villages. This study, through an in-depth analysis of the philosophical connotations of Hakka culture, explored the application of digital technology in the inheritance and dissemination of Hakka clan culture, and proposed specific digital design solutions using Fujian Shen Yuan Tulou as an example. The results show that digital technology can not only enhance the younger generation's interest and participation in Hakka culture but also promote and protect this unique cultural heritage globally. Through interactive guided systems, AR interactive installations, and digital narrative technologies, visitors can gain a deeper understanding and experience of Hakka culture while protecting the privacy of the Tulou residents' lives. Online cultural exchange activities further promote the dissemination and exchange of Hakka culture. The innovation of this paper lies in combining the philosophical nature of Hakka culture with modern digital technology, which provides new perspectives and methods for the inheritance of traditional culture. This not only enriches the theoretical connotations of Hakka culture research but also provides beneficial references for the digital inheritance of traditional culture in other regions, which is of great significance for promoting the sustainable development of Hakka Tulou culture.

Future research directions include technological optimization and innovation, further optimizing 3D modeling and virtual reality technology to improve model accuracy and user experience. Meanwhile, more innovative digital technologies, such as artificial intelligence and machine learning, should be explored to enhance the efficiency and effectiveness of cultural transmission. In addition, deeper exploration of the philosophical connotations and historical stories of Hakka culture can enrich the content of digital displays and enhance the attractiveness and infectiousness of the culture. Strengthen cooperation with multidisciplines, such as sociology, anthropology, and architecture, will support interdisciplinary research and a comprehensive approach to the inheritance and preservation of Hakka culture. Finally, future studies should explore how to better promote the participation of community residents in cultural inheritance to realise the benign interaction between cultural preservation and community development, ensuring the living inheritance and sustainable development of Hakka culture. Through these efforts, we hope to provide more comprehensive and effective solutions for the inheritance and protection of Hakka culture and to promote the sustainable development of traditional culture in modern society.

7. Acknowledgements

and complete. I am profoundly appreciative, and I hope that together we can continue to deepen our pursuit of knowledge and share in the joy of our achievements.

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Evaluative Language in Op-eds: An Assessment of Attitudes and Voices toward Leni Robredo during the 2022 Philippine Elections

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Abstract

This study discusses how op-ed writers used their voices when evaluating former Vice President Maria Leonor Gerona Robredo *(Leni)* during the May 2022 Philippine elections. A total of 34 English op-eds were gathered from four prominent online newspapers in the Philippines*:* Inquirer.net, The Manila Bulletin, Philstar.com, and The Manila Times*.* The op-eds were analyzed using the Appraisal System Framework and Critical Discourse Analysis *(CDA).* Writers use positive and negative judgments, appreciations, and affects to position readers toward specific ideological positions. Writers employ positive, explicit evaluative language when assessing Leni*'*s capacity, while negative, implicit attitudinal evaluations and amplification and softening grading devices can influence readers*'* negative views of her campaign. These implicit attitudes can elicit emotional responses from readers*'* cultural frameworks, affecting the public*'*s perspective of the presidential candidate. The op-eds feature authoritative monoglossic *(single)* and modalized heteroglossic *(*multiple*)* voices to present and reject viewpoints. Readers are engaged to recognize or entertain other diverse perspectives by attributing evaluative language, but Leni and her campaign efforts are negated to position the reader negatively. The study suggests that understanding the underlying evaluative language can assist reader voters in forming opinions and navigating the intricate influences of the media landscape, particularly in political discourse. It is suggested that the Appraisal System Framework could be beneficial for critically assessing evaluative language, evaluating political candidates, making informed voting decisions, and becoming socially active citizens.

Keywords: *Appraisal System Framework; authorial voices; evaluative language; media influence; op-eds; Philippine elections*

1. Introduction

Political discourses may play a crucial role in electoral seasons, as words carry power. Leading up to the May 2022 Philippine elections, a variety of voices were expressed, resulting in significant political transitions. The mass media, especially during election seasons, serves as a vital avenue for these voices to reach voters to educate the electorate, cover campaigns, and even provide an avenue for politicians and political parties.

In the 2022 Philippine presidential race, President Ferdinand "Bongbong" Marcos Jr. (BBM) emerged as the winner, while former Vice President Maria Leonor "Leni" Gerona Robredo (Leni), the only female candidate, finished second. Malibiran (2025) regarded the 2022 electoral outcome and polarization as components of a persistent liberal-populist division in Philippine politics, indicating that Leni Robredo embodies a liberal identity, while BBM Marcos Jr. represents a populist identity.

The campaign period highlighted an evolving media landscape, with social media influencing how candidates engage with voters (Arugay, & Baquisal, 2022). Traditional media, particularly op-eds, is centered on politics. They present diverse viewpoints and contribute to political dialogues by offering critiques, endorsements, and analyses of candidates and policies (Coppock et al., 2018). A well-written and well-argued op-ed can reach millions of people, influence voters' minds, attitudes, and beliefs during electoral campaigns, and even reshape public policy (White, 2021). Conversely, emotional content in the text might influence the reader's mood, potentially leading to perceived political bias and affecting news media trust (Newman et al., 2022).

Op-eds, written by columnists or experts, shape public opinion and policy by presenting arguments, emphasizing candidates' strengths and weaknesses, and helping voters make informed decisions. Although Coppock et al., (2018) found that op-eds influenced both the general public and elites, with a somewhat greater persuasiveness among the general population, their findings for young readers remained limited. Understanding the influence process in shaping public opinion is crucial, as it reveals how media discourse influences political ideologies and voter behavior.

Recent studies, such as those by O'Grady (2019) and Coppock et al., (2018), have shown that media discourse, mainly through present-day digital platforms, plays a decisive role in embedding ideological leanings. Philippine newspapers that have transitioned online, such as the Manila Bulletin, Philippine Daily Inquirer, and Philippine Star, boast high usage percentages and rank among the most trusted brands (Newman et al., 2024). The Philippine Daily Inquirer, being the largest newspaper, is undergoing restructuring amid digitalization, potentially leading to job losses (Chua, 2025). Despite the decline of print media, this trend may have paused as Filipinos consume political polarization news (Chua, 2025). Accordingly, this study explores op-eds published during the campaign period of the 2022 Philippine election, consumed by Filipino readers, and how the writers conveyed their voices and sources in political situations, therefore providing a forum for several points of view.

This study investigates how op-ed writers used rhetorical and linguistic devices to express their political views. It seeks to uncover how different perspectives may encourage more educated and engaged young people to participate in democratic involvement. During elections, readers may encounter attitudinally loaded and biased information, making this analysis crucial. Politicians' discourse underscored the importance of developing awareness for social justice, equality, freedom, rights, and economic growth (Valdez, & Colcol, 2022). The language of op-eds often carries evaluative and emotional undertones, mostly from implicit evaluations that can subtly affect readers' views. By applying Martin, and White's (2005) Appraisal System Framework, readers can deconstruct and identify how writers use language to express appreciation, make judgments, and invoke emotions.

The Appraisal System Framework, developed by Martin, and White (2005), is a part of Systemic Functional Linguistics (SFL) by Halliday, and Matthiessen (2014), which focuses on the language of evaluation. It explores how writers convey their attitudes, amplify their voices, and interact with their readers. The framework comprises three primary subsystems: attitude, graduation, and engagement. The attitude subsystem involves expressing emotions, evaluating behaviors, and appreciating phenomena or events. Graduation refers to the degree of evaluation intensity, with force referring to adjusting the degree of appraisal, and the other aspect involving sharpening or softening the focus. Engagement establishes how authors position themselves with the various voices and perspectives they incorporate in the discourse.

Martin, and White (2005) proposed dialogic contraction, which entails limiting other voices, and dialogic expansion, which means recognizing other voices. Conversely, Martin, and Rose (2007) utilized monoglossic and heteroglossic (projection, modality, and concession). In this study, authorial voice - representing a writer's identity in their writing - has transitioned from individual to social, reflecting a more eclectic or "dialogic" conception of voice over the past 50 years (Mhilli, 2023). Accordingly, these voices were unpacked through the author's distinctive style suggesting a viewpoint readers may take, as they also represent the positions taken by the writers or the additional voices they add to the text.

Ragragio (2022) and Chua (2023) emphasized the use of editorials as political tools, particularly during elections. Chua (2023) framed key themes such as the economy, foreign policy, and health, while Ragragio (2022) highlighted the role of media as watchdogs in democracies. On social media, Capuyan et al., (2023) examined sexist rhetoric in Facebook commentaries during Leni Robredo's 2022 presidential campaign, revealing that hostile sexism was the most prevalent, followed by interpersonal, benevolent, and internalized sexism through a qualitative-descriptive research design. Malibiran (2025) analyzed the 2022 campaign by conducting a meta-review of literature on political polarization and a Critical Discourse Analysis (CDA) of news reports and social media posts from Facebook, YouTube, and X.

Through campaign artifacts at rallies, Leni's supporters employed intertextual references and semiotic elements from popular, meme, and LGBTQ+ media to articulate their perspectives on gender and sexuality (Go, 2024). Go (2024) then examined campaign rallies using the lens of the Linguistic Landscape (LL), focusing on the influence of gender and sexuality in shaping prefigurative spaces within the offline-online dynamic. These studies highlight the limited research on language evaluation through op-eds during Philippine national elections.

Onishi, and Caverlee (2025) explored news summaries generated by large language models (LLMs), demonstrating the nuanced impact of word choice in the digital era and exposing a possible political bias. Gao, and Zeng (2021) delved into the linguistic aspects of news comments and media discourse and found how attitudes and rhetorical strategies influence and reflect ideological ideas in language. Jin (2019) focused on explicit, implicit, positive, and negative meanings in media discourse using the appraisal system to analyze political texts. Tan (2022) investigated how Kennedy's Inaugural Address employed evaluative language to establish credibility and a heteroglossic approach to engage with the audience.

Hänninen, and Rautiainen-Keskustalo (2025) explored how journalists' discourse fostered trust between the journalist and the audience, facilitating a dialogic relationship despite the absence of actual discussion during the event and the audience's perceptions of journalism's roles and functions. Consequently, these insights collectively demonstrate the decisive role of media and language in shaping political narratives and public perception, whether through traditional editorials or modern digital platforms. The roles of journalism and public views were interrelated, with the expectation-evaluation gap and media credibility assessment shaped by the level of news engagement, to inform journalism practice, the media sector, and public policy (Guo et al., 2024).

This study analyzes the authorial voices of published op-eds, evaluating Leni during the 2022 Philippine presidential campaign season, using the Appraisal System Framework and Critical Discourse Analysis (CDA). This study aims to contribute to the larger knowledge of evaluative language, changing media, political discourse, and the function of op-eds in forming public opinion during election times.

2. Objectives

This paper has aimed at the following:
1) To identify the positive and negative attitudinal assessments in the op-eds.
2) To analyze the explicit and implicit manifestations of these attitudinal assessments.
3) To determine how these attitudinal assessments are conveyed.

3. Materials and Methods

This qualitative study on language evaluation has employed Fairclough's (2010, 2015) methods of Critical Discourse Analysis (CDA). Some CDA studies have encouraged text analysis to understand its implications in the context of larger social issues. O'Grady (2019) suggested combining linguistics with other relevant methods to connect semiotics to social practices and societal structures. The appraisal system, which is part of the Systemic Functional Linguistics (SFL) of Halliday, and Matthiessen (2014), can be ideal for analyzing authorial voices, allowing for deductive and inductive data interpretation. SFL has analyzed language as shaped by social functions, focusing on the interpersonal metafunction of language. Appraisal is a framework within SFL that monitors evaluations in texts, encompassing both explicit and implicit forms, while being attuned to the social context of evaluative statements (Macken-Horarik, & Isaac, 2014).

3.1 Sampling Procedure

This study used purposive sampling by selecting the sample size, which is powerful because it focuses on selecting cases that offer rich insights for in-depth analysis (Patton, 2015). To ascertain this, the present study has established and followed the criteria for selecting op-eds to be analyzed in this study (see Table 1).

Espiritu, and Cristobal (2022) argued that the 2022 presidential election was a restaging of the 2016 vice-presidential rivalry between Marcos Jr. and Robredo and a revisiting of the 1986 snap election's significance in restoring democracy in the Philippines. Thus, this study has emphasized the discourse surrounding Leni's bid for the presidency, highlighting that, despite her non-dynastic figure in Philippine politics, her identity goes back to EDSA I, and she was considered the contemporary face of the liberals (Malibiran, 2025). She had been subjected to massive disinformation, trolling, and political internet bashing (Capuyan et al., 2023). This current analysis of the op-eds may provide a different perspective. Her campaign was an underdog effort primarily driven by the volunteerism of supporters, who viewed their participation as a contribution to the nation and a way to realize a potential future defined by a people-driven movement (Go, 2024; Malibiran, 2025).

Print media has evolved with technology, with the four chosen newspapers now reaching a wider scope of consumers through both online and offline channels, offering English-written op-eds from columnists and contributors on national issues such as the presidential elections. The focus on English op-eds is justified by the

fact that English serves as the official language of the Philippines, utilized across multiple sectors including business, government, education, and science & technology, and is prevalent in the nation's media and artistic domains (Salazar, n.d.). However, a notable limitation could emerge from the focus on Leni and English op-eds, which may not adequately represent the whole spectrum of discourses in Philippine media during the election period.

Table 1 Inclusion-Exclusion Criteria for the Op-eds Selection

Criteria	Inclusion Criteria	Exclusion Criteria
Focus	The op-eds were specifically written about Leni Robredo.	Did not retrieve the op-eds for the other presidential candidates in the 2022 race.
Subject Matter	The op-ed should extensively be about the presidential candidate, Leni.	Op-eds written specifically about the other presidential candidate were included.
Title	The title contained the keywords like Leni, Robredo, VP, Vice President, and pink.	Keywords not listed were not collected.
Publication Period	Should be published during the campaign period (12AM of 8 Feb 2022–11:59PM of May 7, 2022).	Op-eds published either before or after the 90-day campaign period.
Source	English op-eds from the top four highly automated (online) newspapers in the Philippines.	Texts not written in English and hard, printed copies were not part of the scope.
Authorship	Written by a columnist, guest, or op-ed contributor with academic expertise or with any professional background.	The writer was not based in the Philippines or was outside of the country at the time of writing.
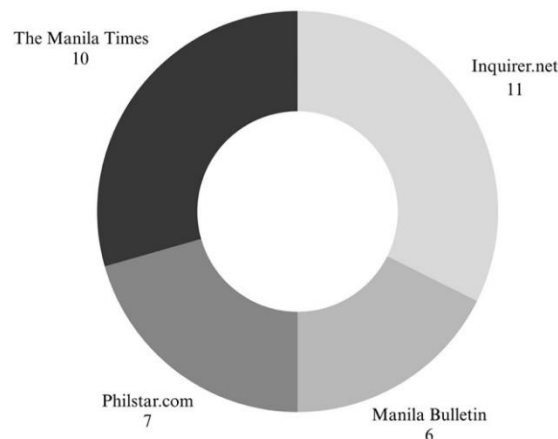
Figure 1 Number of op-eds gathered from each of the newspaper websites

This study used the inclusion-exclusion criteria to ensure the quality of the opinion pieces that were used as actual data in the analysis. All opinion pieces that met the criteria were included in the sample size. The study analyzed 34 op-eds written for Leni in the 2022 Presidential Elections, using purposive sampling. Data was sourced from four prominent online newspapers in the Philippines: Inquirer.net, The Manila Bulletin, Philstar.com, and The Manila Times, focusing on publications during the campaign period (see Figure 1).

3.2 Research Instrument and Validity

The initial step was identifying and extracting the op-eds parts that extensively discussed Leni. After that, the statements were separated into independent and dependent clauses; this step helped in determining the attitudinal word groups. Then, the identified word groups were placed into coding sheets to examine the op-ed writer's voices in assessing Leni.

The coding sheets were divided into nine (9) parts: (1) the newspaper code and date of publication; (2) the authorial voice; (3) the line number; (4) the attitudinal word group; (5) the type of attitude; (6) positive or negative assessment; (7) explicit or implicit manifestation; (8) graduation (force or focus); and (9) engagement mechanism.

The process of analysis is built around Macken-Horarik, and Isaac's (2014) continuum of implicitness in appraisal environments, which starts with explicit linguistic cues and then addresses implicit cues; these text patterns influence choices and frequently prompt an evaluation of lexical appraisal decisions. The figure offers an expanding framework for understanding the patterns and cultures that influence readers' responses to local choices in a text, while shared values and icons carry evaluative weight and offer responses based on cultural values (Macken-Horarik, & Isaac, 2014). This analysis sought to elucidate how op-eds construct political narratives and affect electoral results, thus revealing ideology and power.

To attain descriptive validity, this study has included the steps taken through accurate explanations in the execution of the study. The study involved a meticulous process of reading, rereading, coding, and checking to accurately categorize lexical choices. Accordingly, the appraisal system served as a framework for in-depth textual analysis.

Three experts in the English language, SFL, and the Appraisal System Framework, one of whom has a Philippine context background, were engaged to ensure inter-coder reliability. An expert validation checklist containing 25% of the analyzed data was used to evaluate and cross-check the codes for consistency and validity. Fleiss' Kappa was employed to determine the agreement among the raters, resulting in a value of 0.760, indicating substantial agreement. In case of any inconsistencies identified, they were addressed, and coding definitions were revised to achieve uniformity of assessments.

3.3 Data Analysis Procedures

Fairclough's (2010, 2015) CDA methods involved textual, processing, and social analyses to understand the authors' attitudes and the impact of discourse in swaying readers toward a certain presidential candidate. Following the Appraisal System Framework of Martin, and White (2005) and Martin, and Rose (2007), which was utilized in the study, the execution of the coding process was within the textual analysis. Attitude assessments were in bold (*affect*, judgment, appreciation), *graduation* devices were in italics, and engagement sources were underlined.

The framework used in the study was conducted by applying the Appraisal System Framework. Affect could be positive (happiness, security, satisfaction) and negative (unhappiness, insecurity, dissatisfaction) attitudinal assessments. Evaluations of judgment were catgegorized between social sanction (veracity or propriety) and social esteem (normality, capacity, or tenacity). The third attitude subsystem, appreciation, had evaluations determined by reaction, composition, or valuation. Graduation devices were identified, whether force (intensifiers, attitudinal lexis, and metaphors) to amplify and diminish, or focus (sharpen or soften). Engagement resources were underlined, analyzed, and distinguished as either monoglossic (single voice) or heteroglossic (projection, modality, or concession).

The study adhered to Fairclough, and Fairclough's (2018) ethical frameworks, including deontological, consequentialist, and virtue ethics. The identities of op-ed writers were not disclosed to protect anonymity and ensure ethical objectivity. Additionally, the research endeavored to enhance societal understanding of text construction in opinion pieces and objectively present findings, avoiding bias in data interpretation utilizing the Appraisal System Framework.

4. Results

The aim of this research was to identify how op-ed writers expressed themselves through the lens of the appraisal system. The study evaluated the authorial voices of op-ed writers in their opinion pieces on Leni Robredo during the May 2022 Philippine elections. The other goal was to explore how language evaluation using the appraisal system could demystify power dynamics, particularly in reading op-eds during elections.

4.1 Positive and Negative Attitudinal Assessments

The data presented below were based on the resources of positive and negative attitudes elicited in the analysis. The presented extracts were texts from the op-eds as references to illustrate the results of the study.

4.1.1 Positive Resources

Positive affect expression for Leni was limited, but she received positive appraisals for her social esteem. For example, she was seen as a leader who "communicates *powerfully*" and "inspires and motivates" (Collas-

Monsod, 2022). Appreciations of her electoral run were described as "*historic* candidacy" (David, 2022), "momentum and power of her volunteer movement" (Heydarian, 2022b), and "people's movement, which spurred a nationwide campaign" (Lagman, 2022).

4.1.2 Negative Resources

The writers have expressed negative emotions, rather than positive affect. Tiglao (2022c) expressed feelings of "disliked" and "dissatisfied" were identified toward Leni. Negative appreciations were identified as "still below the last Marcos score of 56" (Pascual, 2022) and her "unholy alliance - would make a dent" (Tiglao (2022c).

4.2 Manifestation of Explicit and Implicit Attitudinal Assessments

This section presents a combination of explicit and implicit data that elicited the attitudinal analysis of the op-eds.

4.2.1 Explicit Resources

One of the writers explicitly expressed, "I urge everyone *to vote for* Leni Robredo for president in the May 9 elections" (Cruz, 2022b). This demonstrated a sense of trust. Excerpts 1, 2, and 3 show the positive judgments evaluating Leni of her capacity to be the next president of the land.

Excerpt 1: But assessing the results of some broadsheet surveys and surveys conducted in various universities seems to indicate that Vice-President Leni Robredo is the next head of this Republic (Guinigundo, 2022).

Excerpt 2: It announced that various governors, notably the governors of Bulacan, Eastern Samar and Northern Samar had *formally* endorsed Robredo for president (Makabenta, 2022a)

Excerpt 3: "that Vice President Leni Robredo, a God-fearing person, is the *most* capable candidate for the presidency" (Lagman, 2022).

Appreciation for Leni's campaign was characterized as "the spirit of volunteerism has spurred a nationwide campaign" (Lagman, 2022). Other observed examples in Excerpts 4, 5, and 6 are as follows:

Excerpt 4: "The Filipino voter has discovered that a political campaign can run without any help from the traditional leaders" (Cruz, 2022a).

Excerpt 5: but instead a *new and transformational* movement aimed at nothing less than saving a besieged democracy (Heydarian, 2022a).

Excerpt 6: To Leni Robredo's credit, that started the rage for securing the endorsement of the governors (Makabenta, 2022a).

Excerpts 7 and 8 were negative assessments of Leni's numbers in the electoral race:

Excerpt 7: Another survey showed why the numbers do not indicate any improvement in Robredo's position (Makabenta, 2022b).

Excerpt 8: The Pulse Asia report the other day was another confirmation of the certainty that Ferdinand Marcos Jr. will win the presidency in May, with his formidable 60 percent preference, in politics light years ahead of Leni Robredo's *15 percent*, *practically* unchanged since last year (Tiglao, 2022b).

4.2.2 Implicit Resources

Implicit emotions were demonstrated in the examples below; see Excerpts 9 and 10.

Excerpt 9: Robredo must be *pulling hair* and wailing in frustration at this latest turn of events (Tiglao, 2022a).

Excerpt 10: The phrase "move the needle" *captures perfectly* the *frustration* and despair of Robredo's campaign (Makabenta, 2022b).

Leni was also criticized for low social esteem (see Excerpt 11) and negative social sanction assessments (see Excerpt 12).

Excerpt 11: Robredo has not moved a point closer to BBM (Makabenta, 2022b).

Excerpt 12: Ironically, the sources claimed, trying to secure such funding from an anti-Duterte New York Filipino American (Tiglao, 2022c).

The implicit appreciation for Leni's election campaign and her opponents' insinuation that "they've proven to be in the *same lightest* weight class as Robredo… as to torpedo Robredo's *already sinking ship*" (Tiglao, 2022a). Excerpts 13 and 14 indicated her standing in the presidential race based on the surveys.

Excerpt 13: that the poll results did not reflect the "massive record-breaking rallies" for his boss (Tiglao, 2022b).

Excerpt 14: The Leni Robredo campaign has not moved the needle in the pre-election surveys (Makabenta, 2022b).

4.3 Sources of Attitudinal Elements

The op-ed writers used a combination of monoglossic and heteroglossic voices to engage the readers. While they expressed their evaluations of Leni, they also added voices and viewpoints through projection and modality, frequently using concessions.

4.3.1 Authorial Voice

The authors of the op-eds conveyed their positive or negative and mostly explicit judgment attitudinal assessments of Leni in a monoglossic (single) voice and without the employment of an engagement mechanism. See examples in Excerpts 15, 16, and 17:

Excerpt 15: I believe it is Leni Robredo's *unique* role to be the *torchbearer* of this ideal [Positive Judgment: Capacity] in a time of overwhelming despair and cynicism (David, 2022).

Excerpt 16: Robredo has shown brilliance in championing [Positive Judgment: Capacity] the democratic way as more effective than tyranny in serving the underrepresented and marginalized (Cruz, 2022c).

Excerpt 17: Way before she became the disdained and unwanted [Negative Judgment: Tenacity] vice president, Leni Robredo has had projects with a civil society orientation [Positive Judgment: Capacity] (Araneta, 2022).

4.3.2 Attributed Sources

The attitudinal assessment of the presidential candidate, Leni, in this study through the op-eds showed how she was framed from the appraisal system in the voices of the writers and the voices or sources they opted to include. The data revealed that the writers used heteroglossic voices and negative implicit assessments of Leni. In the earlier implicit examples, Excerpt 9 used "must," a modal verb; both Excerpts 10 and 13 employed "scare quotes"; and excerpt 13 used reporting based on "poll results" and "not" as a negation device.

An extract from the data presented below provides a specific example of how the appraisal system demonstrated attitudinal evaluations (affect, judgment, appreciation), graduation, and engagement markers. For instance, in an op-ed examining the probability of Leni impacting change (see Excerpts 18, 19, 20 & 21), the author wrote:

Excerpt 18: Vice President Leni Robredo is *especially* incredulous [Negative Judgment: Veracity (Implicit)] that neither Pulse Asia nor Laylo reflected in their survey numbers [Report; Negation] the important gains and changes that are now buoying up [Negative Appreciation: Composition] her campaign (Makabenta, 2022b).

Excerpt 19: The cold fact, however, according to both surveys, [Report] is that VP Leni remains stuck in the ground [Negative Judgment: Capacity (Implicit)] at *16- to 19*-percent [Graduation: Soften] voter preference while Bongbong Marcos is *up in the sky, far, far away with 60- to 64-percent* [Graduation: Focus] voter preference [Positive Appreciation: Reaction] (Makabenta, 2022b).

Excerpt 20, Leni was evaluated negatively in terms of veracity. While two survey sources were not able to capture the "important gains and changes" (see Excerpt 21). Also, she received negative indications of her incapacity to compete with BBM's amplified preference score. She seemed to remain at an undesirable percentage of voter preference. Accordingly, the engagement marker "according to both surveys" served as a tool to eliminate other viewpoints by asserting Leni's inability in the campaign and highlighting BBM's surging score.

Excerpt 22: Robredo has not [Negation] moved a point closer to BBM [Negative Judgment: Capacity (Implicit)]. And BBM has not [Negation] shown any sign of weakening, not [Negation] shedding even a single point [Positive Judgment: Capacity (Implicit)] […] (Makabenta, 2022b).

Excerpt 23: The Leni Robredo campaign has <u>not</u> [Negation] <u>moved the needle</u> [Negative Appreciation: Reaction (Implicit)] in the pre-election surveys. It's the same story <u>with all the other notable surveys</u> - <u>Laylo Research, SWS, Publicus, Tangere</u> - that have made their findings public. <u>All showed</u> [Report] Marcos with a *nearly insurmountable* [Graduation: Force] <u>lead over his rivals,</u> [Positive Appreciation: Valuation] because even if all their percent shares were to go to his closest rival, they <u>could</u> [Polarity] *barely* [Graduation: Soften] pose a challenge to Marcos [Positive Judgment: Capacity (Implicit)] (Makabenta, 2022b).

Excerpts 22 and 23 showed that writers used negation. The extracts displayed the writer's use of the word "not" to position the reader to a negative perspective of Leni. Given the data, the author indicated her lack of strength in the electoral race (see Excerpt 22). The writer attributed insights from "notable sources," such as survey firms (see Excerpt 23) and asserted that Leni's campaign had failed to alter the situation from the start of the campaign to the midpoint of the campaign period, thereby suggesting a credible evaluation of the negative evaluations that the needle in her campaign had not repositioned.

5. Discussion

This study aimed to determine how writers conveyed their voices in op-eds during the 2022 Philippine elections using the Appraisal System Framework, identify the positive and negative attitudinal assessments in the op-eds, analyze the explicit and implicit manifestations of these attitudinal assessments, and determine how these attitudinal assessments are conveyed - impacting readers' perceptions and attitudes and shaping positive and negative views of Leni.

5.1 Evaluative Language and Ideological Influence in Op-eds
5.1.1 Emotional Awareness
Positive judgment of Leni's competencies being the "most capable candidate" and "next head." Positive appreciation of her "historic candidacy" and "volunteer movement." Negative appreciation of survey standing was also assessed. Positive affect was the least attitudinal assessment observed. However, negative affect was used to make the reader feel unhappiness and dissatisfaction toward Leni.

Op-ed writers use affect to convey their emotions and evoke emotional responses from readers, strategically influencing perceptions. In this modern era, power is harnessed through emotional awareness rather than warfare (Deocampo, 2018). Depictions of Leni's frustration and despair are amplified by media messages that heighten feelings of insecurity and focus on the feelings of voters in the digital era; this has evolved in media, magnifying intentional messages and increasing fear and anxiety (Rajan, & Murphy, 2024).

5.1.2 Implicit Attitudes and Extent of Graduation Strategies
The study found that using the Appraisal System Framework revealed explicit and significantly implicit data, graduation devices, and engagement mechanisms from the voices of op-ed writers to reveal underlying attitudes, ideologies, and writing strategies. Writers conveyed: " Leni Robredo's *15 percent*, *practically* <u>unchanged,</u>" *"captures perfectly* the *frustration,"* "as to <u>torpedo</u> Robredo's *already sinking ship,"* *"same lightest* weight class as Robredo," and "<u>still</u> <u>shaky</u> *handful* <u>of governors.</u>"

The examples are implicit attitudinal assessments with words of graduation in italics *practically, perfectly,* and *already* (adverbs); *same lightest* (attitudinal lexis or adjectives); *15 percent* and *handful* (softening devices); and *sinking ship* (metaphor). The findings align with White's (2025) observation of the frequent use of verbs and verb groups to convey assessments of judgment and appreciation. Analogous to Ross, and Caldwell's (2020) study in the United States context, evaluations of Hillary Clinton's character through emotional expressions and grammar were used to attack and undermine her, resembling how Leni's campaign and leadership qualities are framed in the op-eds.

The findings of the study found that explicit attitudinal assessments are positive evaluations of Leni's capacity as a woman leader, while implicit attitudinal assessments are mostly negative evaluations of her veracity and campaign efforts. The assessments may influence the reader's inclination to form negative or positive perspectives of Leni. Overall, findings suggest a leaning toward a negative light. This aligns with the results of Coronel, and dela Cruz's (2023) on the perception that women's fragility and professional subordination are perpetuated through linguistic patterns, cultivating unfavorable views of Leni. In the same 2022 Philippine

election, Sara Duterte as vice president may appear to challenge this trend, as her victory can be surrounded by the political influence of her father, the former President Rodrigo Duterte, their Duterte brand, which Leni lacked, and the liberal image attached to her (Malibiran, 2025).

The use of the metaphor "torchbearer" connotes a positive assessment of her leadership capabilities. Metaphors have been found to influence public opinion on the government in Leni's political discourses (Santiago, 2024). However, force grading devices, such as intensifiers and attitudinal lexis, may have amplified the negative evaluations of Leni, aligning readers with specific ideological positions. Implicit attitudes might be lexically attitudinal and can invoke evaluations due to cultural frameworks (Macken-Horarik, & Isaac, 2014; White, 2021, 2025).

5.2 Voices in Op-eds

Engagement markers, such as monoglossic and heteroglossic voices, position writers in relation to their readers. Recognizing these strategies is crucial for developing an understanding of media influence. Data reveal that writers use various engagement methods, such as negations for endorsement and polarity for distancing.

5.2.1 Monoglossic and Heteroglossic Voices

This study found that the writers often utilize a combination of monoglossic and heteroglossic in their op-eds. By employing a monoglossic voice, writers assert their arguments with confidence and authority, presenting their viewpoints as if the reader automatically agrees (Martin, 2021). Nevertheless, single voices may shift or integrate into a collective voice, resulting in polyphonic, blended, or fused forms (Głaz, & Trofymczuk, 2020).

Heteroglossic involves modalized opinions and negation, leading to the rejection of alternative viewpoints and limiting dialogic opportunities (Martin, 2021; Ross & Caldwell, 2020). Similarly, White (2025) uncovered that text does not directly state certain attitudinal evaluations but may entertain using probability and modal verbs to accommodate diverse viewpoints. According to the data of the study, the writers may attribute the attitudinal assessments to credible personalities, institutions, the candidate herself, and predominantly the survey firms. This approach appeals to individuals who appreciate diverse, grounded viewpoints, offering a balanced and nuanced perspective.

5.2.2 Engagement Mechanisms Influencing Reader Views

Dialogic contraction limits alternative viewpoints by reinforcing specific stances. The writer may suggest differing viewpoints by indicating potential disagreement when they correct or negate a proposed expectation (White, 2020). In the results of the study, the writers' use of concessions and negations and employing grading devices somehow diminish evaluations of Leni, which is evident in aligning the reader into a negative view of the candidate.

Aside from utilizing their authorial voices, the writers may quote attitudinal assessments from external sources to present op-eds as persuasive (White, 2025). Positive evaluations of Leni were attributed to institution and group leaders, governors, and her supporters. However, the findings of this study would like to argue that the attributed attitudes and refuting positive statements suggest the writers may favor the negative view, thus adding voice or source in the text.

Conversely, dialogic expansion recognizes various viewpoints and employs quotes, scare quotes, and modal verbs to provide a more comprehensive discussion (Cruz, 2024; Mayo, & Taboada, 2017). This allows writers to express positive judgments about candidates while maintaining a degree of detachment from their assertions. Accordingly, the author's attributed attitudes and dialogical stances are employed to assess the ideological power of these texts (White, 2020).

Writers incorporate multiple voices to include or exclude different perspectives, making their opinions more engaging and persuasive. Monoglossic assumptions construct a like-minded reader, suggesting shared underlying beliefs and values, implying without the need for persuasion (White, 2020, 2021; Abbas, & White, 2021). Moreover, the findings of the current study suggest a multi-voiced discourse that emphasizes the importance of presenting diverse views and verifying information from different sources. This may be a technique for engaging consumers of information during the rise of disinformation narratives (Arugay, & Baquisal, 2022).

5.3 Language Evaluation and Its Role in Democratic Citizenship

While explicit evaluations validate Leni's desirable leadership, competence, integrity, and status as a symbol of a woman leader, on the other hand, implicit evaluations may have subtly undermined her political viability through metaphors, softening devices, and emotionally charged language. Table 2 illustrates the explicit and implicit attitudes toward Leni Robredo's candidacy as reflected in the op-ed data using the Appraisal System Framework.

This rhetorical difference transcends mere technical concerns; it signifies a profound ideological conflict. Writers employ language not only to express their viewpoints but also to persuade readers to align with specific perspectives. The results of this study, indicating the use of negative implicit attitudes and the extent of grading devices, may be used to make readers view Leni as a weak, ineffective, or unfit to lead in case she wins. These linguistic strategies are integral to a broader narrative concerning political marginalization, particularly during the 2022 Philippine elections, when she was subjected to sustained disinformation during and leading up to the campaigns.

Table 2 Evaluative Language in English Op-eds on Leni Robredo

Explicit/Implicit and Positive/Negative Manifestation	Appraisal Evaluation	Attitudinal Word Group	Interpretation
Explicit Positive	Affect: Security	I urge everyone *to vote for* Leni Robredo…	Affirms leadership and public trust
	Judgement: Capacity	Only a President Robredo has the trait of a **transformational leader**…	Positions her as capable of reform
	Judgement: Veracity	She has the utmost **integrity, unblemished track record**,	Enhances credibility and transparency
	Judgement: Capacity	**well-documented accomplishments and capability**	Reinforces competence and credibility
	Judgement: Capacity	The trait that exceptionally distinguishes is he**r immense power to inspire her supporters to become altruistic and patriotic.**	Demonstrates capacity to inspire hope and motivate action
	Appreciation: Valuation	*Volunteer-driven, bottom-up* **campaign**…	Emphasizes civic engagement and grassroots support
		How aspirations for *good* **government do produce a spirit of volunteerism.**	
Implicit Negative	Affect: Dissatisfaction	Robredo must *be pulling hai*r…	Indicates feelings of frustration and a sense of powerlessness
		The phrase "move the needle" captures perfectly the *frustration*	
	Judgement: Capacity	Robredo **has not moved a point closer to BBM**.	Implies ineffectiveness and lack of progress
		The cold fact, however, according to both surveys, is that VP Leni **remains stuck in the ground** at 16- to 19-percent voter preference	
	Judgement: Veracity	Leni is **lying through her teeth**.	Undermines honesty and credibility
		Leni is certainly **deluded**	
		Vice President Leni Robredo is **pathetic attempt to create a false idol**	
	Appreciation: Composition	as to torpedo Robredo's already **sinking ship**,	Metaphor implying failure and hopelessness
	Appreciation: Reaction	*Same lightest* **weight class** as Robredo	Diminishes political will and stature
	Appreciation: Reaction	Over the past six years, Leni **has been at the receiving end of an unprecedented campaign of disinformation and denigration**	Reveals that she has been has been systematically attacked, portraying her as a casualty of prolonged ideological conflict

Borja et al., (2025) highlighted that being able to evaluate rhetorical strategies can be vital and is essential for democratic citizenship and that in the Philippines, cultivating civic education necessitates dismantling outdated habits and fostering effective involvement in politics. The negative cues, which are also the most implicit, signal the necessity of language evaluation. In turn, language evaluation becomes an essential instrument - not only for comprehending media bias but also for enabling citizens to discern how language can shape their political realities.

This research addresses Malibiran's (2025) call for efforts toward fact-checking and media literacy that are deemed important but lacking in the underlying causes of disinformation's appeal to Filipinos. Finally, the results show that we need to rethink civic education, media literacy, and public discourse. Teachers, reporters, and lawmakers need to understand how language shapes people's beliefs, rethink their approaches to combating disinformation both within and beyond the country, and introduce language evaluation into digital literacy programs for both print and online discourse consumption.

6. Conclusion

This study demonstrates that the Appraisal System Framework can evaluate the authorial voices in op-eds by identifying the explicit and implicit, as well as the positive and negative, evaluative language surrounding Leni during the 2022 Philippine presidential campaign season. The results of the current study suggest that writers position the readers to view positive judgments of Leni's competencies and positive appreciations of her candidacy. However, these positive assessments are contrasted with negative affect, which can evoke dissatisfaction. The findings highlight implicit negative assessments of Leni's leadership abilities and campaign, using intensifiers, attitudinal lexis, metaphors, and softening devices to influence reader perceptions. With the extent of graduation devices elicited in the data, reading op-eds in the context of Filipino readership may require the activation of Filipino cultural frames.

The op-eds feature authoritative monoglossic voices and modalized heteroglossic voices, which are used to present and reject viewpoints. Readers are engaged by op-ed writers through the use of dialogic contraction to limit alternative viewpoints, negating Leni and her campaign efforts, and dialogic expansion to recognize or entertain other diverse perspectives. News commentating or views journalism, like op-eds, could influence readers' perspectives on current trends, disagreements, or controversies, potentially altering opinions and beliefs in certain instances (White, 2025). The analytical approach used in this study helps readers develop a discerning eye for evaluative language. Mangad et al., (2024) emphasized that voters can improve their capacity to critically evaluate political communications and become more discerning consumers of campaign rhetoric by comprehending the creation, design, and structure of political slogans within and beyond the Philippine context. Thus, enhancing their ability to critically read and engage with political discourses, cultivating a more critical and informed readership and citizenship. By developing these skills, readers are bridging the complex landscape of traditional media with current social media and political commentary, thereby fostering a more informed and democratic society.

This study recognizes shortcomings throughout the process and aims to show the value of using a language assessment system; the data found several idiomatic expressions that were not included in the framework. The study did not discuss ownership, news organizations' political leanings, and writer backgrounds. This inquiry focuses on English op-eds from only the leading newspapers, which may not give a comprehensive understanding when one considers local languages and smaller media in the Philippines.

Future research could increase the sample size to include a wider range of media outlets and platforms, such as vlogs, podcasts, and short-form videos. Including regional dialects would provide a more comprehensive view of media analyses and the influence of evaluative language in op-eds across multiple election cycles. Comparative studies with other countries could explore how media evaluations of political candidates differ across cultural and political contexts.

7. Acknowledgements

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APPENDIX A

JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES
(Formerly RANGSIT JOURNAL OF SOCIAL SCIENCES AND HUMANITIES)

ACKNOWLEDGEMENTS

APPENDIX B

JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES
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NOTE FOR AUTHORS

1.   Aims and Scope

Journal of Contemporary Social Sciences and Humanities (JCSH) aims to provide a high profile vehicle for publication of various new issues in different academic areas in Humanities and Social Sciences. *JCSH* invites scholars, researchers, professionals and academicians to publish their manuscripts in the journal. The scope of the Journal encompasses, the author(s) can submit their manuscript covering, but not limited to Interdisciplinary Studies in Humanities and Social Sciences, any of the following areas:

Social Science
   Anthropology
   Criminology & Criminal Justice
   Economics
   Political Science
   Sociology

Humanity
   History
   Linguistics
   Philosophy (inc. Arts & Design)

2.   Submission Deadline

Submissions are to be permanently open. A manuscript submitted between July 1st and December 31st will be considered for publication in the January-June Issue of the subsequent year whereas a manuscript submitted between January 1st and June 30th will be considered for publication in the July-December Issue.

3.   Categories of Articles

The *Journal* accepts the following types of articles:

1. **Research Articles:** A research article is a regular quantitative or qualitative article which aims to present new findings or interpretations.
2. **Review Articles: A review article** or survey articles, also called a literature review, is an article that survey of previously published research on a topic an summarizes the current state of understanding on a topic. It should give an overview of current thinking on the theme and, unlike an original research article, won't present new experimental results. By analyzing a large body of data from existing studies, some systematic reviews can come to new conclusions. Review articles can also provide recommendations for potential research areas to explore next. Moreover, a review article surveys and summarizes previously published studies, rather than reporting new facts or analysis.
3. **Innovations:** An innovation is an article that aims to present creative arts and designs, procedures or devices.

   Research articles, review articles, and innovations should not exceed 15 pages of standard A4 paper using *JCSH* format. The manuscript template is available at https://JCSH.rsu.ac.th. All categories of articles must coincide with manuscript preparation instruction (see Manuscript Preparation Section).

4. Editorial Policies

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General Instruction: Submit your manuscript in both PDF and MS word formats. Manuscripts are acceptable in both US and UK English, but the use of either must be consistent throughout the manuscript. Please note that the editors reserve the right to adjust style to certain standards of uniformity.

Format: Unless specified, type text with 10-point Times New Roman font on 12-point line spacing, with a 1.25 inch left margin, 1 inch bottom and right margin, 2 inch top margin, 1.2 inch header, and 0.6 inch footer. Main text is set in single column. First lines of paragraphs are indented 0.5 inch. For hard copy, use standard A4 paper, one side only. Use ordinary upper- and lower-case letters throughout, except where italics are required. For titles, section headings and subheadings, tables, figure captions, and authors' names in the text and reference list: use ordinary upper- and lower-case letters throughout. Start headings at the left margin. If you wish, you may indicate ranking of complicated section headings and subheadings with numerals (1, 1.1, 1.1.1). Try not to exceed three ranks. All pages must be numbered in the top right-hand corner.

Title: Use 11-point bold font on 12-point line spacing. The length of the title of the article must not exceed 2 lines. A title should be concise and informative. The alignment of the title is centered.

Author Names: Use 10-point font on 11-point line spacing. Centered alignment and leave one line space below the title of the article. Begin with the first name of the author followed by the last name. For more than one author, separate each name by a comma (,), and identify each author's affiliation by superscript numbers at the end of the author's last name.

Author Affiliations: Use 9-point font on 10-point line spacing. Centered alignment and leave one line space below the author names. Include institutional and e-mail addresses for all authors. Place superscript numbers at the beginning of each affiliation accordingly.

Abstract: Use 10-point font on 11-point line spacing for heading and 9-point font on 11-point line spacing for abstract content. An abstract of up to 250 words must be included as and when appropriate. For research papers; the purpose and setting of the research, the principal findings and major conclusions, and the paper's contribution to knowledge should be briefly stated. For empirical papers the locations of the study should be clearly stated, as should the methods and nature of the sample, and a summary of the findings and conclusion. Please note that excessive statistical details should be avoided, abbreviations/acronyms used only if essential or firmly established.

Keywords: List up to 6 keywords and separate each keyword by a comma (,). The keywords should accurately reflect the content of the article. The keywords will be used for indexing purposes.

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References in the Text: To insert a citation in the text use the author-year system, i.e., the author's last name and year of publication. Examples are as follows: "Since Johnson (2008) has shown that..." or "This is in agreement with results obtained later (Benjamin, 2010)". For 2-3 authors; all authors are to be listed, with "and" separating the last two authors, for more than three authors, list the first author followed by et al. The list of references should be arranged alphabetically by authors' names. All in-text citation must be appeared in the reference list. The manuscript should be carefully checked to ensure that the spelling of authors' names and dates are exactly the same in the text as in the reference list. Responsibility for the accuracy of bibliographic citations lies entirely with the author(s). Citation of a reference as "in press" implies that the item has been accepted for publication. Authors are responsible for the accuracy of the content of the references.

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Author./(Year of publication)./Title of Abstract (abstract)./*Journal Title*,/*Volume*(Issue),/Page number.
Example:
Clark, D. V., Hausen, P. H., & Mammen, M. P. (2002). Impact of dengue in Thailand at the family and
　　　　population levels (abstract).*Am J Trop Med Hyg*, *67*(2 Suppl), 239.

Books
Author./(Year of publication)./*Book Title:/Capital letter also for subtitle.*/Edition (if
        any)./Location,/Country :/Publisher.

Example:
Cochrane, A. (2007). *Understanding urban policy: A critical approach.* Malden, MA: Blackwell
        Publishing.
Palmer, G. R., & Short, S. D. (2010). *Health care and public policy: An Australian analysis* (4th ed.). South
        Yarra, VIC: Palgrave Macmillan.
Bulliet, R. W., Crossley, P. K., Headrick, D. R., Hirsch, S. W., Johnson, L. L., & Northrup, D. (2011). *The
        earth and its peoples: A global history* (5th ed.). Boston, MA: Wadsworth.
Chapter in edited book
Richards, K. C. (1997). Views on globalization. In H. L. Vivaldi (Ed.), *Australia in a global worl*d (pp. 29-
        43). North Ryde, Australia: Century.

Article or Chapter in an Edited Book
Author./(Year of publication)./Title of chapter./In/Editor/(Ed.),/*Book Title*/(pages of chapter)./
        Location:/Publisher.
Example:
O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: A metaphor for healing, transition,
        and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107-123). New
        York, NY: Springer.

Conference and Seminar Proceedings
To cite proceedings that are published regularly, use the same format as for a journal article. To cite
proceedings that are published in book form, use the same format as for an article in a book.
Example:
Tester, J. W. (2008). The future of geothermal energy as a major global energy supplier. *Proceedings of the
        Sir Mark Oliphant International Frontiers of Science and Technology Australian Geothermal
        Energy Conference*, Canberra, Australia: Geoscience Australia. Retrieved from
        http://www.ga.gov.au/image_cache/GA11825.pdf

Dissertation or Thesis
Author./(Year of publication)./*Title of dissertation or thesis* /(Doctoral dissertation or Master's
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Example:
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        cirrhotic rat* (Master's thesis). Rangsit University, Pathum Thani.

Editorials
Author./(Year of publication)./Title of Editorial (editorial)./*Journal Title,/ Volume*(Issue),/Page numbers.
Example:
Fisher, R. I. (2003). Immunotherapy in Non-Hodgkin's lymphoma: Treatment advances (editorial). *Semin
        Oncol*, *30*(2Suppl 4), 1-2.

Journal Articles
Author./(Year of publication)./Article Title./*Journal Title,/ Volume*(Issue),/Page numbers.
Example:
Leelawat, S., Leelawat, K., Narong, S., & Matangkasombut, O. (2010). The dual effects of delta
        9-tetrahydrocannabinol on cholangiocarcinoma cells: Anti-invasion activity at low concentration
        and apoptosis induction at high concentration. *Cancer Investigation*, *28*(4), 357-363.

Polk, A., Amsden, B., Scarrtt, D., Gonzal, A., Oknamefe, O., & Goosen, M. (1994). Oral delivery in aquaculture. *Aquacult. Eng*, *13*, 311-323.

Seals, D. R., & Tanaka, H. (2000). Manuscript peer review: A helpful checklist for students and novice referees. *Advances in Physiology Education, 23*(1), 52-58.

Srichandum, S. & Rujirayanyong, T. (2010). Production scheduling for dispatching ready mixed concrete trucks using bee colony optimization. *American J. of Engineering and Applied Sciences*, *3*(1), 823-830.

Letters
Author./(Year of publication)./Title of Letter./*Journal Title*./ *Volume*(Issue),/Page number.
Example:
Enzensberger, W., & Fisher, P. A. (1996). Metronome in Parkinson's disease (letter). *Lancet*, *347*, 1337.

Notes
Author./(Year of publication)./Title of Note./*Journal Title*./ *Volume*(Issue),/Page number.
Example:
Haier, R. J., Schroeder, D. H., Tang, C., Head, K., & Colom, R. (2010). Gray matter correlates of cognitive ability tests used for vocational guidance. *Biomed Central*, *3*, 206.

Unpublished/In Press Articles
Author./(In press Year)./Article Title./*Journal Title*./(in press).
Example:
Veena, B. (2004). Economic pursuits and strategies of survival among Damor of Rajasthan. *J Hum Ecol.* (in press).

Internet periodicals
Author./(Year of publication)./Article Title./*Journal Title*,/*Volume*(issue),/ page numbers./Retrieved mm dd, year, from the full URL of the web page
Example:
Adams, P. J. (2000). Australian economic history. *Journal of Australian Economics, 5*(2), 117-132. Retrieved June 12, 2001, from http://jae.org/articles.html

Internet non-periodicals
Author./(Year of publication)./*Article Title*./Retrieved mm dd, year, from the full URL of the web page
Example:
Lemire, D. (n.d.). *Write good papers*. Retrieved July 1, 2010, from http//www.daniel-lemire.com/blog/rules-to-write-a-good-research-paper

Newspaper retrieved from a database
Article – with an author
Author./(mm dd, Year)./Article Title./*News agency*./Retrieved from the full URL of the web page
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There are four editorial decisions: Accept, Accept with Minor Revision, Resubmit with Major Revision, and Reject. A Reject decision is definitive and authors may not submit a new version of the manuscript to the *JCSH*. A Resubmit with Major Revision requires a major re-write of the manuscript and/or inclusion of significant new data, and thus the creation of a new manuscript, which will thus be assigned a new submission date. An Accept with Minor Revision decision implies that the paper can, in principle, attain the required

standard of the *Journal* without major change. Editors may or may not have a revised manuscript reviewed (generally, by the original reviewers), in order to ascertain whether changes to the original manuscript adequately responded to the criticisms. If changes made do not result in a paper of the required standard, the revised manuscript will be definitively rejected. If a revised manuscript of "Accept with Minor Revision" is accepted, the original submission date will be retained.

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The following resources will provide valuable guidelines for the preparation of manuscripts.

Anonymous. (n.d.). How to write abstract. Retrieved January 17, 2011, from
     http://www.journal.au.edu/au_techno/2006/jan06/vol9num3_howto.pdf

Anonymous. (n.d.). How to write an abstract: Links and tips. Retrieved January 17, 2011, from
     http://research.berkeley.edu/ucday/abstract.html

Koopman, P. (n.d.). How to write an abstract. Retrieved January 17, 2011, from
     http://www.ece.cmu.edu/~koopman/essays/abstract.html

Lemire, D. (n.d.). Write good papers. Retrieved January 17, 2011, from http://lemire.me/blog/rules-to-
     write-a-good-research-paper/

Plonsky, M. (n.d.). Psychology with style: A hypertext writing guide. Retrieved January 17, 2011, from
     http://www.uwsp.edu/psych/apa4b.htm

Seals, D. R., & Tanaka, H. (2000). Manuscript peer review: A helpful checklist for students and novice
     referees. *Advances in Physiology Education, 23*(1), 52-58.

Jones, A., & Pham, H. (n.d.). Basic Referencing using the APA System, Teaching and learning unit, Faculty
     of Economics and Commerce, The University of Melbourne. Retrieved February 15, 2011, from
     http://www.scribd.com/doc/57603066/A-Pa-Style

APPENDIX C

JOURNAL OF CONTEMPORARY SOCIAL SCIENCES AND HUMANITIES
Research Article Single-Column Template
Please note that the paper size is standard A4 size (approx 8.27 x 11.69 in)

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before the last author's name. For more than two authors, also separate each name by a comma (,).
Identify each author's affiliation by superscript numbers at the end of the author's last name.)

Author Affiliations (Use 9-point Times New Roman font on 10-point line spacing.
Include institutional and e-mail addresses for all authors. Place superscript number in front of author's affiliation
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Abstract (10-point bold font on 11-point line spacing)

For abstract content, use 9-point Times New Roman font on 11-point line spacing. First line is indented 0.5 inch. An abstract of up to 250 words must be included. Include your major findings in a useful and concise manner. Include a problem statement, objectives, brief methods, results, and the significance of your findings.

Keywords: List up to 6 keywords and separate each keyword by a comma (,). The keywords should accurately reflect the content of the article. The keywords will be used for indexing purposes.

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The introduction should put the focus of the manuscript into a broader context. As you compose the introduction, think of readers who are not experts in this field. Include a brief review of the key literature. If there are relevant controversies or disagreements in the field, they should be mentioned so that a non-expert reader can find out about these issues further. The introduction should conclude with a brief statement of the overall aim of the experiments.

To insert a citation in the text use the author-year system, i.e., the author's last name and year of publication. Examples are as follows: "Since Johnson (2008) has shown that..." or "This is in agreement with results obtained later (Benjamin, 2010)". For 2-3 authors; all authors are to be listed, with "and" separating the last two authors, for more than three authors, list the first author followed by et al. The list of references should be arranged alphabetically by authors' names. All publications cited in the text should be presented in a list of references following the text of the manuscript. The manuscript should be carefully checked to ensure that the spelling of authors' names and dates are exactly the same in the text as in the reference list. Responsibility for the accuracy of bibliographic citations lies entirely with the author(s). Citation of a reference as "in press" implies that the item has been accepted for publication. Authors are responsible for the accuracy of the content of the references.

2. Objectives

The objectives of the study should be specified explicitly.

3. Materials and Methods

This section should provide enough detail to allow full replication of the study by suitably skilled investigators. Protocols for new methods should be included, but well-established protocols may simply be referenced.

4. Results

The results section should provide details of all of the experiments that are required to support the conclusions of the paper. There is no specific word limit for this section. The section may be divided into subsections, each with a concise subheading. The results section should be written in past tense.

Tables must be cell-based without vertical lines. They should be produced in a spreadsheet program such as Microsoft Excel or in Microsoft Word. Type all text in tables using 9-point font on 10-points line spacing. Type the caption above the table to the same width as the table.

Tables should be numbered consecutively. Footnotes to tables should be typed below the table and should be referred to by superscript numbers. Submit separate files of tables in their original file format and not as graphic files in addition to incorporating in the main text. Tables should not duplicate results presented elsewhere in the manuscript (e.g., in graphs).

Table 1 Table caption

C1	C2	C3	C4
R1			
R2			
R3			
R4			
R5			
R6			

If figures are inserted into the main text, type figure captions below the figure. In addition, submit each figure individually as a separate file. Figures should be provided in a file format and resolution suitable for reproduction, e.g., EPS, JPEG or TIFF formats, without retouching. Photographs, charts and diagrams should be referred to as "Figure(s)" and should be numbered consecutively in the order to which they are referred
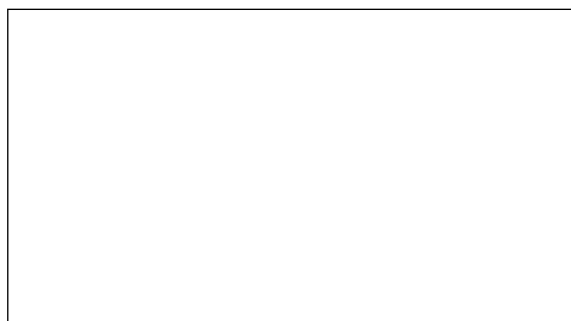
Figure 1 Figure caption

Table 2 Table caption

C1	C2	C3	C4	C5	C6	C7
R1						
R2						
R3						
R4						
R5						
R6						
R7						
R8						
R9						
R10						

Figure 2 Figure caption

5.   Discussion

The discussion should spell out the major conclusions of the work along with some explanation or speculation on the significance of these conclusions. How do the conclusions affect the existing assumptions and models in the field? How can future research build on these observations? What are the key experiments that must be done? The discussion should be concise and tightly argued. Conclusions firmly established by the presented data, hypotheses supported by the presented data, and speculations suggested by the presented data should be clearly identified as such. The results and discussion may be combined into one section, if desired.

6.   Conclusion

The Conclusion section restates the major findings and suggests further research.

7.   Acknowledgements

People who contributed to the work but do not fit criteria for authorship should be listed in the Acknowledgments, along with their contributions. It is the authors' responsibility to ensure that anyone named in the acknowledgments agrees to being so named. The funding sources that have supported the work should be included in the acknowledgments.

8.   References

JCSH uses the American Psychological Association (APA) referencing style, details of which can be found at http://www.apastyle.org/. References are arranged alphabetically according to the last names of the authors and then chronologically. The first line of each reference is aligned left. Use hanging style of 0.5 inch after the first line of each reference. Example of APA references format exists at appendix B.

Abstracts

Author./(Year of publication)./Title of Abstract (abstract)./*Journal Title,/Volume*(Issue),/Page number.
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Clark, D. V., Hausen, P. H., & Mammen, M. P. (2002). Impact of dengue in Thailand at the family and population levels (abstract).*Am J Trop Med Hyg*, *67*(2 Suppl), 239.

Books

Author./(Year of publication)./*Book Title:/Capital letter also for subtitle*./Edition (if any)./Location,/Country :/Publisher.

Example:
Cochrane, A. (2007). *Understanding urban policy: A critical approach.* Malden, MA: Blackwell Publishing.
Palmer, G. R., & Short, S. D. (2010). *Health care and public policy: An Australian analysis* (4th ed.). South Yarra, VIC: Palgrave Macmillan.
Bulliet, R. W., Crossley, P. K., Headrick, D. R., Hirsch, S. W., Johnson, L. L., & Northrup, D. (2011). *The earth and its peoples: A global history* (5th ed.). Boston, MA: Wadsworth.
Chapter in edited book
Richards, K. C. (1997). Views on globalization. In H. L. Vivaldi (Ed.), *Australia in a global worl*d (pp. 29-43). North Ryde, Australia: Century.

Article or Chapter in an Edited Book

Author./(Year of publication)./Title of chapter./In/Editor/(Ed.),/*Book Title*/(pages of chapter)./ Location:/Publisher.
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O'Neil, J. M., & Egan, J. (1992). Men's and women's gender role journeys: A metaphor for healing, transition, and transformation. In B. R. Wainrib (Ed.), *Gender issues across the life cycle* (pp. 107-123). New York, NY: Springer.

Conference and Seminar Proceedings

To cite proceedings that are published regularly, use the same format as for a journal article. To cite proceedings that are published in book form, use the same format as for an article in a book.
Example:
Tester, J. W. (2008). The future of geothermal energy as a major global energy supplier. *Proceedings of the Sir Mark Oliphant International Frontiers of Science and Technology Australian Geothermal Energy Conference*, Canberra, Australia: Geoscience Australia. Retrieved from http://www.ga.gov.au/image_cache/GA11825.pdf

Dissertation or Thesis

Author./(Year of publication)./*Title of dissertation or thesis* /(Doctoral dissertation or Master's thesis)./Awarding Institution.
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Norasingha, A. (2009). *Expression and distribution of mucorinic receptors in hepatic composite of the cirrhotic rat* (Master's thesis). Rangsit University, Pathum Thani.

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Author./(Year of publication)./Title of Editorial (editorial)./*Journal Title*,/ *Volume*(Issue),/Page numbers.

Example:

Fisher, R. I. (2003). Immunotherapy in Non-Hodgkin's lymphoma: Treatment advances (editorial). *Semin Oncol*, *30*(2Suppl 4), 1-2.

Journal Articles

Author./(Year of publication)./Article Title./*Journal Title*,/ *Volume*(Issue),/Page numbers.

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Leelawat, S., Leelawat, K., Narong, S., & Matangkasombut, O. (2010). The dual effects of delta 9-tetrahydrocannabinol on cholangiocarcinoma cells: Anti-invasion activity at low concentration and apoptosis induction at high concentration. *Cancer Investigation*, *28*(4), 357-363.

Polk, A., Amsden, B., Scarrtt, D., Gonzal, A., Oknamefe, O., & Goosen, M. (1994). Oral delivery in aquaculture. *Aquacult. Eng*, *13*, 311-323.

Seals, D. R., & Tanaka, H. (2000). Manuscript peer review: A helpful checklist for students and novice referees. *Advances in Physiology Education, 23*(1), 52-58.

Srichandum, S. & Rujirayanyong, T. (2010). Production scheduling for dispatching ready mixed concrete trucks using bee colony optimization. *American J. of Engineering and Applied Sciences*, *3*(1), 823-830.

Letters

Author./(Year of publication)./Title of Letter./*Journal Title*./ *Volume*(Issue),/Page number.

Example:

Enzensberger, W., & Fisher, P. A. (1996). Metronome in Parkinson's disease (letter). *Lancet*, *347*, 1337.

Notes

Author./(Year of publication)./Title of Note./*Journal Title*./ *Volume*(Issue),/Page number.

Example:

Haier, R. J., Schroeder, D. H., Tang, C., Head, K., & Colom, R. (2010). Gray matter correlates of cognitive ability tests used for vocational guidance. *Biomed Central*, *3*, 206.

Unpublished/In Press Articles

Author./(In press Year)./Article Title./*Journal Title*./(in press).

Example:

Veena, B. (2004). Economic pursuits and strategies of survival among Damor of Rajasthan. *J Hum Ecol.* (in press).

Internet periodicals

Author./(Year of publication)./Article Title./*Journal Title*,/*Volume*(issue),/ page numbers./Retrieved mm dd, year, from the full URL of the web page

Example:

Adams, P. J. (2000). Australian economic history. *Journal of Australian Economics, 5*(2), 117-132. Retrieved June 12, 2001, from http://jae.org/articles.html

Internet non-periodicals

Author./(Year of publication)./*Article Title*./Retrieved mm dd, year, from the full URL of the web page

Example:

Lemire, D. (n.d.). *Write good papers*. Retrieved July 1, 2010, from http//www.daniel-lemire.com/blog/rules-to-write-a-good-research-paper

<u>Newspaper retrieved from a database</u>
<u>Article – with an author</u>
Author./(mm dd, Year)./Article Title./*News agency*./Retrieved from the full URL of the web page
Example:
Darby, A. (August 20, 2002). Rarest tiger skin a rugged survivor. *Sydney Morning Herald.* Retrieved from
     http://www.smh.com.au

<u>Article – without an author</u>
Article Title./(mm dd, Year)./ *News agency*./Retrieved from the full URL of the web page

Example:
Rarest tiger skin a rugged survivor. (August 20, 2002). *Sydney Morning Herald.* Retrieved from
     http://www.smh.com.au

APPENDIX D

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