

# Spatial Analysis Of Sociodemographic Factors Influencing Sustainable Leadership In Coastal Communities

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## Abstract

Good leadership encourages good communities and importance in ensuring the sustainability of coastal tourism, especially in Terengganu. However, limited research has been done on how much sociodemographic characteristics affect sustainable leadership. The main objective of this research is to examine the relationship between variables of sociodemographic and sustainable leadership. Data was collected from 594 respondents along the coastal area of Terengganu. Five main variables of demographic factors including age, state, level of education, income and occupation were analysed to determine the influence towards sustainable leadership. These variables were evaluated in the context of five significant leadership dimensions: communication skills, critical thinking, ethical and moral skills, and sustainable leadership, and community involvement in tourism development. To identify patterns and relationships between leadership perceptions and sociodemographic variables, descriptive analysis and cross-tabulation methods were applied. Moreover, spatial analysis was utilized to visualize the variations as well as highlighted areas that needed more development and those with great leadership skills. The findings showed that age, occupation, and education significantly influence sustainable leadership, with higher education correlated with stronger leadership perceptions. Self-employed people and those working for the government showed greater engagement in sustainable leadership practices, while those with higher education levels (bachelor's degree and above) showed stronger perceptions of leadership. From the spatial analysis, rural districts like Setiu and Besut demonstrated lesser leadership participation, indicating areas that require attention, whereas urbanised districts like Kuala Terengganu and Marang shown stronger leadership traits. This study emphasises the necessity of focused leadership development initiatives and legislative actions to improve sustainable leadership in coastal communities.

**Keywords:** Coastal Area, Communities Development, Spatial Analysis, Sustainable Leadership, Sociodemographic

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## 1. INTRODUCTION

Sustainable leadership is an idea that combines a long-term view, ethical leadership, and community into strong and long-lasting groups, communities, and eventually systems that aim to make a sustainable future (Purwanto et al., 2024), especially in places where natural resources are heavily used. In contrast to traditional top-down business models that prioritise short-term economic gains, sustainable leadership emphasises environmental care, social justice, and pragmatic profitability (Liao, 2022). The importance of this leadership approach is particularly relevant in coastal communities, where livelihoods depend heavily on marine resources, fishing, and tourism-based economies (Becker & Kretsch, 2019). Coastal areas are full of life, with economic and environmental processes intertwined in complex ways. This shows how important it is for communities to have leaders who promote sustainability and environmental care in order to keep growing and protect the natural environment. The need for sustainable leadership has been stressed even more, driven by the increasing environmental challenges affecting coastal regions, such as advancing climate change, rising sea levels, coastal erosion, losses of biodiversity, and resource depletion (Sanopaka & Aziz, 2021). Coastal communities, particularly in tourism-based economies, will struggle in the absence of smart, nimble leadership. Adaptive strategies, participatory decision-making, and capacity-building in local populations can enhance resilience to environmental and economic shocks (Naylor et al., 2021). Coastal community leaders also need strong communication skills, critical thinking abilities, and ethical decision-making to navigate the complexities of sustainability while addressing the needs of different stakeholders (Warren, 2016). As a key economic driver in many coastal regions, tourism

plays a crucial role in the economy of many coastal regions, creating jobs, promoting cultural exchange, and sustaining small businesses (Warren, 2016). Perception is defined as the human ability to acknowledge something through physical senses by seeing, hearing, tasting and feeling during certain situations in focusing to grow up of the sustainability (Ramzi, 2019)

Coastal tourism in Terengganu, Malaysia, is an important sector for local developers. On the other side, when not managed well, tourism threatens to cause ecological deterioration, habitat degradation, pollution, and social displacement (Baloch et al., 2023). Instead, the rapid development of tourism in coastal areas poses problems of mass tourism, overconsumption of resources, and land use conflicts; these are all threats to long-term sustainability (Joseph & Pakkeerappa, 2015). Sustainable leadership in coastal tourism is fundamental to ensure that the delivery of tourism keeps creating economic benefits while consistently balancing environmental and social considerations. These challenges can be addressed by leaders in these regions adopting sustainable tourism models and participation-based efforts for tourism development (Agarwal et al., 2024). For example, beaches and waterfront tourism can be complemented by marine protected areas (MPAs), as well as waste management systems and low-impact infrastructure (Cabral et al., 2025). In addition, the allocation of tourism decisions to local communities promotes social cohesion and fosters the guardianship of natural resources (Alamineh et al., 2023). There is a growing recognition of the need for new approaches to sustainable tourism that are inclusive and promote participatory governance at all levels. A sustainable approach to tourism leadership should also address seasonal employment instability, the fair distribution of income, and the resilience of local businesses (Ginanjar et al., 2024). It is important to understand the influence of sociodemographic factors on sustainable leadership to design targeted interventions that enhance leadership capacity within coastal communities.

Geographic Information Systems (GIS) have proven useful for spatial analysis, environmental, and decision-making processes within the realm of coastal management (Saravanan et al., 2014). GIS presents the spatial patterns of land occupation, environmental vulnerabilities, and the impacts of tourism, assisting leaders in defining more informed and effective sustainability strategies (Vuković, 2022). GIS applications in coastal communities can range from mapping sensitive coastal habitats and assessing the potential effects of coastal erosion to monitoring marine biodiversity and optimising marine tourism zoning for development versus conservation (Šoltésová et al., 2025). When combined with GIS-based decision-making, sustainable leadership impacts spatial planning, risk assessment, and resource management. For example, utilising GIS can help leaders identify sensitive areas that will require stricter regulations to avoid damaging tourism (Xing, 2024). Such tools allow leaders to engage communities through interactive participatory mapping as a way of increasing transparency and engaging local stakeholders in contributing to sustainability initiatives (Vajjhala, 2005). According to Ramaano (2025), GIS is also a big part of promoting fair tourism development by making sure that the economic benefits are shared fairly across different districts while having the least amount of negative effects on the environment. Such a focus can support effective governance, optimise stakeholder cooperation, and assist in future sustainability efforts by integrating GIS alongside sustainable leadership frameworks in coastal cities.

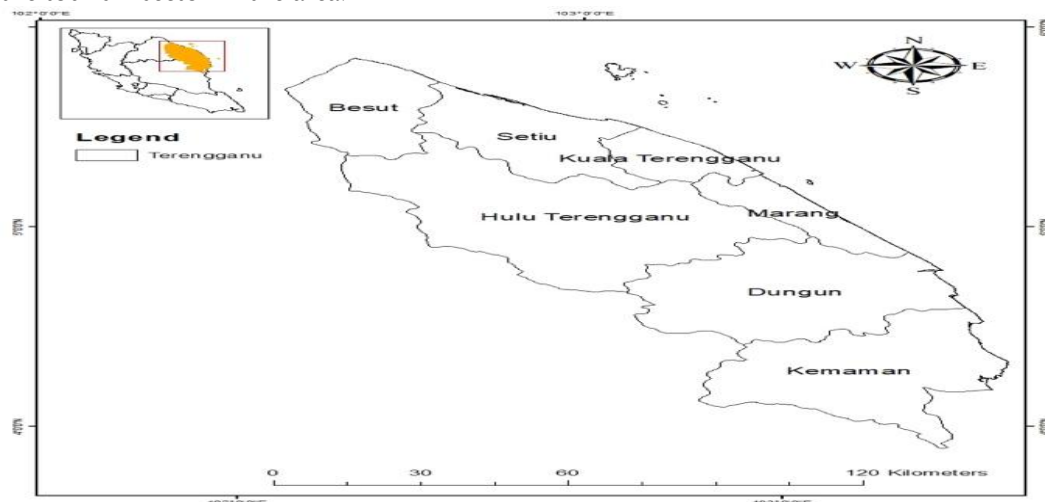
Coastal communities can be supported for resilience and sustainable development only through sustainable leadership. Despite existing literature regarding leadership in rural and coastal contexts, insufficient attention has been given to how sociodemographic factors impact sustainable leadership characteristics. While previous studies have emphasised, generally, leadership development, they have not thoroughly examined district, gender, education levels, employment status, and income status against sustainable leadership attributes (Armani et al., 2020). The gap is particularly stark in the coastal districts of Terengganu, where challenges to the environment, economy, and society call for community-led approaches to leadership. There isn't a lot of real-world evidence for the link between sociodemographic factors and sustainable leadership, which could make it harder for stakeholders to make community-based leadership programs that work for all the different types of people in populations. Thus, if the dynamics of contributions from various demographic groups to sustainability leadership are not well understood, this can result in inequitable policy development, ineffective leadership training, and limited community involvement in sustainable development initiatives.

To fill the gap, this study aims to explore the linkage between the sociodemographic traits and the attributes of sustainable leadership among the coastal communities of Terengganu. In particular, such analysis aims to investigate the influence of one or more of the following demographics on key leadership characteristics (communication skills, critical thinking, ethical values, leadership skills, and community

involvement): district, gender, level of education, occupation, and income. Moreover, this research supports national sustainable development goals, SDG 11 (sustainable cities and communities). The study will have practical implications by offering empirical insights into the relationship between these factors and sustainable leadership dimensions, which will inform leadership development programs, policy frameworks, and capacity-building efforts for coastal communities. These will also help policymakers, community leaders, and other interested parties come up with targeted strategies to improve leadership skills in general. This is because some communities are able to achieve sustainable development while most fail, teaching us lessons that can be used in future developments in communities all over the world. By using GIS-based spatial and temporal analysis to show the geographic and demographic aspects of projects, this research will also encourage coastal governance and leadership that is based on space.

## 2. RESEARCH METHODOLOGY

This research was conducted in Kuala Terengganu. Figure 1 displays the location of the study area. The study area is situated along the coastal region of the South China Sea. The coordinates of Kuala Terengganu are  $5^{\circ}19'48.72''$  N  $103^{\circ}08'26.88''$  E. Terengganu consists of 7 main districts which are Besut, Setiu, Kuala Terengganu, Hulu Terengganu, Marang, Dungun and Kemaman. Nevertheless, for this research, only 6 districts involve which are Besut, Setiu, Kuala Terengganu, Hulu Terengganu, Marang, Dungun and Kemaman as these districts are situated along the coastal area. Terengganu provides a stunning coastal getaway ideal for beachgoers and nature lovers, and is well-known for its gorgeous beaches and abundant marine life. Popular destinations including Redang Island, Perhentian Island and many more cause an increase in the number of tourists hence contributing towards the development of the tourism sector in the area.



**Figure 1:** Location of the study area, Terengganu

### 2. 1 Research Design

This study employs a quantitative research design to analyse the correlation between sociodemographic factors and sustainable leadership attributes among coastal communities in Terengganu. Data abstraction was done through a structured questionnaire to maintain uniformity and reliability in evaluating the proposed variables. Respondents come from six coastal districts in Terengganu (Besut, Setiu, Kuala Terengganu, Dungun, Marang, and Kemaman). Finally, the study applied a purposive sampling technique to select 594 respondents from coastal communities with varying sociodemographic profiles. The main tool for data collection was a structured questionnaire, which was divided into five sections: Part A: Sociodemographic data (district, type of gender, age, marital status, education level, occupational status, and income). Part B to E: Evaluation of sustainable leadership attributes including the essential competencies of communication skills, critical thinking skills, moral and ethical values, sustainable leadership and participation within the community. Face-to-face surveys were conducted to maximise the response rate and minimise the missing data. Responders were informed about the aim of the study, and participation was voluntary.

### 2.2 Data Analysis

The collected data was recorded in Microsoft Excel by using coding and sorting techniques. The statistical package for the social sciences (SPSS), version 26, was used to analyse the collected data. This study utilised three core statistical techniques: descriptive analysis to describe sociodemographic characteristics

and sustainable leadership attributes, and then further analysis of the data using crosstab analysis to examine the association of sociodemographic factors with sustainable leadership attributes. The software ArcGIS version 10.8.2 was used for spatial analysis. The Inverse Distance Weighting (IDW) method was used to interpolate geographical data and make accurate spatial models for analysis. To better comprehend geographic patterns and trends in the variables being studied, this method creates continuous surfaces that help visualise the spatial distribution of the data. The findings from this study will add to the body of research on how sociodemographic affect sustainable leadership in coastal communities. They will also help people who are trying to improve leadership in the real world.

### 3. ANALYSIS AND DISCUSSION

#### 3.1 Socio-Demographic Profile of Respondents in Coastal Communities

Table 1 presents a thorough study of the respondents depending on several demographic variables together with their education level, occupation, income range, and occupation. Starting with residence, Setiu (11.1%), followed by Marang (26.9%) and Kuala Terengganu (34.8%), had the greatest proportion of responses. The information also reveals the degree of education; the majority had finished secondary school (45.3%), while a smaller percentage had obtained higher degrees like a bachelor's degree (12.6%) and a diploma (14.5%). In terms of gender, 50.2% of women and 49.7% of men participated in this study, creating a nearly balanced population. With other age groups varying in size, such as 18 to 24 years (12.1%) and 45 to 54 years (20.7%), the age distribution shows that the largest group lies between 25 to 34 years (20.5%). About marriage, 66.3% of respondents are married; a smaller proportion, 22.4%, are single. 39.1% of the population works for themselves, followed by the government (16%), the private sector (19.2%), and self-employed (39.1%). While more than 56%, a notable percentage (20.9%) is also unemployed, especially in the lowest range of the income group  $\leq 2\%$ . R4501 This table provides a summary of the population under study's socioeconomic and demographic situation.

**Table 1:** Sociodemographic Profile of Respondents in Coastal Communities Characteristics by Demographic

Characteristics by Demographic			
State	Frequency, n (%)	Level of Education	Frequency, n (%)
Besut	48 (8.1)	Primary School	56 (9.4)
Setiu	66 (11.1)	Secondary School	269 (45.3)
Kuala Terengganu	207 (34.8)	STPM	53 (8.9)
Marang	160 (26.9)	Certificates	37 (6.2)
Dungun	60 (10.1)	Diploma	86 (14.5)
Kemaman	53 (8.9)	Bachelor's degree	75 (12.6)
Gender		Master	7 (1.2)
Male	295 (49.7)	PhD	3 (0.5)
Female	298 (50.2)	Others	8 (1.3)
Age		Occupation	
18 hingga 24	72 (12.1)	Government	95 (16)
25 hingga 34	122 (20.5)	Private	114 (19.2)
35 hingga 44	108 (18.2)	Self-employed	232 (39.1)
45 hingga 54	123 (20.7)	unemployed	124 (20.9)
55 hingga 64	113 (19)	Others	29 (4.9)
$\geq 65$	56 (9.4)		
Marital Status		Income	
Married	394 (66.3)	$\leq$ RM1500	336 (56.6)
Divorce	21 (3.5)	RM1501 - RM3000	181 (30.5)
Widow	46 (7.7)	RM3001 - RM4500	46 (7.7)
Single	133 (22.4)	$\geq$ RM4501	31 (5.2)

#### 3.2 Relationship Between Sociodemographic Characteristics and Sustainable Leadership in Coastal Communities

### 3.2.1 Variations in Sustainable Leadership Across Coastal Districts

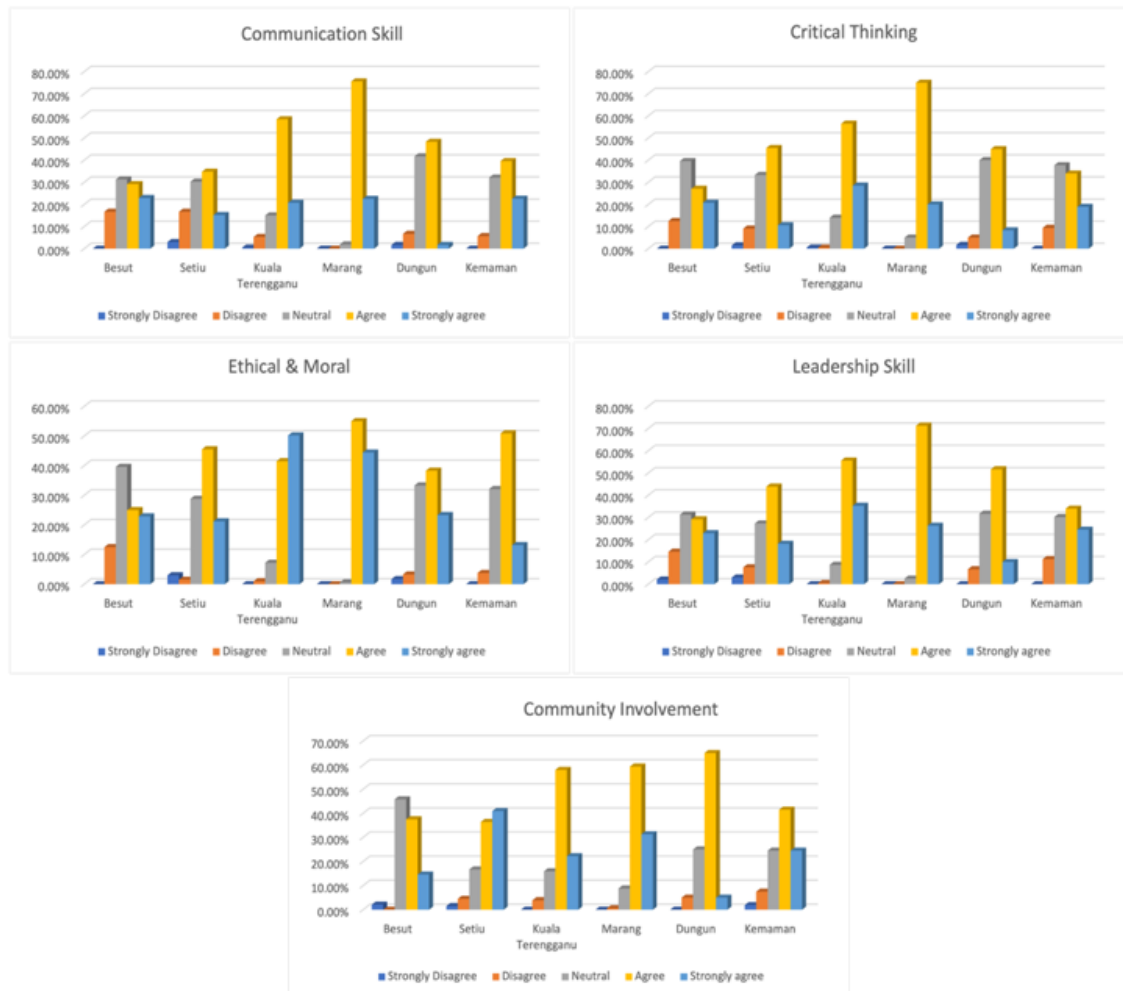
The crosstab analysis reveals varying levels of sustainable leadership attributes in Terengganu districts (Figure 2). Based on the survey findings, respondents generally exhibit a strong agreement that their leaders demonstrate effective communication skills. This is particularly evident in districts such as Marang and Kuala Terengganu, where a high percentage of respondents either agreed or strongly agreed that their leaders effectively communicate. Effective communication is a fundamental characteristic of sustainable leadership, as it enhances transparency, trust, and collective decision-making (Zamani & Karami, 2006). Leaders who are adept communicators can mobilise community participation and encourage sustainable practices, which is critical for addressing environmental and socioeconomic challenges in coastal regions (Stover et al., 2024). Critical thinking skills, which involve problem-solving and adaptive leadership, also received positive responses across all districts, with Marang showing the highest level of agreement. Leaders who exhibit strong critical thinking abilities are more likely to make informed decisions that align with long-term sustainability goals (Felix, 2023). In coastal communities, where challenges such as climate change, coastal erosion, and resource depletion are prevalent, critical thinking is essential for developing innovative solutions and ensuring resilience (Liao, 2022). The high level of agreement in this category suggests that respondents perceive their leaders as capable of addressing complex environmental and social issues.

Ethical and moral values, which are key to sustainable leadership, received varied responses across different districts. While Marang and Kuala Terengganu recorded a high percentage of strong agreement, other districts showed relatively neutral responses. Ethical leadership is crucial in ensuring equity, social justice, and environmental responsibility (Lansing et al., 2023). Leaders who demonstrate ethical integrity foster trust and social cohesion within communities, which is particularly important in coastal regions where livelihoods depend on shared natural resources (Lee et al., 2024). The variation in responses may indicate differences in leadership styles, governance effectiveness, or public confidence in leadership ethics across districts. Leadership skills, including decision-making, strategic vision, and community mobilisation, were rated positively, particularly in Marang. According to Liao (2022), effective leaders inspire and guide their communities towards sustainable development. A high degree of agreement suggests that respondents recognise their leaders as proactive and capable of implementing sustainable policies. Similarly, community involvement received strong agreement across all districts, implying that respondents perceive their leaders as participatory and inclusive. Community engagement is a core principle of sustainable leadership, as it ensures that decision-making processes reflect local needs and aspirations (Suriyankietkaew et al., 2022).

The respondents in Marang, Kuala Terengganu, and Dungun all agreed on many things when it came to community involvement, which is a key part of reaching sustainability goals. This result is consistent with earlier studies showing that participatory programs in local communities were one of the major driving factors for successful sustainability efforts (Marzo et al., 2023). The results indicate that respondents from more urbanised and economically active districts, specifically Kuala Terengganu and Marang, demonstrate enhanced positive perceptions in all dimensions of sustainable leadership. This might be due to increased exposure to governance frameworks, collaborative opportunities, and institutional support. These findings complement earlier research showing that urban areas typically provide better access to social networks encouraging leadership development, economic possibilities, and educational resources (Evans et al., 2023). These three low-scoring districts, Kemaman, Besut, and Setiu, may require the implementation of leadership programmes to increase community consensus. In contrast, however, Besut showed a higher percentage of neutral responses, indicating less effective community engagement. Previous research by Gholipour et al. (2023) has identified barriers to active community participation, including a lack of awareness, weak institutions, and deficits in social capital. This study provides information about what drives people to be involved in their community in this situation. This information could help to design targeted interventions (like awareness campaigns and frameworks for participatory decision-making) to boost community involvement in areas where it has been found to be low.

Overall, the findings suggest that respondents generally hold positive perceptions of their leaders' sustainable leadership attributes, with Marang consistently receiving the highest ratings across multiple dimensions. However, variations in ethical and moral values across districts indicate potential areas for further exploration. Future research could examine the factors influencing these perceptions, such as governance effectiveness, leadership training, and community participation levels. To help coastal communities stay strong in the long term, the results show how important it is to encourage long-lasting

leadership styles that include moral decision-making, critical thinking, and active community involvement.

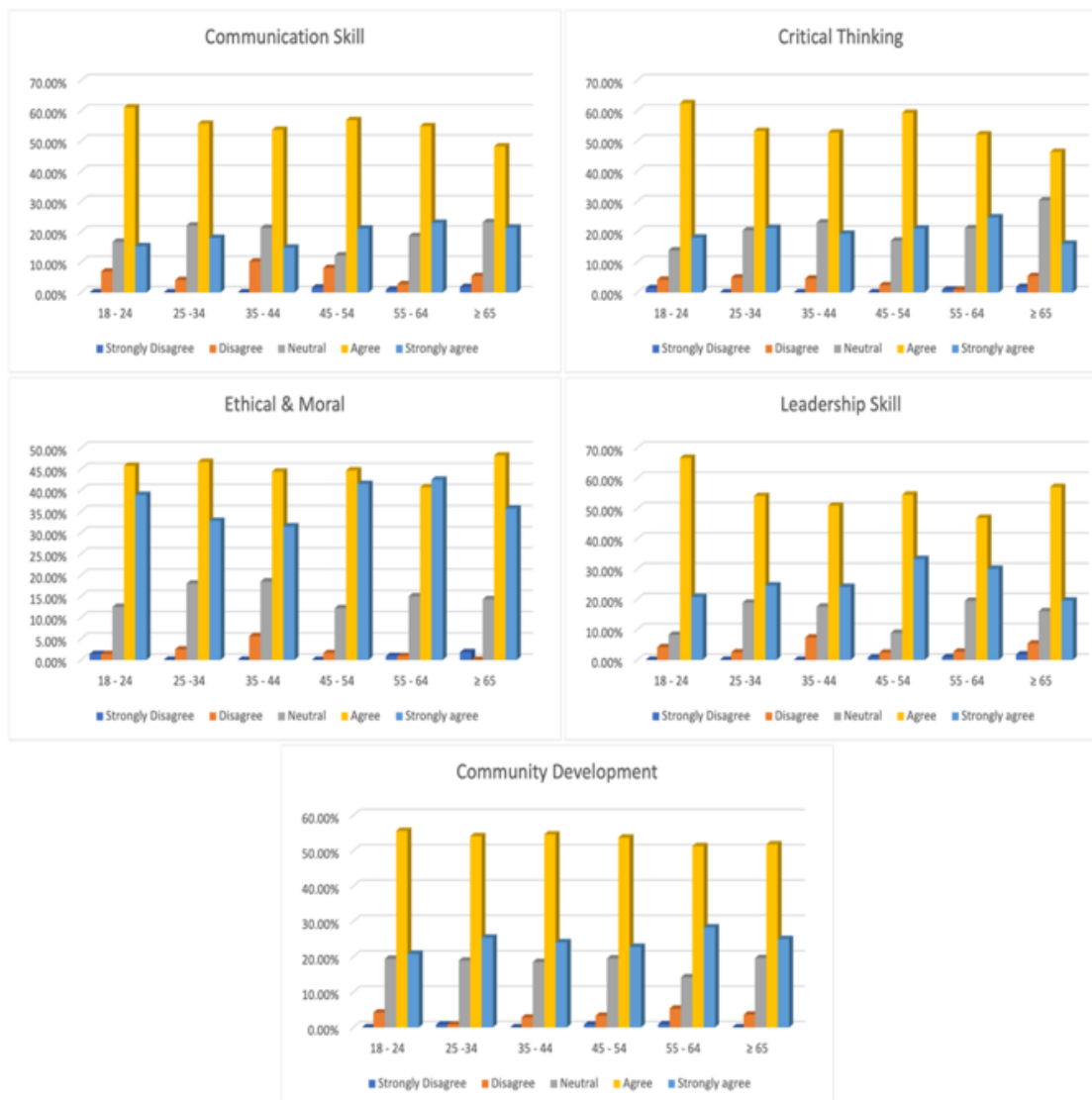


**Figure 2: Perceptions of Sustainable Leadership by District: A Crosstab Analysis of Coastal Communities**  
**3.2.2 The Role of Age in Leadership Development Among Coastal Communities**

Respondents of all ages strongly agree or strongly agree that certain leadership qualities are important, as revealed by the analysis. The evidence indicates that people of all ages value leadership qualities (Figure 3). According to the data, most of the various age groups' respondents have positive assessments of their leaders' communication; a large percentage of them either agree or strongly agree that their leaders interact with the people and communicate policy effectively. Toseef et al. (2022) say that sustainable leadership is built on positive communication because it builds trust, makes it easier to share knowledge, and strengthens the group decision-making skills that are needed to deal with socio-environmental problems in coastal areas. In the same way, especially among middle-aged respondents, critical thinking is seen in a positive light, suggesting that leaders are considered capable of addressing intricate problems and making sound judgements. This finding is consistent with the existing body of literature, which emphasises the need for critical thinking in sustainable leadership when building innovation and resilience among communities that are exposed to environmental challenges (Ricketts, 2005).

Leaders are positively evaluated in the domain of ethical and moral leadership, with older respondents demonstrating greater concurrence. Ethical leadership is essential for ensuring the long-term sustainability of communities (Shuya & Zainal, 2022). Consequently, leaders who uphold ethical norms are more likely to foster trust with their constituency and engage in sustainability projects (Jiang et al., 2015). The elevated consensus among older respondents may result from their prolonged exposure to leadership approaches, allowing them to evaluate ethical governance over time. Leadership qualities elicited minimally favourable feedback across all age groups. Leaders in coastal communities are expected to leverage resources, implement policies, and advocate for sustainability, which are essential for enduring environmental and socio-economic stability (Larsson et al., 2023). Younger respondents exhibit comparatively lower levels of agreement, suggesting a divergence between older and younger generations regarding leadership expectations and engagement in governance procedures.

Ultimately, community development characterised by leaders' deliberate efforts towards participatory governance and social cohesion emerges as another significant quality, receiving overwhelmingly good feedback universally. This aligns with prior research that has emphasised the importance of inclusive leadership in promoting sustainable community development and resilience-building efforts among vulnerable populations in a specific region (Sixsmith et al., 2023). The results suggest that respondents typically view their leaders positively for sustainable leadership; however, variations among age groups imply possible disparities in participation or expectations. Further research should investigate the factors influencing these impressions, including leadership styles, policy effectiveness, and the degree of community engagement. The results show how important it is to keep learning how to be a leader in coastal areas. The process includes learning how to make ethical decisions, adapt to new situations, and involve the community. These efforts are critical because they help leaders change how they do things to better help these communities deal with the unique problems they face with environmental sustainability and socioeconomic development.



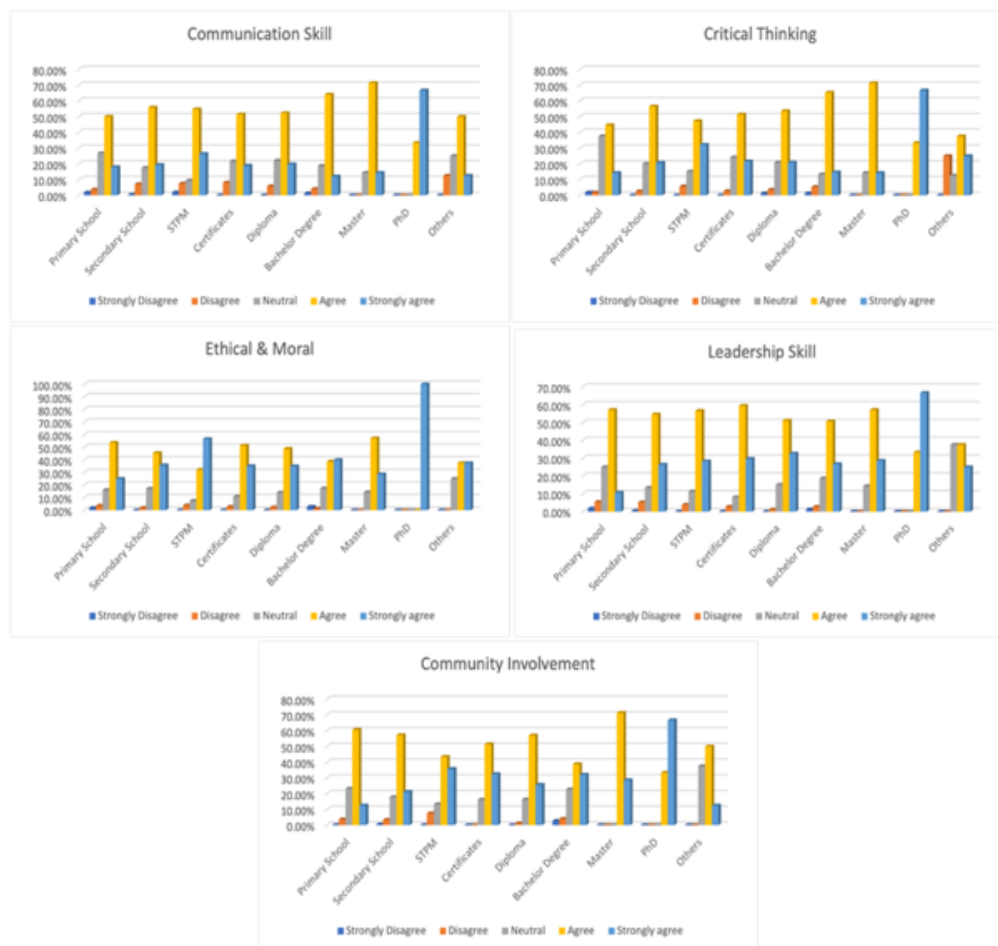
**Figure 3:** Perceptions of Sustainable Leadership by Age: A Crosstab Analysis of Coastal Communities

### 3.2.3 Educational Attainment and Its Impact on Leadership Practices

The perception of respondents toward their leaders' sustainable leadership in coastal areas is different based on their education (Figure 4). People with more education, especially a PhD or master's degree, are much more likely to strongly agree with all of the leadership traits that were tested. These include communication skills, moral and ethical values, critical thinking and positive judgement, leadership skills, and community, global, or social involvement. It indicates a much more participatory, highly informed individual about strategic governance compared to previous studies indicating higher-educated people (Aranda et al., 2022). More educated people learn about theories of leadership, as well as critical inquiry, with which they can judge whether they possess the competencies of their leaders (Alvarez-Huerta et al., 2022). In contrast, those with much lower levels of education, for example, those receiving concurrently

only primary or secondary school education, exhibit a patchier set of responses, with a significant percentage remaining neutral in their evaluations. It may imply that they are not interested or do not understand leadership positions in the development of a community because research shows that lower education levels can limit access to information or participation in decision-making processes (Iqbal & Piwowar-Sulej, 2022).

Additionally, people with lower education backgrounds are likely to judge their leaders based on personal feelings based on experience and not based on any leadership theory. Furthermore, all of the most educated respondents agreed that moral and ethical leadership was important, which suggests that they value responsibility and accountability in government. This conclusion fits with research that shows ethical leadership is the foundation of long-term leadership (Malik et al., 2023-2). Furthermore, people of all educational levels think that being involved in the community is a beneficial thing, with higher levels of education being linked to stronger agreement with this view (Dauer et al., 2021). Furthermore, education promotes civic engagement and active involvement in community development (Martini et al., 2023). Future studies need to further investigate the pathways through which leaders can bridge the educational gap to create a more inclusive view of sustainable leadership. A long-term perspective towards sustainable coastal resilience can be achieved through inclusive leadership that considers different educational backgrounds.



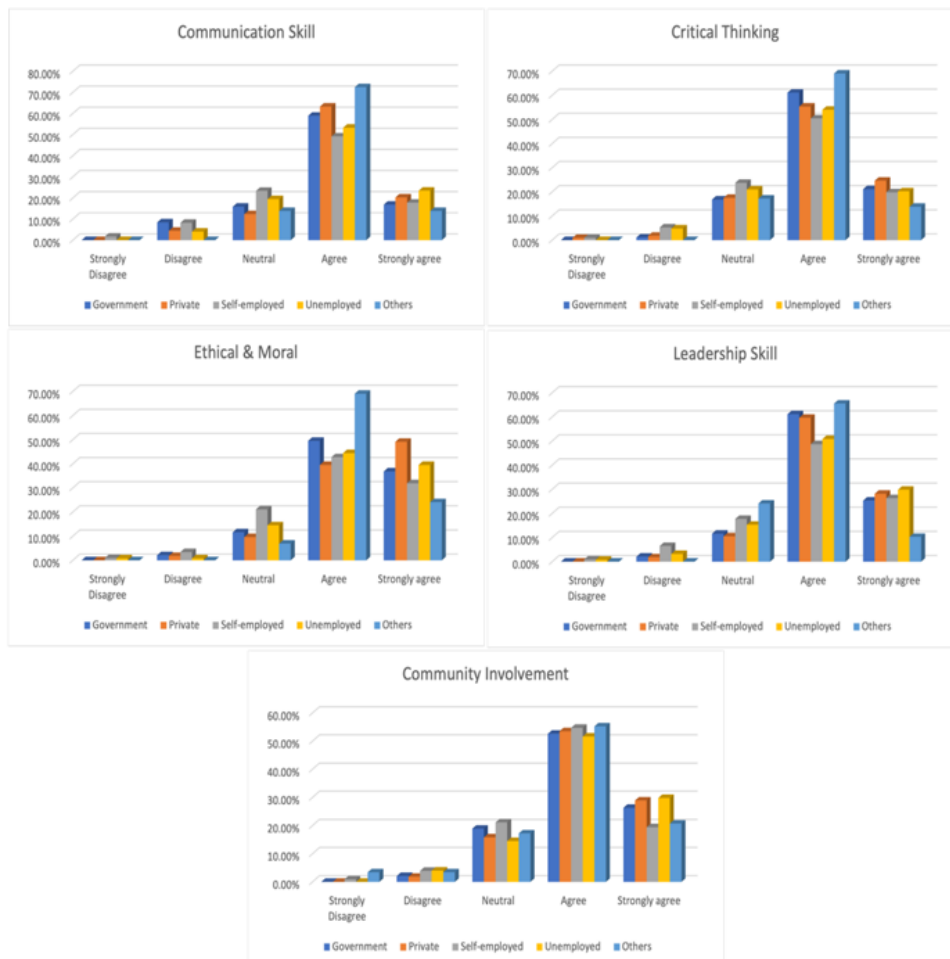
**Figure 4:** Perceptions of Sustainable Leadership by Education Level: A Crosstab Analysis of Coastal Communities

### 3.2.4 Occupational Background and Its Effect on Sustainable Leadership

Figure 5 shows the differences across the occupational categories for combinations of the attributes of sustainable leadership, government employees, private sector workers, self-employed, unemployed, and others. The results indicate that the respondents among all occupational categories were in general agreement or strong agreement with the leadership traits measured. As for government and private sector workers, they seem to have a slightly higher consensus on most leadership attributes, which is in accordance with existing literature that suggests employees in the formal economy are more likely to experience structured leadership and organisational management practices (Tung, 1979). After working

in professional settings, they might be able to think critically about how well this kind of leadership works and name traits like making moral decisions, communicating strategically, and involving everyone in decision-making (Din & Zhang, 2023).

Those self-employed and under the "others" category show similarly high levels of agreement, though responses vary slightly more. Members of this group often draw on informal networks and experiential knowledge to evaluate leadership, illustrating the function of adaptive leadership in non-traditional work environments (Maden-Eyiusta & Alparslan, 2022). The unemployed respondents also have positive leadership perceptions seen as well as a more even response distribution across neutral and agreement categories. Studies indicate that those out of work rate leaders less on organisational terms but on their effect at the community level instead, on the importance of community engagement and social support systems (Infurna et al., 2016). This finding lends further weight to the call that sustainable leadership of coastal areas must include inclusivity of participatory governance for resolution of local socio-economic challenges (Neumann et al., 2017). Because there are so many people with different interests, coastal communities would benefit from leadership and governance styles that encourage groups with different jobs, backgrounds, and points of view to work together and make sure that all points of view are fairly represented in negotiations and decision-making. The study's results underscore the need for contextualized leadership strategies that consolidate formal and informal practices and drive positive sustainability outcomes in coastal settings. Future research can expand on how occupation influences minute expectations or involvement in community-led governance.



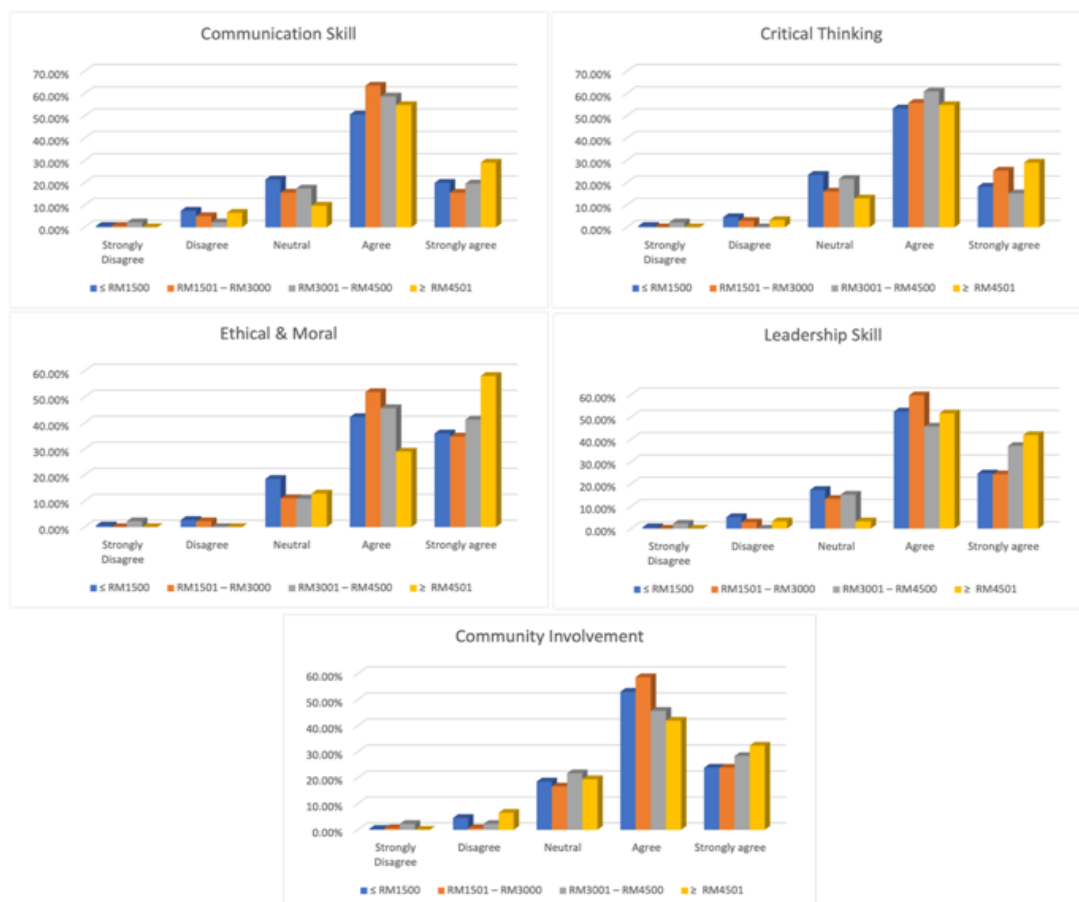
**Figure 5:** Perceptions of Sustainable Leadership by Occupation: A Crosstab Analysis of Coastal Communities.

### 3.2.5 Income Levels and Leadership Capacities in Coastal Communities

Figure 6 illustrates the relationship between respondents' perceptions of sustainable leadership traits and their income levels. Based on income levels, ranging from RM1500 and below to RM4501 and above, respondents' perceptions of their leaders' sustainable leadership in coastal areas are presented. Only a minority of respondents disagree with the leadership attributes assessed, and while the communication skills, critical thinking, ethical and moral values, leadership skills, and community involvement held across all income brackets, there were significant differences between respondents of different income

levels. Respondents with higher incomes (RM4501 and above) were more likely to agree with the final composite statements about leadership traits, especially those related to ethics and morals. This finding suggests that people with higher economic security are more likely to be exposed to leadership systems, stable governments, and ethical dilemmas (Zagorsky, 2017). This may be because their educational and professional environments shape their expectations and perceptions of effective leadership (Kragt & Day, 2020).

Lower-income (RM1500 below) respondents showed reasonable agreement with attributes defined by the leadership, although their results were a bit more spread on agree and neutral segments. This pattern fits with research that says people with less money may judge leaders by how much they help the community in real ways, like by getting involved directly and making it easier for others to find support (De Weger et al., 2022). In "Coastal Communities and How They Define Sustainable Leadership," sustainable leadership is defined as coastal leaders working to address economic vulnerabilities and social inequalities through participatory governance and inclusive decision-making (Abdullah et al., 2025). Overall, their understanding of a successful leader as someone who prioritises the community, maintains strong ethical standards, and demonstrates social responsibility transcends coastal regions and income brackets. Regardless of their income levels, respondents strongly agreed on the importance of community involvement as a leadership quality. This discovery highlights the importance of incorporating sustainable leadership into community engagement to help build social ties and resilience among coastal communities (Abdullah et al., 2025). Leadership must be adaptive, participatory, and inclusive to meet the needs of both current generations and the future, particularly in coastal regions which often face unique socio-economic and environmental challenges. Future studies should continue to analyse the intersection of economic backgrounds and leadership expectations in these areas and further develop sustainable governance strategies through influence.



**Figure 6:** Perceptions of Sustainable Leadership by Income: A Crosstab Analysis of Coastal Communities  
**4. SPATIAL ANALYSIS ON SUSTAINABLE LEADERSHIP**

The spatial model presented in the figure 7 illustrates the distribution of sustainable leadership skills across Terengganu. There are five main key variables: Communication Skills, Critical Thinking, Ethical & Moral Skills, Sustainable Leadership, and Community Involvement in Tourism Development. The levels of agreement are indicated by a colour-coded legend on each map, with "Strongly Disagree" in red,

“Disagree” in orange, “Neutral” in yellow, “Agree” in mint green, “Strongly Agree” in green. These spatial analyses were analyzed by using software ArcGIS version 10.8.2 where leadership aspects were observed and visualized across different states of Terengganu coastal areas.

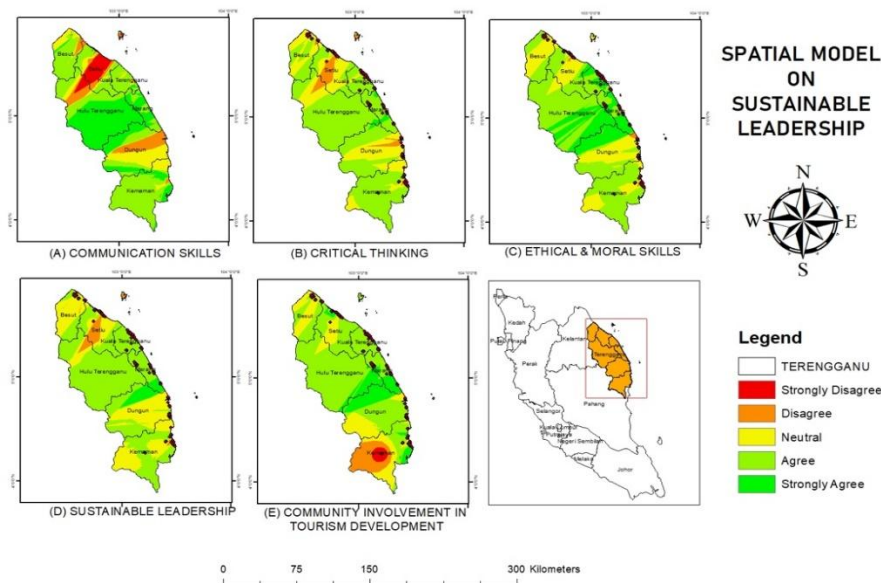
Firstly, communication skills showed 55% of respondents agreed and 19% strongly agreed that communication was recognized as being relatively strong in Terengganu. This indicates the majority of respondents believe that leadership communication skills were important for effective management of a state or district. Research by Hyland-Wood et al., (2021) highlights that leaders must communicate clearly and openly in order to establish public confidence, maintain responsibility, and develop an informed and committed citizen. Furthermore, effective leadership communication promotes collaboration and ensures the development of tourism in that area. Nevertheless, some districts showed 15% neutral and 7% disagree which highlights that minority respondents feel their leaders have good communication skills. Red zones in some areas indicate respondents strongly disagree that their leader had good communication skills thus its suggest that specific actions are required to improve communication skills further.

Moreover, critical thinking visualizes patterns where 55% agree and 21% strongly agree, indicating the leadership in that area demonstrates strong critical thinking skills. Minority of the respondents shown 15% neutral and 5% disagree on critical thinking skills of the leadership. The results also highlight none of the respondent selects strongly disagree on the critical thinking for leadership. Stated by Mustip et al., (2024), developing critical thinking skills is important developing critical thinking skills is important for solving complex problems, informed decisions, and guiding citizens effectively toward sustainable and resilient coastal development. Hence, enhancing critical thinking skills through professional development programs and capacity-building activities could strengthen decision-making and leadership effectiveness in coastal communities.

The trend for moral and ethical skills is slightly differential, with 45% of respondents agree and 37% strongly agree. Meanwhile, 15% of the respondent chose neutral indicating the leader for their districts lacked moral and ethical skills in leading the area. As emphasized by Fry et al., (2021), moral and ethical skills were essential for community leadership because they promote accountability, justice, and trust, guaranteeing decisions, maintaining moral principles and social responsibility while also benefiting society. Leaders that possess strong moral and ethical qualities lead by example, inspire confidence, and foster an honest and respectful culture in their communities (Seijts et al., 2022). The findings show that different respondents have different ideas regarding moral and ethical leadership, hence leaders must have better ethical foundations in order to promote trust, accountability, and sustainability in communities.

Sustainable leadership reveals 54% of the respondents agreed and 26% were strongly agreed. The 15% answers were neutral and 4% disagreed, indicating that certain districts might not have a clear opinion on this leadership issue. Sustainable leadership refers as prioritises long-term achievement, moral decision-making, and environmental, social, and economic sustainability (Boeske , 2023). Liao, (2022) mentioned that sustainable leadership implies that leadership approaches remain to benefit future generations by requiring resilience and strategic thinking. The implementation of sustainable leadership has long-lasting benefits by fostering resilience, encouraging moral decision-making, and supporting social, economic, and environmental sustainability. Community leaders that embrace sustainable leadership could effectively solve community problems, promote significant advancement, and leave positive impacts for next generations.

The community involvement in tourism development variables shown 53% agree and 24% strongly agree, reflecting that local communities' contribution in sustainable tourism is positively recognised. There were 17% of the respondents who chose neutral and 4% disagree for the community's involvement in tourism development. However, the existence of a red zone in Terengganu's southern region indicates 2% of disagreement, most likely as a result of infrastructure or economic issues that limit the community's participation. Mentioned by Zielinski et al., (2021), economic reliance, political restrictions, and a lack of resources are some of the obstacles that frequently prevent community involvement in the growth of tourism. Enhancing participation and promoting sustainable tourism growth can be achieved by addressing these gaps through inclusive tourism legislation, community-based tourism programs, and infrastructural improvements. Greater community involvement in tourism planning can result in better environmental preservation and local economic growth (Baloch et al., 2023).



**Figure 7:** Spatial Analysis on Sustainable Leaderships

In summary, the spatial analysis visualizes the strength and weakness on sustainable leaderships skills across the Terengganu's district focusing on coastal areas. Although ethical, critical thinking, and communication abilities are strongly rated favourably, other variables continue to have neutral or unfavourable opinions, suggesting the need for focused interventions. The varying roles of community involvement and sustainable leadership in tourism development also point to the need for regulatory changes and educational initiatives to close the gaps. The coastal communities of Terengganu can achieve sustainable development and more efficient governance through implementing particular strategies to improve their leadership skills into action.

## 5. CONCLUSION

This study presents important insights about the connection between sustainable leadership and sociodemographic characteristics in coastal communities in Terengganu. The results show that perceptions of leadership are significantly influenced by factors such as income level, occupation, and education of the respondents. Stronger sustainable leadership skills are observed in districts with greater exposure to urban areas (Kuala Terengganu and Marang), especially in the areas of communication, critical thinking, as well as ethical and moral. This research also highlights how crucial community engagement is for the growth of tourism in order to guarantee sustainability for the future. Policymakers and stakeholders should concentrate on community involvement projects, leadership development programs, and the incorporation of geographic information systems (GIS) for efficient governance to promote sustainable leadership. Districts in rural areas, where leadership development is less prominent, should receive special attention from the government. To ensure social well-being, economic progress, and environmental sustainability in the face of global problems, coastal regions must strengthen their leadership potential.

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