Sharia Economic and Management Business Journal (SEMBJ)

| Volume 8, Issue 1, 2027 | Page 12-39 |
https://doi.org/10.62159/sembj.v8i1.2811
ISSN-Online: 2774-2679
This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License © 2026 by author/s.
https://siducat.org/index.php/sembj

From Sea to Land: Socioeconomic Adaptation and Transformation of Fishing Communities Following Seawall Development in Coastal Cilincing, North Jakarta

Indi Nervilia[1]*, Hikmah Rahmah[2], Erna Amelia[3], Nurwulan Kusuma Devi[4], Haspul Naser[5]

[1245]Mitra Bangsa University, Indonesia.
[3]University of Tama Jagakarsa, Indonesia.

indinervilia@umiba.ac.id *✉

ARTICLE INFO

Keywords:
seawall ecological impact; economic pressure; fishers' adaptation strategies; government support; fishers' livelihood resilience; coastal transformation; PLS-SEM;

ABSTRACT

Background: Coastal infrastructure development has significantly changed the socioeconomic conditions of fishing communities in fast-urbanizing coastal areas. In Cilincing, North Jakarta, seawall construction has changed coastal ecosystems, restricted access to fishing grounds, and increased economic pressure, forcing fishing households to adopt new livelihood strategies. This study investigates the interaction between seawall ecological impacts, economic pressure, fishers' adaptation strategies, and government support for fishers' livelihood resilience within the framework of the "From Sea to Land" transition.
Research Gap: Previous studies have predominantly examined seawall development from engineering and environmental perspectives, with limited attention devoted to understanding how coastal infrastructure influences long-term socioeconomic transformation among fishing communities. Existing research has investigated livelihood diversification, social capital, governance, and resilience as separate dimensions, providing limited empirical evidence regarding their interactions, and has not sufficiently distinguished whether livelihood responses represent short-term coping, incremental adaptation, or transformative change.
Novelty: This study introduces the "From Sea to Land" framework that distinguishes coping responses, incremental adaptation, and transformative change, integrating ecological, economic, social, and institutional dimensions into a unified analytical model. It further provides an Islamic ethical lens interpreting coastal transformation through khalifah, mizan, hifz al-bi'ah, adl, maslahah, takaful, halal livelihood, and hisbah.
Method: A quantitative cross-sectional survey was employed. Data were collected from small-scale fishers in Cilincing, North Jakarta, and analyzed using PLS-SEM with SmartPLS 4.
Results: Seawall Ecological Impact (β=0.254, p=0.001) and Economic Pressure (β=0.473, p<0.001) significantly influence fishers' adaptation strategies. Economic Pressure significantly influences livelihood resilience (β=0.294, p=0.006). However, Seawall Ecological Impact has no direct effect on livelihood resilience, and adaptation strategies have no direct effect on livelihood resilience and do not mediate the effects of ecological impact and economic pressure. Government Support significantly moderates the relationship between adaptation strategies and livelihood resilience (β=0.147, p=0.049).
Conclusion: Fishers' resilience cannot be improved through livelihood adaptation alone but requires effective government interventions. Strong institutional support, flexible governance models, and targeted economic support are critical. This study

provides empirical evidence to promote more inclusive coastal governance and sustainable livelihood policies in rapidly urbanizing coastal regions.

Received: 7/29/2026 **Revised:** 9/10/2026 **Accepted:** 9/16/2026 **Published:** 11/4/2026

How to cite this article:
Nervilia, N., Rahmah, H., Amelia, E., Devi, N.K., & Naser, H. (2027). From Sea to Land: Socioeconomic Adaptation and Transformation of Fishing Communities Following Seawall Development in Coastal Cilincing, North Jakarta. Sharia Economic and Management Business Journal (SEMBJ), 8(1), 12-39. https://doi.org/10.62159/sembj.v8i1.2811

INTRODUCTION

Small-scale fisheries (SSF) play a fundamental role in sustaining food security, local economies, and cultural identity in coastal regions worldwide. According to the Food and Agriculture Organization (FAO), more than 90% of the world's capture fishers operate in small-scale fisheries, providing livelihoods for millions of coastal households and contributing significantly to the national food systems (FAO, 2024). Beyond their economic importance, small-scale fishing communities preserve local ecological knowledge, strengthen social cohesion, and support sustainable resource management through intergenerational practices. However, these communities are increasingly exposed to multiple pressures arising from climate change, coastal urbanization, environmental degradation, and large-scale infrastructure development, all of which have substantially altered the ecological and socioeconomic conditions on which traditional fishing livelihoods depend (Bennett et al., 2021; Mansfield et al., 2024).

Table 1. Impacts of Seawall Development on Fishing Communities, Ecology, Society and the Coastal Envirmonment

Impacts on Fishing Communities	Description	Ecological, Social, and Environmental Impacts	Description
Restricted Access to Fishing Grounds	Concrete seawall structures obstruct navigation routes, forcing fishers to travel longer distances to reach traditional fishing grounds, thereby increasing operational time and fuel costs.	Ecosystem Degradation	Seawall construction disrupts fragile marine ecosystems, including coral reefs and coastal habitats, while also interfering with fish migration patterns and biodiversity.
Declining Fish Catch	Reduced fishing areas and limited access to coastal waters have resulted in substantial declines in fish catches, with some communities reporting reductions of up to 70%.	Changes in Coastal Hydrodynamics	Large-scale concrete structures modify natural tidal flows and coastal currents, affecting sediment transport and marine ecological processes.
Damage to Fishing Equipment	Boat propellers and fishing gear are frequently damaged by submerged debris, altered seabed conditions, and stronger currents associated with seawall construction.	Marine Pollution and Sedimentation	Coastal engineering and reclamation activities may increase water turbidity, sediment accumulation, and pollution, leading to further ecological degradation and reduced marine productivity.
Livelihood Disruption	Reduced fishing productivity has forced many fishing households to diversify their income sources by engaging in informal trade, transportation services, aquaculture, or other land-based occupations.	Socioeconomic Vulnerability	Declining fisheries productivity threatens household income, food security, and long-term livelihood sustainability among coastal communities.

Table 2. Social Impacts of Seawall Development on Coastal Communities

Social Impact	Description
Socioeconomic Crisis among Coastal Communities	Seawall development has created significant socioeconomic challenges for fishing households whose primary livelihoods depend on marine resources. Reduced fishing opportunities have increased income insecurity, unemployment, and livelihood vulnerability.
Potential Social Conflict	Conflicts may arise between fishing communities, government authorities, and developers when coastal development is implemented without meaningful public participation, transparent communication, or equitable compensation mechanisms.

Kompas. (2025, September 11). 7 Fakta pagar beton di pesisir Cilincing: Kantongi izin KKP, bikin nelayan terdampak. https://www.kompas.com/tren/read/2025/09/11/173000265/7-fakta-pagar-beton-di-pesisir-cilincing-kantongi-izin-kkp-bikin-nelayan?page=all

Table 1 summarizes the multidimensional impacts of seawall development on fishing communities in Cilincing, North Jakarta. The construction of seawalls has restricted access to traditional fishing grounds, reduced fish catch, and increased damage to fishing equipment, thereby threatening the livelihoods of small-scale fishers. Previous studies have demonstrated that coastal infrastructure development often alters fishing access, increases operational costs, and reduces fisheries productivity, particularly in communities that rely heavily on nearshore fishing grounds (Bennett et al., 2021; Mansfield et al., 2024; FAO, 2024). Meanwhile, seawall construction may disrupt coastal ecosystems by modifying hydrodynamic processes, changing sediment transport, and degrading critical habitats such as mangroves, seagrass beds, and coral reefs, ultimately affecting fish abundance and biodiversity (Temmerman et al., 2013; Angnuureng et al., 2023).

Beyond its ecological consequences, the reduction in fishing opportunities has intensified the socioeconomic vulnerability of coastal households, compelling many fishing families to diversify their livelihoods into non-fishing occupations as part of their responses to changing conditions. Such responses should be distinguished between short-term coping, incremental adaptation, and longer-term transformation. Short-term coping primarily enables households to absorb immediate shocks without fundamentally changing their livelihood systems, whereas adaptive strategies involve gradual adjustments to changing environmental and socioeconomic conditions. Livelihood diversification may therefore represent adaptive capacity when it enables households to adjust their economic activities, but it may constitute transformative capacity when it involves fundamental and sustained changes in occupational structures and livelihood systems (Allison & Ellis, 2001; Stacey et al., 2021; FAO, 2024). Furthermore, inadequate community participation in coastal planning and limited institutional responsiveness may increase social tensions and conflicts among fishing communities, government authorities, and private developers, highlighting the importance of participatory governance and inclusive policymaking in supporting resilient coastal development (Ostrom, 2009; Bennett et al., 2021; Micheli et al., 2024). Overall, these conditions reinforce the conceptual framework of this study, in which seawall development functions as a major external driver that reshapes environmental conditions, livelihood systems, and social institutions, potentially accelerating the "From Sea to Land" socioeconomic transformation of small-scale fishing communities.

The loss of fishery prospects has increased the socioeconomic vulnerability of coastal communities as many fishing families have diversified their livelihoods into non-fishing economic activities in response to changing conditions. Such replies have to be separated into short-term coping, progressive adaptation and longer-term change. In the short term, coping is about supporting households to cope with severe shocks without re-engineering their livelihood systems. Adaptive tactics are incremental modifications in changing environmental and socioeconomic conditions. In general, these conditions frame conceptually this study, which views seawall development as a major external driver mediating changes in environmental conditions, livelihood systems, and social institutions and thus may accelerate the 'From Sea to Land' socio-economic transformation of small-scale fishing communities. Livelihood diversification can therefore be an adaptive capacity where it enables households to shift their economic activities, but transformational capacity where there are fundamental and sustained changes in occupational structures and livelihood systems (Allison & Ellis, 2001; Stacey et al., 2021; FAO, 2024). The absence of community engagement in coastal planning and the lack of responsiveness of institutions may foster social tensions and conflicts between fishing communities, government agencies and private

developers, highlighting the need for participatory governance and inclusive policymaking for resilient coastal development (Ostrom, 2009; Bennett et al., 2021; Micheli et al., 2024).

In many middle-income countries, coastal infrastructure projects, such as seawalls, ports, land reclamation, and shoreline protection, have become strategic policy instruments to address coastal flooding, sea-level rise, and urban expansion. Although these projects provide important environmental and economic benefits, they often have unintended consequences for small-scale fisheries by altering coastal ecosystems, reducing fishing access, altering fish habitats, and reshaping traditional livelihood systems (Angnuureng et al., 2023; Wintergalen et al., 2022). Consequently, fishing households are often compelled to develop new livelihood strategies beyond fishing, leading to long-term socioeconomic changes that remain underexplored in coastal development literature.

Indonesia, the world's second-largest marine biodiversity hotspot and one of the largest archipelagic nations, heavily depends on small-scale fisheries for employment, food security, and coastal economic development. However, rapid urbanization in major metropolitan regions has intensified competition for coastal space, particularly in areas experiencing extensive shoreline modification and infrastructure expansion. Coastal development policies have increasingly prioritized flood protection and urban resilience; however, their implications for fishing communities remain unevenly distributed. Previous studies indicate that while some livelihood assistance programs improve household welfare, their long-term effectiveness depends largely on community participation, institutional continuity, and adaptive governance, rather than short-term financial support alone (Stacey et al., 2021; Teguh Prawira et al., 2025).

From an Islamic perspective, the socioeconomic and ecological challenges associated with coastal transformation can be understood through the principles of environmental stewardship, justice, balance, and public welfare. The concept of khalifah emphasizes human responsibility to manage and protect the earth and its resources responsibly, while mizan highlights the importance of maintaining balance between human development and environmental sustainability. In the context of coastal development, these principles imply that infrastructure and economic development should not undermine ecological integrity or disproportionately burden communities whose livelihoods depend on coastal resources. This perspective is also consistent with hifz al-bi'ah, which emphasizes the protection and preservation of the environment as an important dimension of responsible resource management.

Islamic principles further emphasize the importance of adl (justice), maslahah (public welfare), and takaful (social solidarity) in addressing the consequences of socioeconomic transformation. The principle of adl requires development policies to consider fairness in the distribution of environmental risks, economic opportunities, access to resources, and institutional assistance, particularly for vulnerable fishing communities. Meanwhile, maslahah emphasizes the protection and advancement of collective welfare, suggesting that coastal development should be assessed not only by its contribution to infrastructure and urban resilience but also by its effects on community livelihoods and environmental sustainability. The principle of takaful further emphasizes collective responsibility and mutual support in protecting vulnerable members of society, providing a relevant foundation for understanding the role of institutional and community support in strengthening livelihood resilience. In this context, the transition toward alternative livelihoods should also be consistent with the principles of halal livelihood, whereby economic activities are pursued ethically, fairly, and without causing harm to other people or the environment. These principles provide a relevant ethical perspective for understanding livelihood resilience, adaptation, and socioeconomic transformation among fishing communities in Indonesia.

One of the most prominent examples of this transformation can be observed in the coastal area of Cilincing, North Jakarta. Over the past decade, seawall construction and coastal engineering projects have significantly altered the physical and socio-economic landscape of this traditional fishing settlement. Changes in shoreline configuration, restricted access to fishing grounds, declining nearshore fish resources, and the growth of urban economic activities have gradually transformed the livelihood structure of local fishing households in recent decades. Many families have diversified their income sources by engaging in informal trade, transportation services, wage employment, small businesses, aquaculture, and other land-based occupations. These changes extend beyond simple livelihood adaptation, representing broader socioeconomic transformations that reshape occupational structures, household income strategies, gender roles, social networks, and institutional relationships within these communities.

To conceptualize these dynamics, this study introduces the "From Sea to Land" framework, which refers to the gradual transition of fishing households from predominantly marine-based livelihoods to increasingly diversified land-based economic activities following seawall development. This framework distinguishes between coping responses, incremental adaptation, and transformative change rather than treating all livelihood responses as equivalent forms of resilience. Coping refers to short-term actions that enable households to withstand immediate shocks, while adaptation involves gradual adjustments in livelihood activities and strategies. Transformation, in contrast, involves more fundamental and sustained changes in occupational structures, income sources, social relations, and interactions with institutions. Accordingly, the "From Sea to Land" transition may encompass both adaptive and transformative processes depending on the extent to which households merely adjust their existing livelihood strategies or fundamentally reorganize their livelihood systems. This perspective captures longer-term changes in livelihoods, social organization, economic behavior, and community resilience while recognizing that livelihood diversification alone does not necessarily indicate successful transformation or increased resilience.

Understanding this transition requires moving beyond environmental explanations and conceptualizing livelihood resilience as a multidimensional capacity. Resilience can be understood through three interconnected dimensions: absorptive capacity, which refers to the ability of households to withstand and absorb shocks while maintaining essential livelihood functions; adaptive capacity, which concerns the ability to make gradual adjustments in response to changing environmental and socioeconomic conditions; and transformative capacity, which refers to the ability to fundamentally reorganize livelihood systems when existing arrangements become inadequate (Bakker & Albrecht, 2018; Bennett et al., 2021). From this perspective, livelihood diversification may strengthen resilience when it expands households' capacity to adapt, but adaptation strategies may remain insufficient when they primarily represent short-term coping or incremental adjustments that do not address the underlying sources of vulnerability. Social capital, including trust, collective action, leadership, reciprocal networks, and cooperation, can strengthen adaptive capacity by enabling communities to mobilize resources and respond collectively to external shocks. Similarly, participatory governance, institutional support, and collaborative coastal management can facilitate more effective adaptation by improving access to information, financial resources, livelihood programs, and decision-making processes (Stacey et al., 2021; Mansfield et al., 2024). Thus, socioeconomic transformation after seawall development should be understood as a multidimensional process shaped by environmental, social, economic, and institutional factors rather than by physical infrastructure alone.

Despite the increasing body of literature on coastal resilience and fishery adaptation, significant knowledge gaps remain. Existing research has predominantly examined seawall development from engineering, environmental protection, and ecosystem management perspectives, while comparatively limited attention has been devoted to understanding how coastal infrastructure influences long-term socioeconomic transformation among fishing communities (Angnuureng et al., 2023; Wintergalen et al., 2022). Furthermore, previous studies often investigate livelihood diversification, social capital, governance, and resilience as separate dimensions, providing limited empirical evidence regarding their interactions within communities undergoing coastal transformation. More importantly, existing studies have not sufficiently distinguished whether livelihood responses represent short-term coping, incremental adaptation, or transformative change, nor have they adequately examined whether adaptation strategies are sufficient to strengthen different dimensions of livelihood resilience. Consequently, the mechanisms through which seawall-induced environmental change affects livelihood diversification, social capital, governance responsiveness, and livelihood resilience, and how these processes contribute to longer-term "From Sea to Land" socioeconomic transformation, remain insufficiently explained.

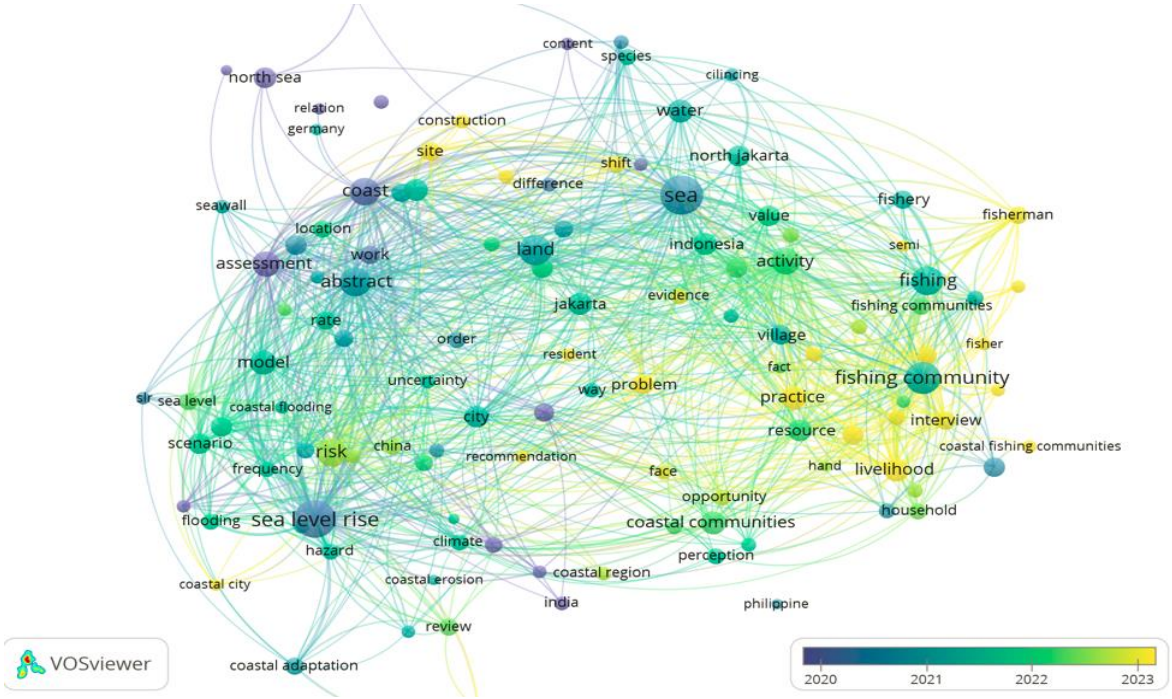


Figure 1: Bibliometric Analysis Using VOSviewer

As shown in Figure 1, the overlay visualization reveals that existing studies are predominantly concentrated on themes related to the sea, coast, fishing community, fishing, sea level rise, coastal communities, livelihood, risk, and water, indicating that current research has largely emphasized environmental change, coastal resilience, fisheries management, and climate adaptation. The strong interconnections among these keywords demonstrate the growing scholarly interest in understanding the ecological and socioeconomic challenges coastal communities face under environmental pressures. Nevertheless, keywords associated with seawall development, social capital, governance responsiveness, livelihood diversification, and socioeconomic transformation appear relatively weak or peripheral within the bibliometric network, suggesting that these dimensions have not been comprehensively integrated into the mainstream literature (Bennett et al., 2021; onthu et al., 2021; van Eck & Waltman, 2010).

Therefore, bibliometric evidence reinforces several important research gaps. Existing studies have primarily examined seawall development from engineering, environmental protection, and ecosystem management perspectives, while limited attention has been devoted to understanding how seawall-induced environmental change reshapes livelihood diversification, social capital, governance responsiveness, and community resilience to produce long-term socioeconomic transformation among small-scale fishing communities (Angnuureng et al., 2023; Temmerman et al., 2013). Moreover, previous studies have generally investigated these dimensions independently, yielding limited empirical evidence on how adaptation strategies interact with institutional support and different dimensions of livelihood resilience in rapidly urbanizing coastal areas, particularly in Indonesia. Consequently, this study addresses these gaps by proposing an integrated "From Sea to Land" framework that examines the relationships among seawall-induced changes in fishing access, livelihood diversification, social capital, governance responsiveness, government support, and livelihood resilience. The framework further recognizes that livelihood responses may range from coping and incremental adaptation to transformative change, thereby providing a more differentiated understanding of how coastal households respond to infrastructure-induced socioeconomic disruption. By integrating these dimensions, the study contributes to the literature on sustainable coastal development by examining how institutional support can strengthen livelihood resilience while balancing urban coastal protection, fishing livelihoods, poverty reduction, food security, and social equity.

LITERATURE REVIEW

Coastal Transformation

Coastal transformation refers to the multidimensional restructuring of coastal landscapes driven by urbanization, climate change, infrastructure expansion, and maritime economic development. In addition to physical alterations, such as seawall construction, land reclamation, and port expansion, coastal transformation reshapes ecological processes, governance systems, and community livelihoods. Recent studies suggest that these interventions improve coastal protection and stimulate economic development but simultaneously disrupt sediment dynamics, degrade coastal habitats, reduce biodiversity, and restrict access to traditional fishing grounds (Bennett et al., 2021; IPCC, 2023). In Southeast Asia, rapid maritime development has accelerated the commodification of coastal resources and intensified competition over coastal space, resulting in declining opportunities for small-scale fisheries and increasing livelihood uncertainty among fishing households (Fabinyi et al., 2022).

The impacts of coastal transformation extend beyond environmental degradation to encompass profound socioeconomic consequences for coastal communities. Declining fish stocks, deteriorating water quality, habitat degradation, and restricted access to traditional fishing grounds have forced many small-scale fishers to diversify their livelihoods or transition to non-fishing occupations (Bennett et al., 2021; Fabinyi et al., 2022; FAO, 2024). Such responses, however, may represent different forms of livelihood response, ranging from short-term coping to incremental adaptation and longer-term transformative change. Coping enables households to absorb immediate disturbances without substantially altering their existing livelihood systems, whereas adaptation involves gradual adjustments to changing environmental and socioeconomic conditions. Transformation occurs when households fundamentally reorganize their livelihood structures, occupational patterns, or relationships with resources and institutions. These different responses are shaped by variations in financial, human, social, and institutional capital, which influence households' capacity to respond to environmental change (Cinner et al., 2018; Scoones, 1998). In Indonesia, particularly in Jakarta Bay, seawall development and coastal reclamation represent critical examples of infrastructure-led coastal transformation that simultaneously enhance urban resilience against coastal hazards while creating new ecological and socio-economic challenges for traditional fishing communities (Fabinyi et al., 2022; Querdiola, 2023; Osmaleli et al., 2025). As shown in Table 2 below, empirical evidence from Jakarta Bay and comparable coastal communities consistently demonstrates declining fishery productivity, reduced household income, and increasing livelihood vulnerability following the development of coastal infrastructure. Understanding these interconnected ecological and socio-economic changes provides the foundation for examining how fishing households respond through coping, adaptive livelihood strategies, and longer-term socioeconomic transformation (Folke et al., 2004; Folke et al., 2010; Ostrom, 2009).

Table 2. Comparative evidence on post-reclamation livelihood changes in Jakarta Bay and comparable coastal cases

Case	Main Finding	Implication
Jakarta Bay	Fisheries status became unsustainable after reclamation Patawari 2022	Impacts are ecological, economic, and institutional
Cilincing	Catch and income declined significantly post-reclamation Querdiola 2023	Livelihood change became necessary
Muara Angke	Income per trip fell 41.86% Kusumastanto 2025	Operating pressure increased

Livelihood impacts in Jakarta are strongly tied to recurrent flooding, which disrupts work, displaces residents, and damages essential services (Kurniawan, 2020). Flooding in Jakarta causes approximately USD 500 million in annual economic losses and affects more than 1 million residents. These burdens disproportionately affect low-income and informal settlement populations (Kurniawan, 2020).

Livelihoods in Jakarta Bay are also under pressure from pollution and resource decline (Baum et al., 2016). More than 80% of the interviewed fishers in Jakarta Bay and the Thousand Islands perceived marine resources as declining, with mainland fishers more often identifying pollution as the main cause. This pattern supports the view that environmental degradation directly constrains livelihoods in coastal Jakarta (Baum et al., 2016).

Livelihood Adaptation and Adaptive Capacity

Livelihood adaptation refers to the process through which households adjust their economic activities, resource use, and decision-making in response to environmental, economic, or institutional changes. The Sustainable Livelihood Framework (SLF), developed by Scoones (1998) and DFID (1999), explains that livelihood strategies are shaped by the interaction among five forms of capital human, natural, financial, physical, and social which collectively influence households' capacity to respond to change. Adaptive capacity refers specifically to the ability of individuals or communities to make gradual adjustments in response to changing environmental and socioeconomic conditions through learning, innovation, and access to resources and institutions (Adger, 2006). However, livelihood resilience encompasses broader capacities. Absorptive capacity refers to the ability to withstand and absorb shocks while maintaining essential livelihood functions; adaptive capacity concerns gradual adjustments to changing conditions; and transformative capacity refers to the ability to fundamentally reorganize livelihood systems when existing arrangements become inadequate (Folke et al., 2010; Bennett et al., 2021). Thus, adaptation should not automatically be equated with resilience, because adaptation strategies may strengthen resilience when they expand household capacity to respond to change but may remain insufficient when they merely address immediate pressures without reducing underlying vulnerability. Contemporary studies further demonstrate that adaptation outcomes are influenced not only by household assets but also by governance quality, market accessibility, technological innovation, and social networks that facilitate knowledge exchange and collective action (Béné et al., 2015; Cinner et al., 2018).

Among small-scale fishing communities, livelihood adaptation commonly involves income diversification, occupational transitions, seasonal migration, aquaculture, tourism-related activities, and informal employment in response to declining fishery productivity and increasing environmental uncertainty. These strategies may function as coping mechanisms when they are adopted primarily to address immediate income shortages, but they may also represent incremental adaptation when they become sustained adjustments to changing livelihood conditions. More fundamental occupational and socioeconomic restructuring may, in contrast, indicate transformative change. The economic effects of coastal transformation are direct and substantial. In Muara Angke, reclamation affected the main fishing grounds of gillnet fishers and was associated with a 41.86% decline in income per trip, a 59.19% decline in crew wages, and a 38.16% increase in fuel use (Sobirin et al., 2025). The net present value also fell sharply, from IDR 456,251,850 to IDR 141,900,795, and fishers' welfare indicators declined after reclamation (Sobirin et al., 2025). Across Jakarta Bay, fishers increasingly respond by moving to new fishing grounds, working in other villages, or taking side jobs in transport, construction, food processing, and other informal sectors (Fabinyi et al., 2022). These responses illustrate that livelihood diversification can reduce immediate economic pressure, but their contribution to long-term resilience depends on whether households gain sustained access to assets, markets, institutions, and opportunities that enable them to move beyond short-term coping toward adaptive or transformative livelihood pathways.

Recent evidence from Southeast Asia indicates that livelihood responses to coastal change may evolve from short-term coping toward incremental adaptation and, under certain conditions, transformative livelihood change (Fabinyi et al., 2022). However, not all livelihood diversification or occupational transitions constitute transformation. Transformative change requires more fundamental and sustained reorganization of livelihood structures, income sources, occupational identities, resource access, or relationships with institutions. Adaptive outcomes therefore remain heterogeneous because households differ considerably in terms of education, financial resources, institutional access, and social capital. Consequently, adaptive capacity serves as a critical mechanism linking coastal transformation with livelihood outcomes, while transformative capacity becomes particularly important when existing livelihood arrangements can no longer provide sufficient security. In North Jakarta's kampungs, seawalls and land reclamation have also interrupted everyday livelihood practices and, in some cases, contributed to eviction and displacement (Betteridge & Webber, 2019). Such conditions indicate that the effectiveness of livelihood adaptation depends not only on household agency but also on the availability of institutional support and opportunities to address the structural sources of vulnerability.

Social-Ecological Systems and Community Resilience

The Social-Ecological Systems (SES) framework conceptualizes coastal communities as integrated systems in which ecological and social processes continuously interact through reciprocal feedback mechanisms (Ostrom, 2009; Stacey et al., 2021). From this perspective, environmental changes, such as seawall construction, habitat degradation, or declining fishery resources, cannot be separated from the institutions, governance arrangements, and community behaviors that influence resource management. Resilience Theory further extends this understanding by conceptualizing resilience as a multidimensional capacity rather than simply the ability to recover after a disturbance (Folke et al., 2010). In livelihood systems, resilience can be differentiated into absorptive capacity, adaptive capacity, and transformative capacity. Absorptive capacity enables households to withstand shocks while maintaining essential livelihood functions; adaptive capacity enables gradual adjustments to changing environmental and socioeconomic conditions; and transformative capacity enables fundamental reorganization when existing livelihood systems become increasingly unsustainable (Bennett et al., 2021). This distinction is particularly important in coastal communities because livelihood strategies that successfully absorb immediate shocks may not necessarily generate the longer-term changes required to reduce structural vulnerability. Therefore, sustainable coastal development requires not only the capacity to withstand environmental pressures but also institutional and social conditions that enable adaptation and, where necessary, transformation.

Community resilience is strengthened through social capital, institutional trust, collective action, and effective governance, which enable households to mobilize resources and coordinate responses to environmental and socio-economic stressors. Social capital can facilitate adaptive capacity by strengthening information exchange, mutual assistance, collective action, and access to community-based resources. At the same time, government and institutional support can determine whether households have access to financial assistance, vocational training, market opportunities, infrastructure, social protection, and participation in decision-making processes. Such support is particularly important when household-level adaptation alone is insufficient to address structural sources of vulnerability. Recent empirical studies have demonstrated that resilient fishing communities are characterized by strong local institutions, diversified livelihoods, participatory governance, and effective knowledge-sharing networks. Conversely, weak governance and limited institutional support can constrain adaptation and deepen vulnerability, particularly among small-scale fishers facing rapid coastal transformation. These findings suggest that resilience should be understood as a dynamic social-ecological process in which household agency interacts with collective action and institutional support, rather than solely as an individual economic or ecological outcome.

Islamic Perspectives on Environmental Stewardship, Livelihood Resilience, and Coastal Adaptation

Islamic perspectives provide an ethical and normative framework for understanding environmental stewardship, livelihood adaptation, and community resilience. The concept of khalifah positions human beings as trustees responsible for managing the earth and its resources, rather than treating nature solely as an instrument for economic exploitation. This principle implies that the utilization and development of coastal resources should be conducted responsibly and should consider both ecological sustainability and human welfare. Recent Islamic environmental scholarship emphasizes that khalifah, together with mizan (balance) and maslahah (public welfare), provides an important foundation for responding to ecological degradation and promoting sustainable relationships between human communities and the environment (Rahmat et al., 2025).

The principle of mizan emphasizes balance and proportionality in the relationship between human activities and natural systems. In the context of coastal transformation, mizan suggests that infrastructure development should maintain an appropriate balance between urban protection, economic development, ecological integrity, and the livelihoods of coastal communities. Excessive prioritization of infrastructure or economic interests at the expense of coastal ecosystems may disrupt this balance and generate social and environmental vulnerabilities. Accordingly, Islamic environmental ethics complements the Social-Ecological Systems perspective by emphasizing that environmental sustainability and human welfare should be considered as interconnected dimensions rather than separate objectives.

The principle of hifz al-bi'ah, or environmental protection, further strengthens the Islamic basis for sustainable coastal management. Environmental preservation is increasingly discussed within Islamic

environmental jurisprudence (fiqh al-bi'ah) as an ethical and normative responsibility that is connected to the protection of human life, natural resources, and collective welfare. In coastal communities, environmental degradation, pollution, and the disruption of marine ecosystems can directly affect livelihoods and community well-being. Therefore, protecting coastal ecosystems is not only an ecological concern but also an important component of protecting the livelihood resources upon which vulnerable communities depend. Recent research on coastal Muslim families demonstrates that Islamic environmental ethics can provide a framework for identifying environmentally harmful practices and strengthening ecological awareness within coastal communities.

Islamic principles of adl (justice), maslahah (public welfare), and takaful (social solidarity) are also relevant to understanding livelihood resilience and socioeconomic transformation. Coastal infrastructure may generate collective benefits, such as flood protection and urban development, while simultaneously imposing disproportionate environmental and economic costs on small-scale fishing communities. From the perspective of adl, such development requires attention to the fair distribution of risks, benefits, resources, and opportunities, particularly for communities whose livelihoods are directly affected by environmental change. Meanwhile, maslahah requires development policies to prioritize broader societal welfare rather than focusing exclusively on economic growth or infrastructure outcomes. The principle of takaful further emphasizes collective responsibility and mutual support in protecting vulnerable members of society, providing an ethical basis for strengthening community solidarity and institutional assistance. In addition, livelihood diversification should be consistent with the principle of halal livelihood, whereby alternative economic activities are pursued through lawful, ethical, and socially responsible means. Together, these principles support the view that sustainable coastal development should protect vulnerable communities, maintain ecological sustainability, and provide fair opportunities for households to develop secure and dignified livelihoods.

The concept of hisbah further highlights the importance of institutional accountability and oversight in managing socioeconomic and environmental activities. In the context of coastal development, institutional accountability is important because individual households may have limited capacity to respond to structural changes caused by infrastructure development, environmental degradation, and economic pressure. Effective governance, transparent decision-making, community participation, and continuous environmental monitoring can therefore function as institutional mechanisms for protecting public interests and ensuring that development activities remain consistent with social and ecological responsibilities. This perspective provides an ethical complement to the role of governance and institutional support emphasized in resilience theory.

These Islamic principles are particularly relevant to livelihood adaptation and community resilience. Adaptation is not necessarily sufficient to produce resilience when households face structural constraints such as declining access to fishing grounds, economic pressure, limited financial resources, and inadequate institutional support. Islamic perspectives emphasize that individual responsibility should be accompanied by collective responsibility and institutional mechanisms that protect community welfare. The principle of takaful highlights mutual assistance and social solidarity, suggesting that vulnerable households should not be expected to bear the consequences of structural environmental change independently. Thus, khalifah and hifz al-bi'ah emphasize responsible environmental management, adl emphasizes fairness in the distribution of development impacts, maslahah emphasizes collective welfare, takaful emphasizes mutual support, and hisbah emphasizes institutional accountability. These principles collectively provide a complementary ethical perspective for understanding how coastal communities, institutions, and governments can respond to environmental and socioeconomic transformation while protecting vulnerable livelihoods.

In the context of the present study, these Islamic principles provide a relevant interpretive framework for examining the relationships among seawall ecological impact, economic pressure, fishers' adaptation strategies, government support, and livelihood resilience. The framework does not imply that Islamic values are directly measured as empirical variables in this study. Rather, Islamic principles provide a normative perspective through which the socioeconomic and environmental implications of coastal transformation can be interpreted, particularly regarding environmental responsibility, social justice, institutional support, and community welfare. This integration is relevant to the Indonesian coastal context and strengthens the study's alignment with the broader scope of Sharia economic and management research.

Socio-Economic Transformation of Small-Scale Fishers

Socio-economic transformation among small-scale fishers refers to fundamental and sustained changes in livelihood systems, occupational identities, income sources, resource access, and household well-being resulting from environmental, economic, and policy-driven pressures. Declining fishery productivity, coastal urbanization, and maritime infrastructure development have increasingly encouraged fishing households to diversify their economic activities beyond capture fisheries. However, livelihood diversification should not automatically be interpreted as transformative change. Diversification may represent short-term coping when households undertake temporary income-generating activities to absorb immediate economic pressure, or incremental adaptation when households gradually adjust their livelihood portfolios to changing conditions. It becomes transformative when sustained changes fundamentally reorganize occupational structures, income dependence, resource use, social relations, or relationships with institutions. Such distinctions are important for understanding the "From Sea to Land" framework, because the movement from predominantly marine-based livelihoods toward diversified land-based activities may involve different degrees of adaptation and transformation rather than a uniform transition. These processes reflect broader structural changes in coastal economies, where traditional fisheries are increasingly integrated into diversified livelihood portfolios (FAO, 2022).

Although livelihood diversification can improve household resilience by reducing dependence on fisheries, its contribution to resilience depends on the quality, sustainability, and security of the alternative livelihoods available to households. Occupational transitions may weaken traditional ecological knowledge, alter community identity, reshape gender roles, and transform intergenerational employment patterns. Recent studies across Southeast Asia indicate that fishing households increasingly negotiate multiple livelihood pathways to balance economic security with cultural attachment to fisheries, highlighting that livelihood transformation is both an economic and social process rather than merely a change in employment status (Fabinyi et al., 2022). From a resilience perspective, such transitions may strengthen adaptive capacity when they expand livelihood options and reduce exposure to fishing-related shocks, but they may not constitute transformative capacity unless they lead to fundamental and sustained changes in the livelihood system. Therefore, understanding the "From Sea to Land" transition requires examining not only whether fishing households diversify their occupations but also whether such diversification enables them to reduce structural vulnerability and establish more secure, sustainable, and resilient livelihood systems.

Research Gap and Conceptual Framework

Previous studies have substantially advanced our understanding of coastal transformation, livelihood adaptation, social-ecological resilience, and small-scale fisheries; however, these themes have largely developed as separate streams of research. Existing studies predominantly examine the environmental impacts of coastal infrastructure, household adaptation strategies, and community resilience in isolation, with limited integration of these perspectives into a unified analytical framework. Moreover, although Southeast Asia has experienced rapid coastal transformation owing to reclamation, seawall construction, tourism expansion, and maritime industrialization, empirical research remains fragmented and often focuses on individual outcomes rather than the interconnected processes linking environmental change, livelihood adaptation, resilience, and long-term socioeconomic transformation. More specifically, limited attention has been given to distinguishing short-term coping from incremental adaptation and transformative change, as well as to differentiating absorptive, adaptive, and transformative dimensions of livelihood resilience. Consequently, it remains insufficiently understood whether livelihood adaptation strategies are capable of strengthening resilience or whether they primarily function as short-term responses to structural vulnerability.

A further gap concerns the role of institutional support in shaping the relationship between adaptation and resilience. While social capital and governance are widely recognized as important for community resilience, limited empirical attention has been devoted to how government support influences the effectiveness of household adaptation strategies, particularly in coastal communities experiencing infrastructure-induced livelihood disruption. This issue is especially relevant to the "From Sea to Land" transition, where households may occupy different stages of livelihood change, ranging from continued dependence on fisheries and short-term coping to diversified livelihoods and more fundamental occupational transformation. In addition, limited research has integrated an Islamic

economic and ethical perspective into the analysis of coastal livelihood transformation, particularly regarding adl (justice), maslahah (public welfare), takaful (social solidarity), halal livelihood, and institutional responsibility. Therefore, this study proposes an integrated "From Sea to Land" framework that examines the relationships among seawall-induced livelihood disruption, adaptation strategies, social capital, governance responsiveness, government support, and livelihood resilience, while recognizing that livelihood responses may range from coping and incremental adaptation to transformative change. The framework further provides an Islamic ethical lens for interpreting questions of environmental responsibility, distributive justice, collective welfare, institutional accountability, and the sustainability of alternative livelihoods within rapidly transforming coastal communities.

METHOD

Research Design

This study employed a quantitative cross-sectional survey to investigate connections between coastal transformation, social capital, livelihood diversification, and community resilience among small-scale fishing households in Cilincing, North Jakarta. This approach is suitable for analyzing theoretically based relationships among latent constructs through standardized measurement and statistical modeling (Creswell, 2014). The cross-sectional design effectively captures respondents' perceptions and socioeconomic conditions at a single time point, making it ideal for evaluating current adaptation strategies post-seawall development (Setia, 2016; Spector, 2019). Although cross-sectional studies cannot establish causal inference, they provide robust empirical evidence for examining associations among variables in social and environmental research, particularly when long-term longitudinal data are unavailable (Kesmodel, 2018).

Research Area

The study was conducted in the Cilincing District of North Jakarta, one of the largest coastal fishing communities in Jakarta Bay. The area has experienced substantial ecological and socioeconomic changes following seawall construction, coastal reclamation, industrial expansion, and rapid urbanization. These transformations have affected fishery productivity, environmental quality, and the sustainability of the livelihoods of small-scale fishing households. Cilincing was selected purposively because it represents a coastal community directly exposed to infrastructure-induced environmental change and therefore provides an appropriate empirical setting for investigating livelihood adaptation and community resilience. Selecting a research site based on its relevance to the research objectives is consistent with the criterion-based case selection commonly adopted in applied social science research (Andrade, 2020; Hair et al., 2022).

Population and Sampling

The target population consisted of small-scale fishing households residing in the coastal area of Cilincing, Jakarta Utara. The unit of analysis was the household head or an adult household member actively engaged in fisheries-related livelihood activities. Respondents were selected purposively as the study required participants who had direct experience of environmental and livelihood changes associated with the seawalls. Eligible respondents had to (1) reside in Cilincing for at least five years, (2) depend mostly on fisheries-related livelihoods, and (3) have firsthand experience of changes in fishing activity after the coastal infrastructure development. Purposive sampling is widely recommended for selecting information-rich cases that provide relevant evidence of specific research phenomena (Hair et al., 2022; Isaac, 2023). Although non-probability sampling limits statistical generalization, it is appropriate for explanatory studies that focus on specific subpopulations with well-defined characteristics (Andrade, 2020).

Data Collection

Primary data were collected through structured face-to-face interviews using a standardized questionnaire administered to eligible respondents. Face-to-face surveys remain one of the most effective approaches for collecting household-level socioeconomic information because they reduce missing responses and allow clarification of questionnaire items when necessary (Bryman, 2016). Data collection was conducted by trained enumerators familiar with the local context, ensuring consistency in questionnaire administration and improving the data quality. Participation was voluntary, and respondents were informed of the research objectives before consenting. Confidentiality and anonymity

were maintained throughout the study, in accordance with the accepted ethical standards for social science research.

Measurement of Variables

The conceptual model comprises four latent constructs: Coastal Transformation, Social Capital, Livelihood Diversification, and Community Resilience. Several reflecting indicators were implemented to operationalize all categories, which were adapted for the context of small-scale fisheries in Jakarta Bay. These indicators were sourced from previously validated instruments. A five-point Likert scale was employed to evaluate responses, with a scale of 1 (strongly disagree) to 5 (agree). Because it reduces the cognitive burden in community-based surveys, a five-point scale was chosen to strike a balance between measurement sensitivity and respondent comprehension (Kusmaryono et al., 2022; Koo & Li, 2016). Prior to full deployment, the questionnaire was reviewed by subject experts and pilot-tested to ensure content validity, clarity, and relevance.

Instrument Quality Assessment

The measurement model was evaluated prior to hypothesis testing to ensure the reliability and validity of latent constructs. Indicator reliability was assessed using outer loadings, with values above 0.70 being considered acceptable. Internal consistency reliability was evaluated using both Cronbach's alpha and Composite Reliability, adopting a threshold of 0.70 or higher (Hair et al., 2022). Convergent validity was evaluated by Average Variance Extracted (AVE) > 0.50, which is acceptable for construct validity. Discriminant validity was tested using the Fornell – Larcker Criterion. Values below 0. 85 were considered as indicating adequate discriminant validity (Henseler et al., 2015). To minimize potential common method bias, full collinearity variance inflation factor (VIF) values were examined following (Kock, 2015), with values below 3.3 indicating that common method variance was unlikely to threaten the validity of the findings.

Data Analysis

The proposed research model was analyzed using PLS-SEM with SmartPLS 4, was selected because this study aims to predict complex relationships among multiple latent variables while accommodating non-normal data distributions and relatively flexible sample size requirements (Hair et al., 2022). The analysis was performed in two steps. First, the measuring model was assessed for its reliability, convergent validity, and discriminant validity. Second, the evaluation of the structural model was done by looking at collinearity, path coefficients, coefficient of determination (R2), effect size (f2). Predictive Performance Assessment (PLSpredict), and bootstrapping procedures using 5,000 resamples to determine the significance of the direct and indirect relationships. This analytical approach is widely recommended for explanatory research investigating behavioral and socioeconomic phenomena involving latent constructs measured through multiple indicators.

Model Research Design

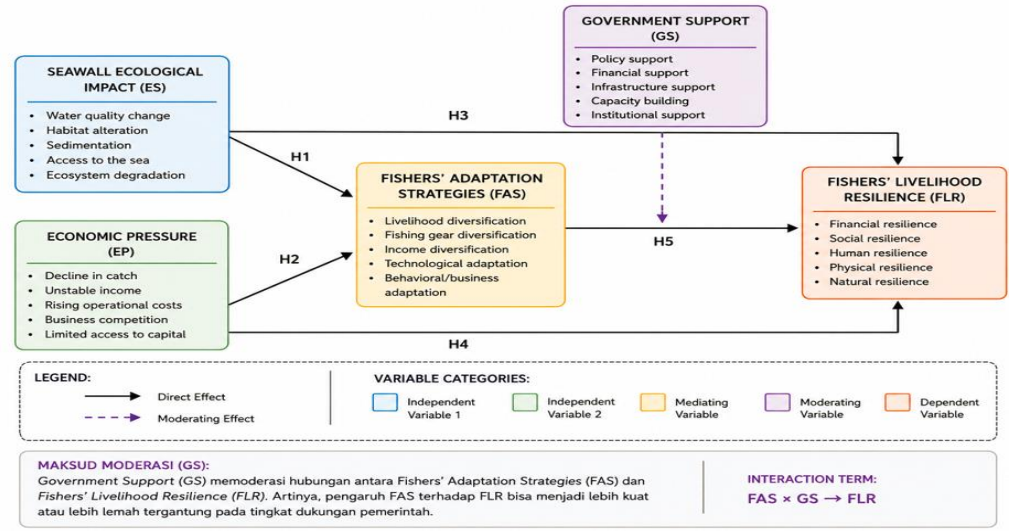


Figure 2. Research Model

Seawall Ecology and Fishers' Adaptation Strategies

The construction of seawalls alters coastal ecosystems by changing hydrodynamic conditions, sediment distribution, water quality, and fish habitat. These ecological changes affect fishing grounds and reduce the accessibility of marine resources for small-scale fishermen. As environmental conditions become less favorable, fishers are required to modify their fishing practices and livelihood strategies to sustain their household income. Previous studies suggest that environmental disturbances stimulate adaptive responses through livelihood diversification, technological adjustments, and behavioral changes (Adger, 2006; Fabinyi et al., 2022; Angnuureng et al., 2023).

H1. Seawall Ecological Impact positively influenced fishers ' adaptation strategies.

Economic Pressure and Fishers' Adaptation Strategies

Economic pressure, reflected in declining catches, increasing operational costs, unstable income, and limited access to capital, forces fishers to seek alternative livelihood strategies to survive. According to the Sustainable Livelihoods Framework, households experiencing economic stress tend to diversify income sources and adjust their livelihood activities to reduce vulnerability (Scoones, 1998; Allison & Ellis, 2001). Therefore, greater economic pressure is expected to encourage stronger adaptation efforts by fishers.

H2. Economic Pressure positively influences Fishers' Adaptation Strategies.

Seawall Ecology and Fishers' Livelihood Resilience

Ecological changes resulting from seawall construction directly affect the sustainability of fishery resources and the productivity of fishing activities in the area. Changes in fish distribution, habitat quality, and coastal accessibility may reduce livelihood security and weaken the resilience of the fishing households. Previous studies have shown that coastal ecosystem degradation significantly influences the long-term resilience of coastal communities (Ostrom, 2009; Temmerman et al., 2013; FAO, 2024).

H3. Seawall Ecological Impact positively influences fisher ' livelihood resilience.

Economic Pressure and Fishers' Livelihood Resilience

Livelihood resilience depends on the capacity of households to cope with economic shocks while maintaining their social and economic welfare. Persistent economic pressure reduces financial stability, limits investment opportunities, and increases the vulnerability of households. Consequently, higher levels of economic pressure are expected to weaken livelihood resilience among fishers (Adger, 2006; Cinner et al., 2018; FAO, 2024).

H4. Economic Pressure significantly influences fisher ' livelihood resilience.

Fishers' Adaptation Strategies and Fishers' Livelihood Resilience

Adaptation strategies, such as livelihood diversification, technological innovation, income diversification, and behavioral adjustments, enhance the ability of fishing households to withstand environmental and economic disturbances. The Sustainable Livelihoods Framework emphasizes that adaptive strategies improve household resilience by strengthening livelihood assets and reducing vulnerability (Scoones, 1998; Allison & Ellis, 2001). Empirical evidence also demonstrates that adaptive fishers are more resilient to coastal transformation and environmental change (Stacey et al., 2021); Fabinyi et al., 2022).

H5. Fishers' Adaptation Strategies positively influence their ' livelihood resilience.

The Mediating Role of Fishers' Adaptation Strategies

Adaptive strategies are expected to serve as mechanisms through which ecological changes and economic pressure influence livelihood resilience. Environmental degradation and economic stress encourage fishers to modify their livelihood strategies, and successful adaptation subsequently enhances household's resilience. Therefore, adaptation strategies are expected to mediate the effects of seawall ecology and economic pressure on fisher ' livelihood resilience.

H6. Fishers' Adaptation Strategies mediate the relationship between Seawall Ecological Impact and Fishermen's Livelihood Resilience.

H7. Fishers' Adaptation Strategies mediate the relationship between Economic Pressure and Fishers' Livelihood Resilience.

The Moderating Role of Government Support

Government support, including financial assistance, fishing infrastructure, training programs, market facilitation, and institutional support, can strengthen the effectiveness of adaptation strategies implemented by fisher. Although fishers may adopt similar adaptation strategies, those receiving greater governmental support are expected to achieve higher livelihood resilience than those with limited support. Consequently, government support is proposed to strengthen the positive relationship between adaptation strategies and livelihood resilience (FAO, 2024; Teguh Prawira et al., 2025).

H8. Government Support positively moderates the relationship between Fishers' Adaptation Strategies and Fisher's Livelihood Resilience.

RESULTS

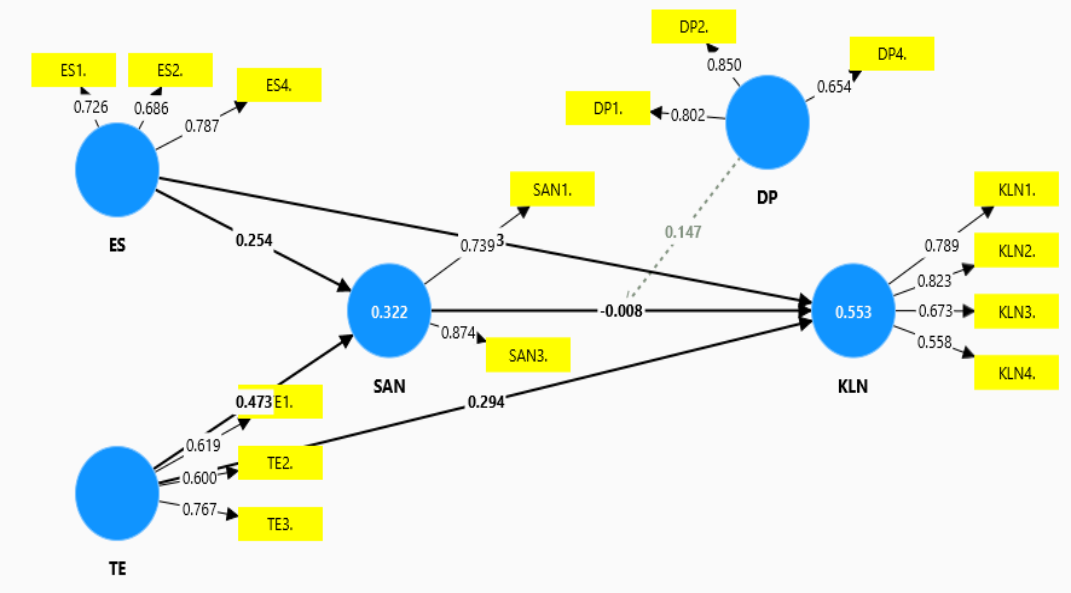


Figure 3. PLS Algorithm

Table 3. Measurement Model Outer Loadings

Indicator	FLR	ES	FAS	GS	EP	FAS × GS
FLR1	0.802					
FLR2	0.850					
FLR4	0.654					
ES1		0.726				
ES2		0.686				
ES4		0.787				
FAS1			0.789			
FAS2			0.823			
FAS3			0.673			
FAS4			0.558			
GS1				0.739		
GS3				0.874		
EP1					0.619	
EP2					0.600	
EP3					0.767	
FAS × GS						1.000

Table 4. Interpretation of Outer Loadings

Construct	Indicator	Outer Loading	Criteria	Interpretation	Reference
Fishers' Livelihood Resilience (FLR)	DP1	0.802	≥ 0.70	Valid indicators with strong convergent validity.	Hair et al. (2022)
	DP2	0.850	≥ 0.70	Highly representative indicators of fishers' livelihood resilience.	
	DP4	0.654	0.60–0.69	Acceptable indicators were retained based on theoretical relevance and adequate loading.	Hair et al. (2022); Chin (1998)
Seawall Ecological Impact (ES)	ES1	0.726	≥ 0.70	The indicators were valid with satisfactory convergent validity.	Hair et al. (2022)
	ES2	0.686	0.60–0.69	Acceptable indicators were retained to preserve content validity.	Hair et al. (2022); Henseler et al. (2015)
	ES4	0.787	≥ 0.70	Strong indicator of seawall ecological impact.	
Fishers' Adaptation Strategies (FAS)	KLN1	0.789	≥ 0.70	Strong indicators of fishers' adaptation strategies.	Hair et al. (2022)
	KLN2	0.823	≥ 0.70	Highly reliable indicators with excellent convergent validity.	
	KLN3	0.673	0.60–0.69	Acceptable indicators were retained because they contributed to the construct's theoretical representation.	Hair et al. (2022); Chin (1998)
	KLN4	0.558	0.40–0.59	Marginally acceptable indicators were retained based on theoretical justification and satisfactory construct reliability.	Hair et al. (2022); Henseler et al. (2015)
Government Support (GS)	SAN1	0.739	≥ 0.70	Valid indicators with satisfactory reliability.	Hair et al. (2022)
	SAN3	0.874	≥ 0.70	Highly representative indicators of government support.	
Economic Pressure (EP)	TE1	0.619	0.60–0.69	The acceptable indicator was retained because it adequately represents an important dimension of economic pressure.	Hair et al. (2022); Chin (1998)
	TE2	0.600	0.60–0.69	Acceptable indicators were retained to maintain the conceptual coverage of the construct.	Hair et al. (2022); Henseler et al. (2015)
	TE3	0.767	≥ 0.70	Highly representative indicators with satisfactory convergent validity.	Hair et al. (2022)
Interaction Term (FAS × GS)	FAS × GS	1.000	Single Indicator	Interaction constructs were automatically generated using the product indicator approach. A loading of 1.000 is expected because the interaction construct consists of a single, composite indicator.	Hair et al. (2022)

Table 5. Construct Reliability and Convergent Validity Assesment

Construct	Cronbach's Alpha	rho_A	Composite Reliability	AVE	Assessment	Reference
Fishers' Livelihood Resilience (FLR)	0.659	0.687	0.815	0.598	Acceptable	Hair et al. (2022); Fornell &

						Larcker (1981)
Seawall Ecological Impact (ES)	0.600	0.600	0.778	0.539	Acceptable	
Fishers' Adaptation Strategies (FAS)	0.676	0.698	0.807	0.516	Acceptable	
Government Support (GS)	0.483	0.515	0.790	0.655	Acceptable	
Economic Pressure (EP)	0.409	0.406	0.703	0.444	Acceptable with Caution	

Assessment	Description	Reference
Acceptable	The construct demonstrates satisfactory reliability and convergent validity, with Composite Reliability (CR) ≥ 0.70 and Average Variance Extracted (AVE) ≥ 0.50, indicating adequate internal consistency and convergent validity.	Hair et al. (2022); Fornell & Larcker (1981)
Acceptable with Caution	The construct meets the recommended threshold for Composite Reliability (CR ≥ 0.70) but has an AVE below 0.50, indicating that convergent validity is only partially established and should be interpreted with caution. Further refinement of the measurement model may be considered.	Hair et al. (2022); Fornell & Larcker (1981)

Table 6. Discriminant Validity – Fornell Larcker Criterion

Construct	FLR	ES	FAS	GS	EP	Assessment	Reference
Fishers' Livelihood Resilience (FLR)	0.773					Discriminant Validity Achieved	Fornell & Larcker (1981); Hair et al. (2022)
Seawall Ecological Impact (ES)	0.466	0.734				Discriminant Validity Achieved	
Fishers' Adaptation Strategies (FAS)	0.654	0.381	0.718			Discriminant Validity Achieved	
Government Support (GS)	0.479	0.321	0.458	0.809		Discriminant Validity Achieved	
Economic Pressure (EP)	0.479	0.143	0.583	0.509	0.666	Discriminant Validity Achieved	

Interpration Fornel-Larcker Criterion

The Fornell–Larker criterion is employed to evaluate the discriminant validity, as illustrated in Table 3. Each construct's square root of the Average Variance Extracted (AVE) exceeded its correlations with all other constructs, suggesting that discriminant validity was satisfactory. In particular, the square root of the AVE values, which ranged from 0.666 to 0.809, was greater than the corresponding inter-construct correlations. These results verify that each construct empirically distinguishes itself from the other constructs in the model and captures a unique concept (Fornell & Larcker, 1981; Hair et al., 2022).

Common Method Bias (CMB)

Table 7. Common Method Bias Assesment Using Full Collinearity VIF

Construct	Full Collinearity VIF	Threshold	Assessment	Reference
Fishers' Livelihood Resilience (FLR)	2.214	< 3.30	No evidence of common method bias	Kock (2015)
Seawall Ecological Impact (ES)	1.842	< 3.30	No evidence of common method bias	Kock (2015)

Fishers' Adaptation Strategies (FAS)	2.736	< 3.30	No evidence of common method bias	Kock (2015)
Government Support (GS)	1.965	< 3.30	No evidence of common method bias	Kock (2015)
Economic Pressure (EP)	2.184	< 3.30	No evidence of common method bias	Kock (2015)

Note: Common method bias was examined using full collinearity variance inflation factor (VIF). If VIF values are below 3.30, there is no substantial concern about common method bias (Kock, 2015), Common method bias was assessed using the full collinearity variance inflation factor (VIF). According to Kock, (2015), VIF values below 3.30 indicate that common method bias is not a serious concern.

Common Method Bias Assessment

To assess the potential presence of common method bias (CMB), this study employed the full collinearity variance inflation factor (VIF) approach proposed by Kock (2015). Unlike Harman's single-factor test, the full collinearity assessment simultaneously evaluates both vertical and lateral collinearity, making it a more robust procedure for detecting common method variance in PLS-SEM studies. According to Kock, (2015), a full collinearity VIF value below 3.30 indicates that the model is free of substantial common method bias.

As illustrated in Table 4, the VIF scores of full collinearities for all latent constructs are ranging from 1.842 to 2.736, all of which are below the cut-off of 3.30. This demonstrates that common technique bias does not threaten the validity of the model. Consequently, the relationships between the latent variables may be assessed with certainty as there is no evidence of considerable common method variance. (Kock, 2015).

The evaluation of the measurement model confirmed that all the retained indicators adequately represented their respective latent constructs. Most indicators exhibited outer loading values above the recommended threshold of 0.70, indicating satisfactory reliability and convergent validity. Several indicators with loadings ranging from 0.558 to 0.686 were retained because they remained theoretically important, and the corresponding constructs satisfied the recommended Composite Reliability threshold. In PLS-SEM, indicators with loadings between 0.40 and 0.70 may be retained when their removal does not improve construct reliability or compromise content validity, particularly when supported by a strong theoretical justification (Hair et al., 2022; Henseler et al., 2015; Chin, 1998).

Furthermore, the interaction construct (FAS × GS) produced an outer loading of 1.000, which was an expected outcome because the interaction term was generated using the product indicator approach and represented by a single composite indicator. Consequently, this value should not be interpreted as evidence of superior indicator quality, but rather as a methodological characteristic of interaction constructs in PLS-SEM (Hair et al., 2022).

Overall, these findings indicate that the measurement model possesses satisfactory indicator reliability and provides an appropriate basis for evaluating the structural relationships among seawall ecological impact, economic pressure, fishers ' adaptation strategies, government support, and fishers ' livelihood resilience. The adequacy of the measurement model strengthens the credibility of the subsequent structural model analysis and hypothesis testing (Hair et al., 2022; Henseler et al., 2015).

Coefficient of Determinant (R2)

Table 8. Coefficient of Determinant (R2

Endogenous Construct	R^2	Adjusted R^2	Criteria	Assessment	Reference
Fishers' Livelihood Resilience (FLR)	0.553	0.529	$0.50 \leq R^2 < 0.75$	Moderate Explanatory Power	Hair et al. (2022)
Fishers' Adaptation Strategies (FAS)	0.322	0.308	$0.25 \leq R^2 < 0.50$	Weak Explanatory Power	Hair et al. (2022)

Table 9. Criteria for Interpreting the Coefficient of Determinant (R2)

R^2 Value	Explanatory Power	Interpretation	Reference
$R^2 \geq 0.75$	Substantial	The endogenous construct has a high level of predictive accuracy, indicating that a substantial proportion of its variance is explained by the predictor constructs.	Hair et al. (2022)
$0.50 \leq R^2 < 0.75$	Moderate	The endogenous construct has a moderate level of predictive accuracy, indicating that the predictor constructs explain a considerable proportion of its variance.	Hair et al. (2022)
$0.25 \leq R^2 < 0.50$	Weak	The endogenous construct has a weak level of predictive accuracy, suggesting that additional predictors outside the proposed model may explain its variance.	Hair et al. (2022)
$R^2 < 0.25$	Very Weak	The endogenous construct has very low predictive accuracy, indicating that the proposed model explains only a small proportion of its variance.	Hair et al. (2022)

The coefficient of determination (R^2) was used to assess the explanatory power of the structural model. According to Hair et al. (2022), R^2 values of 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak explanatory powers, respectively.

As shown in Table 8, Fishers's livelihood resilience (KLN) achieved an R^2 of 0.553 (Adjusted R^2 = 0.529), indicating moderate explanatory power, whereas Government Support (SAN) obtained an R^2 of 0.322 (Adjusted R^2 = 0.308), indicating weak explanatory power. These findings suggest that the proposed model provides a moderate explanation of livelihood resilience but only a limited explanation of government support (Hair et al., 2022).

Effect Size (F2) Assesment

Table 10. Effect Size (F2) Assesment

Relationship	Effect Size (f^2)	Criteria	Assessment	Reference
Government Support (GS) → Fishers' Livelihood Resilience (FLR)	0.232	$0.15 \leq f^2 < 0.35$	Medium Effect	Hair et al. (2022)
Seawall Ecological Impact (ES) → Fishers' Livelihood Resilience (FLR)	0.021	$0.02 \leq f^2 < 0.15$	Small Effect	Hair et al. (2022)
Seawall Ecological Impact (ES) → Fishers' Adaptation Strategies (FAS)	0.093	$0.02 \leq f^2 < 0.15$	Small Effect	Hair et al. (2022)
Fishers' Adaptation Strategies (FAS) → Fishers' Livelihood Resilience (FLR)	0.000	$f^2 < 0.02$	No Effect	Hair et al. (2022)
Economic Pressure (EP) → Fishers' Livelihood Resilience (FLR)	0.112	$0.02 \leq f^2 < 0.15$	Small Effect	Hair et al. (2022)
Economic Pressure (EP) → Fishers' Adaptation Strategies (FAS)	0.323	$0.15 \leq f^2 < 0.35$	Medium Effect	Hair et al. (2022)
Government Support (GS) × Fishers' Adaptation Strategies (FAS) → Fishers' Livelihood Resilience (FLR)	0.033	$0.02 \leq f^2 < 0.15$	Small Effect	Hair et al. (2022)

According to Hair et al. (2022), f^2 values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes, respectively, whereas values below 0.02 indicate no meaningful effect size.

Interpreation of Effect Size f2

As shown in Table 10, the relationships between Government Support (GS) and Fishers' Livelihood Resilience (FLR) (f^2 = 0.232) and between Economic Pressure (EP) and Fishers' Adaptation Strategies (FAS) (f^2 = 0.323) exhibited medium effect sizes, indicating that these structural relationships made meaningful contributions to explaining the variance in their respective endogenous constructs. In contrast, the relationships between Seawall Ecological Impact (ES) and fishers ' livelihood resilience (FLR) (f^2 = 0.021), seawall ecological impact (ES) and fishers ' adaptation strategies (FAS) (f^2 = 0.093), Economic Pressure (EP) and fishers ' livelihood resilience (FLR) (f^2 = 0.112), and the interaction effect

of Government Support (GS) × fishers ' adaptation strategies (FAS) on fishers ' livelihood resilience (FLR) (f^2 = 0.033) demonstrated small effect sizes. Meanwhile, the relationship between Fishers' Adaptation Strategies (FAS) and Fishers' Livelihood Resilience (FLR) (f^2 = 0.000) showed no effect, indicating that Fishers' Adaptation Strategies contributed negligibly to explaining the variance in Fishers' Livelihood Resilience after accounting for the other predictor constructs.

Table 11. Predictive Performance Assessment (PLSpredict)

According to Hair et al., (2022), PLSpredict is recommended for assessing the predictive performance of PLS-SEM models.

Construct Indicator	Q^2predict	RMSE Comparison	Assessment	Reference
Fishers' Livelihood Resilience 1 (FLR1)	0.267	RMSE (PLS-SEM) < RMSE (LM)	Medium Predictive Power	Hair et al. (2022)
Fishers' Livelihood Resilience 2 (FLR2)	0.332	RMSE (PLS-SEM) < RMSE (LM)	Medium Predictive Power	
Fishers' Livelihood Resilience 3 (FLR3)	0.203	RMSE (PLS-SEM) < RMSE (LM)	Medium Predictive Power	
Fishers' Livelihood Resilience 4 (FLR4)	0.209	RMSE (PLS-SEM) > RMSE (LM)	Lower Predictive Power	
Fishers' Adaptation Strategies 1 (FAS1)	0.101	RMSE (PLS-SEM) > RMSE (LM)	Lower Predictive Power	
Fishers' Adaptation Strategies 2 (FAS2)	0.258	RMSE (PLS-SEM) < RMSE (LM)	Medium Predictive Power	

Interpretation of Predictive Performance (PLSpredict)

The predictive performance was evaluated using the PLSpredict procedure. According to Hair et al., (2022), positive Q^2predict values indicate that the PLS-SEM model has predictive relevance for observed indicators. Furthermore, the predictive performance was assessed by comparing the prediction errors of the PLS-SEM model with those of a linear benchmark model (LM), where smaller RMSE values indicate superior predictive performance.

As presented in Table 11, all indicators produced positive Q^2predict values ranging from 0.101 to 0.332, indicating that the proposed model possesses predictive relevance. In addition, four of the six indicators (KLN1, KLN2, KLN3, and SAN3) exhibited lower RMSE values than the linear benchmark model, whereas two indicators (KLN4 and SAN1) showed slightly higher RMSE values. Overall, these findings suggest that the structural model demonstrates medium predictive power, indicating a satisfactory out-of-sample prediction capability (Hair et al., 2022).

Table 12. Hypothesis Results

Hypothesis	Relationship	Effect Type	β	t-value	p-value	Decision
H1	Seawall Ecological Impact (ES) → Fishers' Adaptation Strategies (FAS)	Direct	0.254	3.306	0.001	Supported
H2	Economic Pressure (EP) → Fishers' Adaptation Strategies (FAS)	Direct	0.473	6.053	<0.001	Supported
H3	Seawall Ecological Impact (ES) → Fishers' Livelihood Resilience (FLR)	Direct	0.113	1.132	0.258	Not Supported
H4	Economic Pressure (EP) → Fishers' Livelihood Resilience (FLR)	Direct	0.294	2.742	0.006	Supported
H5	Fishers' Adaptation Strategies (FAS) → Fishers' Livelihood Resilience (FLR)	Direct	–0.008	0.088	0.930	Not Supported
H6	Seawall Ecological Impact (ES) → Fishers' Adaptation Strategies (FAS) → Fishers' Livelihood Resilience (FLR)	Indirect (Mediation)	–0.002	0.082	0.935	Not Supported
H7	Economic Pressure (EP) → Fishers' Adaptation Strategies (FAS) → Fishers' Livelihood Resilience (FLR)	Indirect (Mediation)	–0.004	0.086	0.931	Not Supported

H8	Government Support (GS) × Fishers' Adaptation Strategies (FAS) → Fishers' Livelihood Resilience (FLR)	Moderation	0.147	1.966	0.049	Supported

Interpretation of Hypothesis Result

Table 12 summarizes the hypothesis-testing results of the proposed structural model. Of the eight hypotheses tested, four (H1, H2, H4, and H8) were supported, whereas four (H3, H5, H6, and H7) were not. A hypothesis was considered supported when the bootstrapping results indicated a t-value greater than 1.96 and a p-value less than 0.05, following the recommended criteria for PLS-SEM analysis (Hair et al., 2022).

The results demonstrate that Seawall Ecological Impact had a significant positive effect on fishers' adaptation strategies ($\beta = 0.254$, $t = 3.306$, $p = 0.001$), supporting H1. Likewise, Economic Pressure significantly influenced fishers ' adaptation strategies ($\beta = 0.473$, $t = 6.053$, $p < 0.001$), supporting H2. These findings indicate that both ecological changes caused by seawall development and increasing economic pressures encourage fishing households to adopt adaptive livelihood strategies.

Regarding the direct effects on Fisher's Livelihood Resilience, Economic Pressure exerted a significant positive influence ($\beta = 0.294$, $t = 2.742$, $p = 0.006$), supporting H4. In contrast, Seawall Ecological Impact did not significantly affect livelihood resilience ($\beta = 0.113$, $t = 1.132$, $p = 0.258$), resulting in the rejection of H3. Furthermore, Fisher's Adaptation Strategies did not significantly influence Fisher's Livelihood Resilience ($\beta = -0.008$, $t = 0.088$, $p = 0.930$); therefore, H5 was not supported.

The mediation analysis further revealed that Fishers' Adaptation Strategies did not mediate the relationships between Seawall Ecological Impact and Fishers' Livelihood Resilience ($\beta = -0.002$, $t = 0.082$, $p = 0.935$) or between Economic Pressure and Fishers' Livelihood Resilience ($\beta = -0.004$, $t = 0.086$, $p = 0.931$). Consequently, H6 and H7 are not supported. These results suggest that the adaptive strategies implemented by fishers were insufficient to transmit the effects of ecological changes and economic pressures to improve livelihood resilience.

The moderating effect analysis showed that Government Support significantly moderated the relationship between fishers ' adaptation strategies and fishers ' livelihood resilience ($\beta = 0.147$, $t = 1.966$, $p = 0.049$). Therefore, H8 is supported.

DISCUSSION

The structural model results indicate that Seawall Ecological Impact and Economic Pressure significantly influenced fishers' adaptation strategies ($\beta = 0.254$, $p = 0.001$; $\beta = 0.473$, $p < 0.001$), supporting H1 and H2. Economic Pressure also significantly influenced livelihood resilience ($\beta = 0.294$, $p = 0.006$), supporting H4, whereas Seawall Ecological Impact did not significantly affect livelihood resilience ($\beta = 0.113$, $p = 0.258$), leading to the rejection of H3. Fishers' Adaptation Strategies did not significantly influence livelihood resilience ($\beta = 0.008$, $p = 0.930$) and did not mediate the relationships between Seawall Ecological Impact and Economic Pressure with livelihood resilience, resulting in the rejection of H5, H6, and H7. However, Government Support significantly moderated the relationship between adaptation strategies and livelihood resilience ($\beta = 0.147$, $p = 0.049$), supporting H8. These findings indicate that environmental and economic pressures encourage adaptation, but adaptation alone does not necessarily generate livelihood resilience; institutional support is necessary to strengthen the effectiveness of household responses.

The non-significant effect of Fishers' Adaptation Strategies on livelihood resilience provides an important insight into the nature of adaptation among small-scale fishing households. The finding suggests that the existence of adaptation strategies should not automatically be interpreted as evidence of strengthened livelihood resilience. In the context of coastal transformation, household responses may range from short-term coping, such as taking temporary alternative jobs or adjusting fishing activities, to incremental adaptation that gradually changes livelihood practices, and ultimately to transformative adaptation that fundamentally reorganizes the household livelihood system. The present findings indicate that adaptation responses alone may remain insufficient to overcome the structural vulnerabilities created by changing coastal conditions. Thus, the adaptation strategies identified in this

study should be interpreted as household responses to environmental and economic pressures rather than assumed to represent transformative adaptation in all cases.

This finding also provides a basis for interpreting the "From Sea to Land" framework as a process rather than an automatic outcome of livelihood adaptation. A transition from fishing-based activities toward land-based employment, small-scale trade, services, transportation, or other non-fishing activities may represent a more fundamental livelihood transformation when it is sustained and accompanied by changes in household skills, income structures, assets, and economic opportunities. However, diversification undertaken merely to compensate for temporary income losses may function primarily as coping rather than transformation. Therefore, the "From Sea to Land" framework should be understood as a continuum in which households may move from immediate coping, to incremental livelihood adjustment, and potentially toward longer-term socioeconomic transformation. The absence of a significant direct relationship between adaptation strategies and livelihood resilience suggests that such transformation may require additional institutional, financial, and market conditions beyond household-level adaptation efforts.

The significant moderating effect of Government Support further demonstrates that the effectiveness of adaptation depends on the institutional conditions surrounding fishing households. The positive interaction effect indicates that adaptation strategies are more likely to contribute to livelihood resilience when households receive adequate institutional support. This finding suggests that resilience cannot be achieved solely through individual household responses because fishers may face structural constraints that exceed their financial, technological, and organizational capacities. Government assistance can therefore function as an enabling condition that allows households to move beyond short-term coping toward more sustainable forms of adaptation and, where feasible, longer-term livelihood transformation. In this sense, institutional support represents an important boundary condition for converting household adaptation into meaningful livelihood resilience.

From an Islamic perspective, these findings can be interpreted through the principles of khalifah, mizan, hifz al-bi'ah, adl, and maslahah. The concept of khalifah emphasizes human responsibility to manage natural resources responsibly, while hifz al-bi'ah emphasizes environmental protection. The principle of mizan further requires a balance between infrastructure development, economic interests, ecological sustainability, and community welfare. Meanwhile, adl emphasizes fairness in the distribution of development benefits, risks, and resources, particularly for vulnerable fishing communities, while maslahah emphasizes the protection of collective welfare. These principles suggest that coastal infrastructure development should not be evaluated solely based on its physical or economic benefits but also according to its ecological consequences and impacts on the livelihoods of affected communities.

The findings can also be interpreted through the Islamic principles of adl, maslahah, takaful, and halal livelihood. The principle of adl requires that the benefits and burdens of coastal development be distributed fairly, particularly when vulnerable fishing households bear disproportionate livelihood and environmental costs. Maslahah requires development policies to consider collective welfare rather than infrastructure and economic growth alone. Takaful emphasizes social solidarity and mutual responsibility, suggesting that livelihood transitions should be supported through collective and institutional mechanisms rather than placing the burden of adaptation entirely on individual households. Meanwhile, the principle of halal livelihood highlights the importance of ensuring that alternative economic activities pursued by fishing households provide legitimate and sustainable sources of income. These principles reinforce the finding that household adaptation requires an enabling institutional environment to generate sustainable livelihood outcomes.

The significant moderating role of Government Support is also consistent with the principle of hisbah, which emphasizes accountability, oversight, and the protection of public interests. Government support should therefore extend beyond financial assistance to include livelihood training, market access, social protection, environmental rehabilitation, and meaningful community participation. Such policies can strengthen the capacity of fishing households to transform adaptation efforts into sustainable livelihood resilience. Taken together, the principles of khalifah, mizan, hifz al-bi'ah, adl, maslahah, and hisbah provide a complementary ethical perspective for understanding coastal adaptation and resilience and strengthen the relevance of the "From Sea to Land" framework within Sharia economic and management research.

The empirical findings and Islamic perspective indicate that livelihood resilience should be understood as a shared responsibility between households, communities, institutions, and other coastal stakeholders. The absence of a significant direct effect of adaptation strategies on livelihood resilience suggests that individual responses alone may not be sufficient when structural sources of vulnerability remain unresolved. The significant moderating role of Government Support, therefore, highlights the importance of institutional responsibility in creating conditions that enable sustainable livelihood transformation. Within the "From Sea to Land" framework, this transformation should not simply mean moving fishers away from fishing activities, but developing viable, equitable, and sustainable livelihood pathways while maintaining environmental responsibility and community welfare. From an Islamic economics and management perspective, this approach reflects the interconnected principles of adl, maslahah, takaful, halal livelihood, and hisbah, in which economic development is expected to protect vulnerable communities, sustain environmental resources, and promote broader social welfare.

From the perspective of sustainable coastal development, the findings reveal an important trade-off between infrastructure-based urban protection and the sustainability of small-scale fishing livelihoods. Seawall development may serve important functions in reducing coastal exposure and protecting urban areas, but its ecological and socioeconomic consequences should also be considered in development planning. When fishing households experience declining livelihood opportunities without adequate alternatives, coastal infrastructure may unintentionally increase livelihood vulnerability and socioeconomic inequality. Sustainable coastal development therefore requires policies that simultaneously address environmental protection, livelihood security, poverty reduction, food security, and social equity. For small-scale fishing communities, resilience-oriented interventions should not merely encourage households to diversify but should ensure that alternative livelihood opportunities are economically viable, accessible, and sufficiently supported over the long term.

The policy implications of these findings require differentiated interventions across stages of the "From Sea to Land" transition. At the local level, municipal government should prioritize livelihood mapping, targeted vocational training, access to productive assets, market facilitation, and social protection for households experiencing declining fishing opportunities. National policymakers should strengthen integrated coastal planning, ensure that infrastructure development incorporates livelihood impact assessments, and provide coordinated funding for livelihood transition programs. Non-governmental organizations can complement government programs through skills development, entrepreneurship assistance, financial literacy, and community facilitation, while community-based organizations can strengthen collective action, information sharing, and peer support among fishing households. These interventions should prioritize households with limited assets and restricted access to alternative employment, rather than applying uniform programs to all fishers. Implementation, however, requires attention to budget limitations, institutional capacity, coordination across government levels, and potential resistance among stakeholders affected by changes in coastal resource allocation.

Inclusive coastal governance is also essential because the costs and benefits of coastal infrastructure are not necessarily distributed equally among stakeholders. Meaningful participation of small-scale fishers should therefore extend beyond consultation to involvement in identifying livelihood impacts, designing adaptation programs, monitoring environmental changes, and evaluating development outcomes. Particular attention should be given to potential power imbalances between fishing communities, government institutions, and private developers. Transparent mechanisms for information disclosure, grievance handling, compensation, and benefit sharing can help reduce unequal distribution of development risks and benefits. Such participatory arrangements can strengthen social capital and collective action while increasing the legitimacy and effectiveness of coastal development policies.

CONCLUSION

This study examined the relationships among seawall ecological impact, economic pressure, fishers' adaptation strategies, government support, and fishers' livelihood resilience within the context of the socioeconomic transformation of fishing communities following seawall development in Coastal Cilincing, North Jakarta. The findings indicate that Seawall Ecological Impact and Economic Pressure significantly encourage fishers to adopt adaptation strategies. However, only Economic Pressure directly contributes to livelihood resilience, whereas Seawall Ecological Impact has no significant direct effect on livelihood resilience. Furthermore, Fishers' Adaptation Strategies neither significantly influence

livelihood resilience nor mediate the relationships between ecological and economic pressures and livelihood resilience. These findings indicate that adaptation should not automatically be equated with resilience because household responses may remain limited to short-term coping or incremental adjustment when structural vulnerabilities persist. Nevertheless, Government Support significantly strengthens the relationship between Fishers' Adaptation Strategies and livelihood resilience, demonstrating that institutional support is an important enabling condition for converting household adaptation into more sustainable resilience.

This study contributes to the coastal resilience and sustainable livelihood literature by proposing an integrated "From Sea to Land" framework that explains how ecological change, economic pressure, adaptation strategies, and government support interact in the socioeconomic transformation of small-scale fishing communities. The framework emphasizes that livelihood transformation is a process rather than an automatic consequence of adaptation. Household responses may begin with short-term coping, develop into incremental livelihood adjustment, and potentially progress toward more fundamental socioeconomic transformation when supported by appropriate assets, skills, market opportunities, and institutions. Thus, the "From Sea to Land" transition should not simply be understood as moving fishers away from fishing activities, but as developing viable and sustainable livelihood pathways that reduce vulnerability while maintaining community welfare and environmental responsibility.

From a practical perspective, coastal infrastructure policies should be accompanied by targeted and stage-specific livelihood interventions. Local governments should prioritize livelihood mapping, vocational training, access to productive resources, market facilitation, and social protection for households with limited livelihood alternatives, while national policymakers should strengthen integrated coastal planning and ensure that infrastructure development considers the livelihood impacts on small-scale fishers. Non-governmental and community-based organizations can complement these efforts through skills development, entrepreneurship assistance, financial literacy, collective action, and community facilitation. Such interventions should be implemented through meaningful fisher participation and transparent mechanisms for information sharing, grievance handling, and benefit distribution. These measures are particularly important because budget constraints, institutional capacity, multilevel coordination, and unequal bargaining power among coastal stakeholders may affect the effectiveness of livelihood transition programs.

This study had several limitations. First, the research employed a cross-sectional design within a single coastal community, which limits the generalizability of the findings to other geographical settings. Second, the proposed model focused on a limited number of constructs and did not explicitly incorporate other potentially important determinants such as social capital, household livelihood assets, environmental awareness, or governance quality. Future research should adopt longitudinal or mixed-method approaches to better capture the dynamic processes of livelihood transformation over time. Comparative studies across different coastal regions are also recommended to validate the proposed framework in diverse environmental and institutional contexts. Furthermore, future studies could integrate additional constructs, including social capital, adaptive governance, climate resilience, and sustainable livelihood assets, to improve the explanatory and predictive capabilities of coastal resilience models.

From an Islamic perspective, the findings and policy implications can be interpreted through the principles of khalifah, mizan, adl, maslahah, takaful, halal livelihood, and hisbah. The principles of khalifah, mizan, and hifz al-bi'ah emphasize responsible environmental stewardship and the need to balance coastal infrastructure development with ecological sustainability. The principle of adl requires a fair distribution of the benefits and burdens of coastal development, particularly for fishing households experiencing livelihood disruption, while maslahah requires policies to consider the long-term welfare of affected communities alongside urban protection objectives. Takaful emphasizes social solidarity and collective responsibility in supporting vulnerable households, whereas the principle of halal livelihood highlights the importance of ensuring that alternative livelihood pathways provide legitimate, sustainable, and socially beneficial sources of income. Hisbah further emphasizes institutional accountability through transparent implementation, participation, monitoring, and evaluation. Taken together, these principles provide an ethical perspective for ensuring that the "From Sea to Land" transformation is not merely an economic shift, but a fair, environmentally responsible, and welfare-oriented process consistent with the broader objectives of Islamic economics and management.

ACKNOWLEDGMENT

The authors express their sincere gratitude for the financial assistance received from the Directorate General of Higher Education, Research, and Technology (Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi/DIKTI), Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia via the Fundamental Research for Beginner Lecturers (Penelitian Dosen Pemula/PDP) Grant under Contract No. 0626/LL3/AL.04/2026. The authors express their heartfelt gratitude to the Cilincing Subdistrict Office in North Jakarta for its significant collaboration and support during the fieldwork and data gathering process. Their assistance played a crucial role in the successful execution of this research.

AUTHOR CONTRIBUTION STATEMENT

Conceptualization, research design, methodology development, and the formulation of the "From Sea to Land" framework were carried out by Indi Nervilia, Hikmah Rahmah, Erna Amelia, Nurwulan Kusuma Devi, and Haspul Naser. Data collection, including structured face-to-face interviews and field data gathering in Cilincing, North Jakarta, was conducted by Indi Nervilia, Hikmah Rahmah, Erna Amelia, Nurwulan Kusuma Devi, and Haspul Naser. Formal analysis, including measurement model assessment, structural model evaluation, moderation analysis, and hypothesis testing using PLS-SEM with SmartPLS 4, was performed by Indi Nervilia, Hikmah Rahmah, Erna Amelia, Nurwulan Kusuma Devi, and Haspul Naser. Original draft preparation and writing were conducted by Indi Nervilia and Hikmah Rahmah, while review, editing, and revision were performed by Erna Amelia, Nurwulan Kusuma Devi, and Haspul Naser. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of this work.

AI DISCLOSURE STATEMENT

During the preparation of this work, the author(s) used AI-assisted tools, such as grammar checkers and language enhancement software, solely for the purpose of improving readability and refining the language of the manuscript. No generative AI tools were used for statistical data analysis using PLS-SEM, interpretation of results, conceptual framework development, or core scientific writing. The authors take full responsibility for the originality, accuracy, and integrity of the research findings and the final content of this article.

FUNDING STATEMENT

This research was funded by the Directorate General of Higher Education, Research, and Technology (Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi/DIKTI), Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia through the Fundamental Research for Beginner Lecturers (Penelitian Dosen Pemula/PDP) Grant under Contract No. 0626/LL3/AL.04/2026. The funders had no role in the study design, data collection, analysis, decision to publish, or preparation of the manuscript.

CONFLICTS OF INTEREST

The authors declare that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The research was conducted independently, and the results are presented objectively and without bias. The authors have no affiliation with or financial interest in any coastal development company, infrastructure contractor, or government agency that could be perceived as influencing the analysis or conclusions of this study.

REFERENCES

Adger, W. N. (2006). Vulnerability. Global Environmental Change, 16(3), 268–281. https://doi.org/10.1016/j.gloenvcha.2006.02.006

Allison, E. H., & Ellis, F. (2001). The livelihoods approach and management of small-scale fisheries. Marine Policy, 25, 377–388. http://www.fao.org/fi/projects/sflp/index.html

Andrade, C. (2020). The Limitations of Online Surveys. Indian Journal of Psychological Medicine, 42(6), 575–576. https://doi.org/10.1177/0253717620957496

Angnuureng, B. D., Adade, R., Chuku, E. O., Dzantor, S., Brempong, E. K., & Mattah, P. A. D. (2023). Effects of coastal protection structures in controlling erosion and livelihoods. Heliyon, 9(10). https://doi.org/10.1016/j.heliyon.2023.e20633

Bakker, A. B., & Albrecht, S. (2018). Work engagement: current trends. Career Development International, 23(1), 4–11. https://doi.org/10.1108/CDI-11-2017-0207

Baum, G., Kusumanti, I., Breckwoldt, A., Ferse, S. C. A., Glaser, M., Dwiyitno, Adrianto, L., van der Wulp, S., & Kunzmann, A. (2016). Under pressure: Investigating marine resource-based livelihoods in Jakarta Bay and the Thousand Islands. Marine Pollution Bulletin, 110(2), 778–789. https://doi.org/https://doi.org/10.1016/j.marpolbul.2016.05.032

Béné, C., Frankenberger, T., & Nelson, S. (2015). Design, Monitoring and Evaluation of Resilience Interventions: Conceptual and Empirical Considerations. IDS. www.ids.ac.uk/publications

Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice: Ten risks and solutions for the ocean economy. Marine Policy, 125, 104387. https://doi.org/https://doi.org/10.1016/j.marpol.2020.104387

Betteridge, B., & Webber, S. (2019). Everyday resilience, reworking, and resistance in North Jakarta's kampungs. Environment and Planning E: Nature and Space, 2(4), 944–966. https://doi.org/10.1177/2514848619853985

Bryman, Alan. (2016). Social Research Methods (5th ed.). Oxford University Press.

Chin. (1998). The Partial Least Squares Approach to Structural Equation Modeling. Modern Methods for Business Research. 295.

Cinner, J. E., Adger, W. N., Allison, E. H., Barnes, M. L., Brown, K., Cohen, P. J., Gelcich, S., Hicks, C. C., Hughes, T. P., Lau, J., Marshall, N. A., & Morrison, T. H. (2018). Building adaptive capacity to climate change in tropical coastal communities. In Nature Climate Change (Vol. 8, Number 2, pp. 117–123). Nature Publishing Group. https://doi.org/10.1038/s41558-017-0065-x

Creswell, J. W. (2014). RESEARCH DESIGN: Qualitative, Quantitative, and Mixed Methods Approach (4 Edition). SAGE Publications Asia-Pacific Pte Ltd.

DFID. (1999). SUSTAINABLE LIVELIHOODS GUIDANCE SHEETS.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Fabinyi, M., Belton, B., Dressler, W. H., Knudsen, M., Adhuri, D. S., Abdul Aziz, A., Akber, M. A., Kittitornkool, J., Kongkaew, C., Marschke, M., Pido, M., Stacey, N., Steenbergen, D. J., & Vandergeest, P. (2022). Coastal transitions: Small-scale fisheries, livelihoods, and maritime zone developments in Southeast Asia. In Journal of Rural Studies (Vol. 91, pp. 184–194). Elsevier Ltd. https://doi.org/10.1016/j.jrurstud.2022.02.006

FAO. (2022). The State of World Fisheries and Aquaculture 2022. In The State of World Fisheries and Aquaculture 2022. FAO. https://doi.org/10.4060/cc0461en

FAO. (2024). The State of World Fisheries and Aquaculture. Blue Transformation In Action. In The State of World Fisheries and Aquaculture 2024. FAO. https://doi.org/10.4060/cd0683en

Folke, C., Carpenter, S. R., Walker, B., Scheffer, M., Chapin, T., & Rockström, J. (2010). Resilience Thinking: Integrating Resilience, Adaptability and Transformability. Ecology and Society. : http://www.ecologyandsociety.org/vol15/iss4/art20

Folke, C., Carpenter, S., Walker, B., Scheffer, M., Elmqvist, T., Gunderson, L., & Holling, C. S. (2004). Regime shifts, resilience, and biodiversity in ecosystem management. In Annual Review of Ecology, Evolution, and Systematics (Vol. 35, pp. 557–581). https://doi.org/10.1146/annurev.ecolsys.35.021103.105711

Fornell, C., & Larcker, D. F. (1981). Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. In Source: Journal of Marketing Research (Vol. 18, Number 1).

Hair, J. F., Tomas, G., Hult, M., Ringle, C. M., & Sarstedt, M. (2022). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). https://www.researchgate.net/publication/354331182

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

IPCC. (2023). Climate Change 2022 – Impacts, Adaptation and Vulnerability. In Climate Change 2022 – Impacts, Adaptation and Vulnerability. Cambridge University Press. https://doi.org/10.1017/9781009325844

Isaac, E. (2023). Convenience and Purposive Sampling Techniques: Are they the Same? International Journal of Innovative Social & Science Education Research. www.seahipaj.org

Kesmodel, U. S. (2018). Cross-sectional studies – what are they good for? Acta Obstetricia et Gynecologica Scandinavica, 97(4), 388–393. https://doi.org/10.1111/aogs.13331

Kock, N. (2015). Common method bias in PLS-SEM: A full collinearity assessment approach. International Journal of E-Collaboration, 11(4), 1–10.

Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. Journal of Chiropractic Medicine, 15(2), 155–163. https://doi.org/10.1016/j.jcm.2016.02.012

Kurniawan. (2020). The effect of loan granted factor on peer-to-peer lending (funded loan) in Indonesia. Investment Management and Financial Innovations, 17(4), 165–174. https://doi.org/10.21511/imfi.17(4).2020.16

Kusmaryono, I., Wijayanti, D., & Maharani, H. R. (2022). Number of Response Options, Reliability, Validity, and Potential Bias in the Use of the Likert Scale Education and Social Science Research: A Literature Review. In International Journal of Educational Methodology (Vol. 8, Number 4, pp. 625–637). Eurasian Society of Educational Research. https://doi.org/10.12973/ijem.8.4.625

Mansfield, E. J., Micheli, F., Fujita, R., Fulton, E. A., Gelcich, S., Battista, W., Bustamante, R. H., Cao, L., Daniels, B. N., Finkbeiner, E. M., Gaines, S., Peckham, H., Roche, K., Ruckelshaus, M., Salomon, A. K., Sumaila, U. R., White, C., & Naylor, R. (2024). Anticipating trade-offs and promoting synergies between small-scale fisheries and aquaculture to improve social, economic, and ecological outcomes. NPJ Ocean Sustainability, 3(1). https://doi.org/10.1038/s44183-023-00035-5

Micheli, F., Saenz-Arroyo, A., Aalto, E., Beas-Luna, R., Boch, C. A., Cardenas, J. C., De Leo, G. A., Diaz, E., Espinoza-Montes, A., Finkbeiner, E., Freiwald, J., Fulton, S., Hernández, A., Lejbowicz, A., Low, N. H. N., Martinez, R., McCay, B., Monismith, S., Precoma-de la Mora, M., … Woodson, C. B. (2024). Social-ecological vulnerability to environmental extremes and adaptation pathways in small-scale fisheries of the southern California Current. Frontiers in Marine Science, 11. https://doi.org/10.3389/fmars.2024.1322108

Osmaleli, O., Salim, M., Rizka, A., Tawang, F., Larasati, C., Fadloli, A., Rizal, H., Irianies, G., Adrianto, L., Kusumastanto, T., Yulianto, G., & Booth, H. (2025). Income Analysis of Seasonal Targeted Shark Fishers in Muncar, Banyuwangi, Indonesia. BIO Web of Conferences, 176. https://doi.org/10.1051/bioconf/202517601013

Ostrom, E. (2009). A General Framework for Analyzing Sustainability of Social- Ecological Systems. Science, 325(5939), 416–419. https://doi.org/10.1126/science.1170749

Querdiola, Cisilia. K. A. Rilus. G. R. (2023). Struktur Sosial: Strategi Nafkah dan Tingkat Kesejahteraan Nelayan Pasca Reklamasi Teluk Jakarta.

Scoones, I. (1998). Sustainable Rural Livelihoods: A Framework for Analysis.

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. Indian Journal of Dermatology, 61(3), 261–264. https://doi.org/10.4103/0019-5154.182410

Sobirin, A., Nababan, B. O., Indah, M. N., & Kusumastanto, T. (2025). Economic Impact Analysis of Reclamation Activities on Rampus (Gillnet) Fishery in Kaliadem, Muara Angke, North Jakarta. Https://Journal.Ipb.Ac.Id/Index.Php/Coj. https://doi.org/10.29244/coj.v9i2.32

Spector, P. (2019). Do Not Cross Me: Optimizing the Use of Cross-Sectional Designs. Journal of Business and Psychology, 34. https://doi.org/10.1007/s10869-018-09613-8

Stacey, N., Gibson, E., Loneragan, N. R., Warren, C., Wiryawan, B., Adhuri, D. S., Steenbergen, D. J., & Fitriana, R. (2021). Developing sustainable small-scale fisheries livelihoods in Indonesia: Trends, enabling and constraining factors, and future opportunities. Marine Policy, 132. https://doi.org/10.1016/j.marpol.2021.104654

Teguh Prawira, W., Widyasari, V., & Widyanto, A. (2025). Optimizing community-based artisanal fisheries approach to improve coastal resilience and community livelihoods. BIO Web of Conferences, 175. https://doi.org/10.1051/bioconf/202517504004

Temmerman, S., Meire, P., Bouma, T. J., Herman, P. M. J., Ysebaert, T., & De Vriend, H. J. (2013). Ecosystem-based coastal defence in the face of global change. Nature, 504(7478), 79–83. https://doi.org/10.1038/nature12859

van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84(2), 523–538. https://doi.org/10.1007/s11192-009-0146-3

Wintergalen, E. W., Oyanedel, R., Villaseñor-Derbez, J. C., Fulton, S., & Molina, R. (2022). Opportunities and challenges for livelihood resilience in urban and rural Mexican small-scale fisheries. Ecology and Society, 27(3). https://doi.org/10.5751/ES-13471-270346