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Transforming Social Capital to Strengthen Local Government Resilience in Hazard-Prone Areas

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Abstract

This study examines the transformation of social capital in strengthening local government resilience to natural disaster risks in Gowa, Indonesia—an area highly vulnerable to multiple natural hazards. Employing a quantitative research design, the study utilises Structural Equation Modelling (SEM) via Partial Least Squares (PLS-SEM) to conduct regression analysis. Data were collected through a structured survey involving 150 respondents from 15 institutions, including government agencies, private sector actors, non-governmental organisations (NGOs), and disaster response volunteers. The survey comprised 72 statement items across eight variables, ensuring the dataset's validity and reliability. The findings indicate that strengthening social bonds, fostering community collaboration, and enhancing trust in local institutions significantly contribute to reducing the impacts of disasters by enabling swift responses and improving recovery efforts. These results underscore the vital—yet often underappreciated—role of social capital in disaster risk management and resilience building. The study calls for policy interventions that promote community cohesion and institutional trust, demonstrating that social dimensions are central to effective and sustainable disaster risk reduction. Moreover, the research aligns with the United Nations Sustainable Development Goals (SDGs), particularly Goal 11 (Sustainable Cities and Communities) and Goal 13 (Climate Action), by advocating for socially inclusive, community-driven resilience strategies.

Keywords: *Community Resilience; Disaster Risks; Social Capital*

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Introduction

In recent years, there has been a marked global increase in both the frequency and severity of natural disasters (Alimonti & Mariani, 2023). From intense wildfires to catastrophic storms, floods, and earthquakes, these events have caused extensive devastation with enduring repercussions (Lu, 2022). Data indicate that natural disasters are the most frequently occurring hazards; droughts cause the highest number of fatalities, floods affect the largest populations, and storms result in the greatest economic losses. Natural hazards—such as earthquakes, hurricanes, floods, and wildfires—not only lead to fatalities and physical injuries but also adversely affect the quality of life of impacted populations. This escalation in hazard events should not be regarded as isolated occurrences but as indicators of a broader, alarming global trend. These disasters disproportionately affect socially and economically marginalised groups, exacerbating pre-existing inequalities (Fergusson & Boden, 2014). As the world approaches a future characterised by more frequent and intense disasters, developing a comprehensive understanding of disaster risk and strengthening community resilience has become imperative (Ciottone & Ciottone, 2024; Zander et al., 2023).

The rising vulnerability to natural hazards stems from a complex interplay of climate change, rapid urbanisation, and environmental degradation. Climate change significantly intensifies weather-related disasters (Drake, 2023). Concurrently, unplanned urban expansion increases population exposure and vulnerability, particularly in densely populated areas with inadequate infrastructure (Gasselt & Tsai, 2022). Additionally, environmental degradation has reduced the efficacy of natural protective barriers such as forests and wetlands, which have traditionally mitigated the effects of extreme events.

Scientific projections and current trends paint a bleak picture of the future. With rising global temperatures, more severe storms, droughts, and heatwaves are expected. Simultaneously, rising sea levels threaten coastal areas, and shifting precipitation patterns are altering the geography of flood-prone zones. These physical transformations carry profound socio-economic implications, affecting agriculture, water systems, public health, and human migration patterns (Alotaibi, 2023; Auffhammer et al., 2018).

In light of these escalating threats, community resilience has emerged as a key concern (Barasa, 2018). A community's ability to respond and recover effectively is deeply rooted in its social capital, which plays a critical role both during immediate disaster response and in long-term reconstruction phases (Ciottone & Ciottone, 2024; W. Liu et al., 2022). Social capital—defined by relationships, trust, norms, and networks within a community—substantially influences how individuals collectively anticipate, withstand, and recover from natural disasters (Aldrich & Meyer, 2022; Narain, 2021; Panday et al., 2021; Ressler, 2022; Y. Liu et al., 2022). Investigating how social capital can be cultivated and leveraged to reinforce disaster resilience is therefore both an academic imperative and a practical necessity.

This concern is especially relevant for countries in the Global South, such as Afghanistan, which face compound challenges due to climate vulnerability, weak

institutional structures, and post-conflict reconstruction efforts. Afghanistan is acutely susceptible to various natural hazards—including floods, droughts, and earthquakes—aggravated by environmental degradation and limited disaster governance (Carrasco et al., 2024). In such fragile contexts, social capital becomes a crucial asset for community-level resilience. Research shows that in states with underdeveloped institutions, civic trust and social networks are fundamental to enabling both emergency responses and sustainable recovery (Utsumi & Muradi, 2024). Understanding the dynamics of social capital in these contexts not only enhances comparative academic perspectives but also informs inclusive and context-sensitive global disaster governance frameworks.

In Gowa, Indonesia, the seasonal onset of rainfall is frequently accompanied by severe flooding, bringing both life-sustaining water and recurring humanitarian crises. In 2019, floods in the area impacted 2,216 individuals, submerged 604 homes, and caused 46 fatalities. In 2021, another flood in Pallangga District resulted in 92 deaths and prompted emergency evacuations. A 2020 study in Gowa highlighted the acute vulnerability of riverine communities (Widodo et al., 2021). These statistics are more than numbers—they represent a community continually struggling with displacement, loss, and the arduous process of rebuilding.

The transformation of social capital carries significant implications for sustainable development. Shifting social dynamics—shaped by urbanisation, technological change, and evolving socio-economic conditions—are reshaping how communities interact, with both positive and negative consequences for social cohesion (Benfer & Gold, 2017). These changes directly impact efforts to enhance community resilience, which is a key target of the United Nations Sustainable Development Goals (SDGs), particularly SDG 11 (Sustainable Cities and Communities). While robust social ties can facilitate preparedness and collective action, weakened social cohesion may intensify vulnerability in times of crisis (Alexander Priest, 2023).

The increasing incidence of natural disasters calls for a deeper exploration of how social capital can be mobilised to enhance adaptive capacity, in alignment with SDG 13 (Climate Action). Recognising and addressing shifts in social capital enable policymakers and local leaders to develop strategies that not only preserve but also strengthen these essential networks. Social cohesion must therefore be deliberately cultivated as a fundamental resource for disaster risk reduction and long-term resilience.

The evolving role of social capital thus transcends theoretical interest and becomes a matter of practical urgency. Grounded in trust, shared norms, and mutual support, social capital enhances a community's collective capacity to coordinate, respond to, and recover from disaster events. A critical question arises: how can this latent potential be transformed into a strategic resource to reinforce resilience in Gowa District? This study aims to provide a comprehensive analysis of the role of social capital in disaster resilience, along with practical recommendations for policymakers, community leaders, and local residents. It also seeks to reframe disaster response approaches in Gowa—from reactive recovery to proactive resilience-building.

Social capital, as conceptualised in this article, is not merely an academic abstraction but a tangible asset supporting communities as they navigate environmental

uncertainty (Bhandari & Yasunobu, 2009; Filipovic & Arslanagic-Kalajdzic, 2023). Although its manifestations vary across cultural settings—such as in Gowa Regency—the fundamental premise remains consistent: human relationships are a powerful defence against adversity. Social capital comprises a range of resources, both tangible and intangible, derived from social connections.

Antonacci et al. (2023) identify four principal dimensions of social capital: social trust, network diversity, social reciprocity, and civic engagement. Likewise, Cockburn and Cockburn-Wootten (2022) highlight personal relationships, the diversity and strength of social support networks, civic involvement, and the shared values that underpin cooperation. Social capital is often categorised into cognitive and structural forms—the former relating to trust, reciprocity, and mutual support, and the latter to institutional participation, group membership, and network density. It may also be differentiated into bonding capital (informal ties) and bridging capital (formal connections) (Menardo et al., 2022). This study adopts a holistic perspective, focusing on four core dimensions of social capital: personal relationships, social network support, civic engagement, and trust and cooperative norms (Motkuri, 2018).

Community resilience is a multidimensional construct encompassing numerous interrelated components. These include governance, risk identification, cultural awareness, risk mitigation, and organisational strategies for disaster preparedness and response (Patel, 2022; Robinson et al., 2022). Other influencing factors include financial and social capital, technological capabilities, institutional and physical infrastructure, and cultural traditions of meaning-making and survival (Livnat & Almog-Bar, 2023; McNeill et al., 2022). Emotional resilience—marked by optimism and trust—as well as cooperation norms and mutual aid mechanisms, also enhance resilience. Additionally, reliable and disaggregated data are essential for baseline assessments and post-disaster evaluations, reinforcing evidence-based planning (Robinson et al., 2022; Sousa & Moss, 2022). This study assesses resilience in Gowa District through four dimensions: economic, social, managerial, and environmental (W. Liu et al., 2022).

Each dimension represents a distinct component of resilience. Economic resilience refers to the capacity for economic continuity and recovery post-disaster, involving socio-demographics, collaboration, community assets, and infrastructure, including housing (Taylor et al., 2022; Osei-Kyei et al., 2023). In indigenous contexts, it may also include local employment and development opportunities (Gu et al., 2023). Social resilience is rooted in trust and belonging, shaped by interpersonal connections and social networks.

Managerial or institutional resilience relates to governance quality, equity, policy frameworks, and governmental support and protection mechanisms (W. Liu et al., 2022). Environmental resilience includes both built and natural environments, assessed through access to public services and ecological benefits that support sustainability and recovery. Collectively, these dimensions provide a framework for enhancing community resilience.

Personal relationships, as a facet of social capital, are integral to both economic and social resilience. These relationships provide emotional and practical support during crises (Cvetkovic & Ivkovic, 2022). They promote reciprocity and shared values, reinforcing communal cohesion (Pfefferbaum et al., 2017). Resilient communities rely on

trust, social support, leadership, and collective agency, fostering inclusive governance (Spierenburg, 2022; Lyu et al., 2023; Panday et al., 2021; Slingerland et al., 2022).

Hypotheses:

H1: Personal Relationships are significantly associated with Economic Resilience
H2: Personal Relationships are significantly associated with Social Resilience
H3: Personal Relationships are significantly associated with Managerial Resilience
H4: Personal Relationships are significantly associated with Environmental Resilience
H5: Personal Relationships are significantly associated with Social Network Support
H6: Personal Relationships are significantly associated with Trust and Cooperative Norms

Social network support is another critical dimension of social capital that fosters adaptive capacity and resilience (Wünsche & Fischer, 2020). These networks—comprising family, friends, neighbours, and wider community ties—provide emotional, informational, and material support (Jia et al., 2021). In crises, such networks facilitate timely information and resource distribution, often outperforming formal channels (Mohapatra & Ketut Prasetyo, 2019; Doyle & Mace, 2019; Cho & Lee, 2022; Fan et al., 2020). The strength and function of these networks depend on cohesion, network structure, and levels of bonding and bridging capital (Lubbers, 2022). Recognising and strengthening these networks is essential to resilience planning.

Hypotheses:

H7: Social Network Support is significantly associated with Economic Resilience
H8: Social Network Support is significantly associated with Social Resilience
H9: Social Network Support is significantly associated with Managerial Resilience
H10: Social Network Support is significantly associated with Environmental Resilience
H11: Social Network Support is significantly associated with Civic Engagement

Civic engagement forms the foundation of community resilience, enabling citizens to shape responses to social and environmental challenges (Sutley & Lyles, 2023). Engagement enhances preparedness, responsiveness, and recovery, especially when grounded in local culture (Ardoin et al., 2023). Pre-disaster, engagement includes planning, awareness, and volunteering. During disasters, it facilitates coordinated action (Mutiarni et al., 2022; Mabor, 2020; Pierel et al., 2023; Ingham et al., 2022).

Hypotheses:

H12: Civic Engagement is significantly associated with Economic Resilience
H13: Civic Engagement is significantly associated with Social Resilience
H14: Civic Engagement is significantly associated with Managerial Resilience
H15: Civic Engagement is significantly associated with Environmental Resilience
H16: Civic Engagement is significantly associated with Trust and Cooperative Norms

Trust and cooperative norms are essential for social order and resilience (Fornalé et al., 2023; Sousa & Moss, 2022; Abdalla et al., 2021). Trust in institutions and among citizens supports effective communication and coordination (Deb & González-Díaz, 2019; Sharma et al., 2022). Cultural resilience, emotional strength, and collective enforcement norms reinforce societal unity (Kuipers, 2022; Murase & Hilbe, 2023; Qurniati, Rommy,

Febryano, & Zulfiani, 2017; Alexander Priest, 2023; Bertoldo et al., 2020; Toner et al., 2015).

Hypotheses:

H17: Trust and Cooperative Norms are significantly associated with Economic Resilience

H18: Trust and Cooperative Norms are significantly associated with Social Resilience

H19: Trust and Cooperative Norms are significantly associated with Managerial Resilience

H20: Trust and Cooperative Norms are significantly associated with Environmental Resilience

Research Methods

This study adopts a quantitative research methodology, employing regression analysis through Structural Equation Modelling (SEM) using Partial Least Squares (PLS-SEM). This approach enables a comprehensive analysis of the complex relationships among the various components of social capital and community resilience, as outlined in the conceptual model (see Figure 1). The model provides a theoretical and empirical framework that examines how key dimensions of social capital—namely Personal Relationships, Social Network Support, Civic Engagement, and Trust and Cooperative Norms—are associated with the four core aspects of community resilience: Economic, Social, Managerial, and Environmental Resilience.

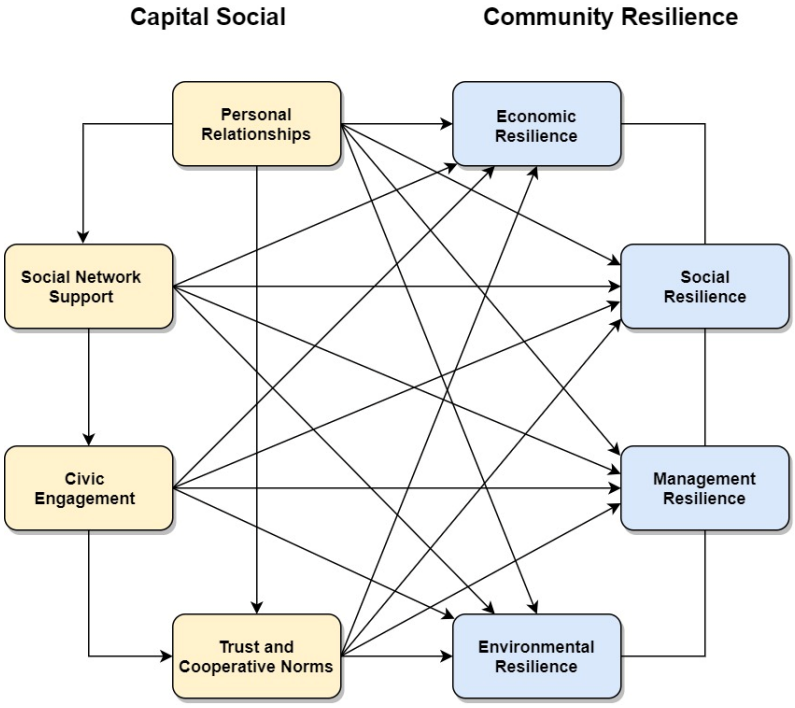


Figure 1. Conceptual Model
Source: Processed by the authors (2024)

The research model has been developed based on a synthesis of established theoretical foundations and prior empirical studies, ensuring both academic rigour and

contextual relevance. By using PLS-SEM, the study is able to explore both direct and indirect effects between latent variables, offering insights into the mechanisms through which social capital contributes to disaster resilience. This methodological choice is particularly suitable for studies involving complex constructs with multiple indicators and where the aim is to predict key target constructs within a theory-driven framework.

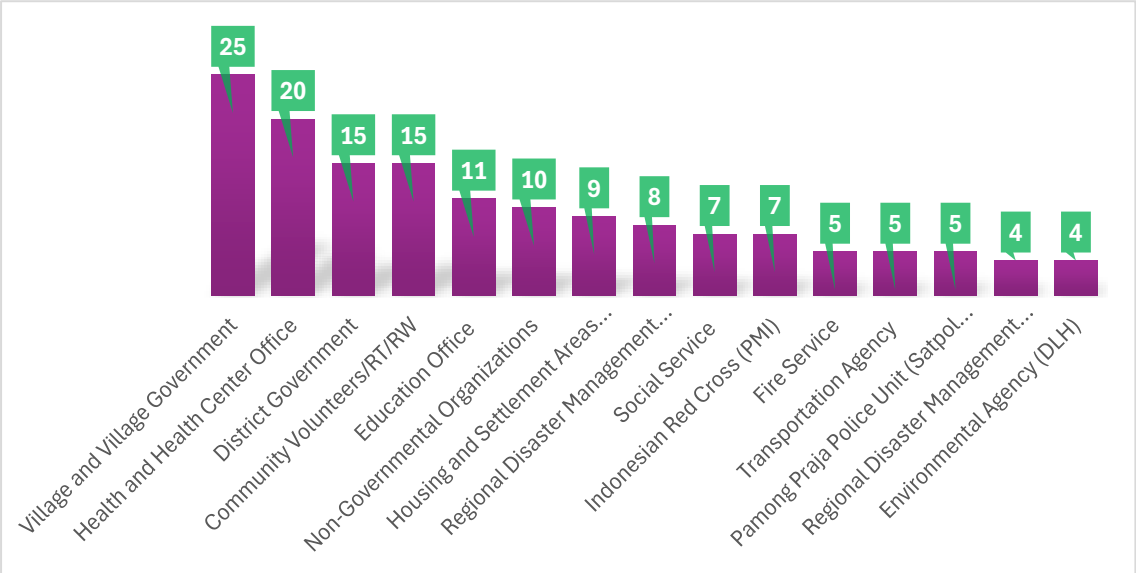


Figure 2. Institutions and Number of Respondents
Source: Processed by the authors (2024)

The study draws on data collected from 150 respondents across 15 institutions (see Figure 2), comprising government agencies, private sector actors, non-governmental organisations (NGOs), and disaster response volunteers. This multi-stakeholder selection is intentional, as it ensures the inclusion of diverse institutional perspectives on the transformation of social capital in the context of disaster risk resilience in Gowa District, Indonesia. Given the region's exposure to recurrent natural hazards, such as floods and landslides, the involvement of these key actors is crucial to capturing the full scope of community-level resilience efforts.

The sample size of 150 respondents allows for adequate statistical power in SEM analysis and reflects a balanced representation of institutional stakeholders. The involvement of 15 distinct organisations ensures variation across both formal and informal sectors, which is essential for understanding the inter-organisational dynamics and collaborative mechanisms underpinning resilience-building strategies. An overview of respondent characteristics is presented in Figure 3.

In addition, the survey instrument comprises 72 statement items across eight latent variables. This comprehensive design requires a sufficiently large and diverse sample to ensure the reliability and validity of the constructs measured. The inclusion of multiple indicators per construct enhances the robustness of the analysis, while the distribution across key dimensions allows for a nuanced understanding of the relationships among social capital and resilience factors.

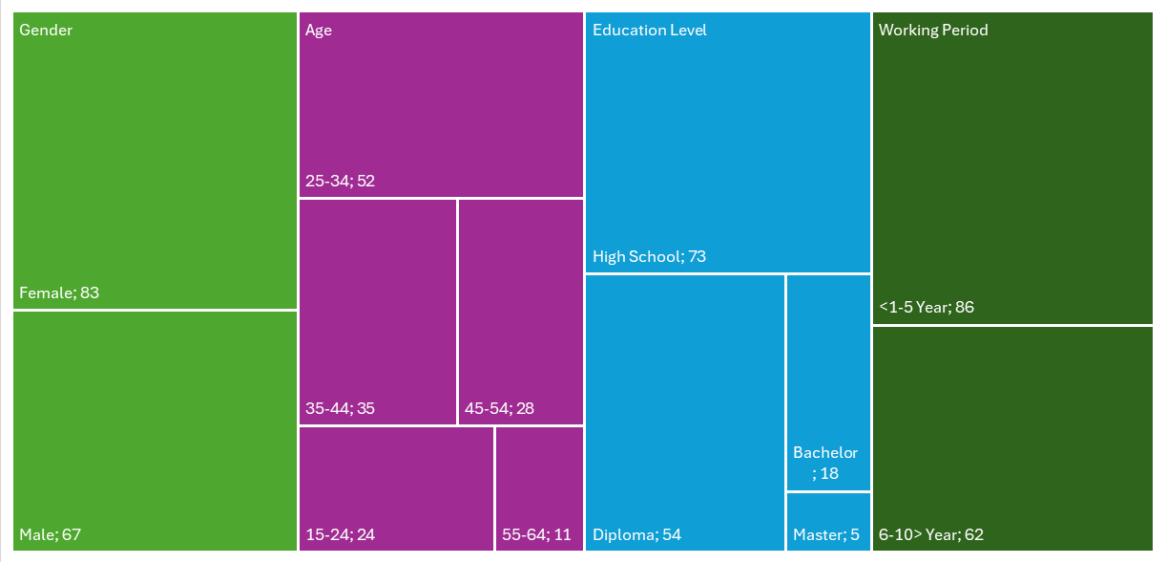


Figure 3. Respondent Characteristics
Source: Processed by the authors (2024)

By integrating a well-structured conceptual framework, rigorous statistical analysis, and a diverse respondent base, this study aims to generate evidence-based insights that inform both policy and practice. Ultimately, it seeks to contribute to the strengthening of disaster governance through socially grounded and empirically supported strategies tailored to hazard-prone regions such as Gowa, Indonesia.

Results and Discussion

Reliability and Validity Testing

The outer model analysis is crucial to ensuring that the constructs and indicators used in the measurement model are both valid and reliable. This analysis assesses construct validity through composite reliability, measuring the extent to which constructs are consistently and accurately represented. While a Cronbach's alpha value exceeding 0.7 is generally regarded as acceptable for internal consistency, some scholars argue that slightly lower thresholds may be permissible depending on the research context (Erten & Özdemir, 2020). Composite reliability (rho_A), considered a more precise estimate of internal consistency, is deemed satisfactory at values above 0.7 (Chuanxin Zhang et al., 2020). Similarly, composite reliability (rho_C)—although computed differently—serves as an additional indicator of internal reliability, with higher values reflecting stronger consistency (Shah et al., 2022). Furthermore, Average Variance Extracted (AVE) is employed to evaluate construct validity, with values above 0.5 indicating adequate convergent validity (Appiah-Twumasi et al., 2022).

As shown in Table 1, Cronbach's alpha values range from 0.913 to 0.951, suggesting excellent internal consistency across all constructs. Likewise, composite reliability (rho_A and rho_C) values fall between 0.918 and 0.959, reinforcing these findings. AVE values span from 0.593 to 0.743, indicating sufficient to strong convergent validity. These results

confirm that the measurement model meets the required standards for reliability and validity, rendering the constructs suitable for further structural analysis.

Table 1. Construct Reliability and Validity
Source: Processed by the authors (2024)

Variable	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Civic Engagement	0.945	0.946	0.953	0.693
Economic Resilience	0.922	0.939	0.937	0.632
Environment Resilience	0.94	0.942	0.95	0.68
Management Resilience	0.951	0.952	0.959	0.743
Personal Relationships	0.913	0.918	0.929	0.593
Social Network Support	0.93	0.933	0.942	0.642
Social Resilience	0.941	0.942	0.95	0.68
Trust and Cooperative Norms	0.933	0.934	0.944	0.653

Figure 4 provides a heatmap illustrating the distribution of reliability and validity values across the various constructs. Darker colours indicate higher values, while lighter shades signify relatively lower levels. Among the constructs, Management Resilience demonstrates the highest internal consistency, with Cronbach's alpha and composite reliability values reaching 0.951 and 0.959, respectively. Civic Engagement, Social Resilience, and Trust and Cooperative Norms also exhibit strong internal reliability and validity. In contrast, Personal Relationships shows the lowest AVE (0.593), suggesting it accounts for a relatively smaller proportion of variance. Nonetheless, all constructs remain above the generally accepted thresholds (e.g., Cronbach's alpha > 0.7, AVE > 0.5), underscoring the model's robustness.

Based on the results in Table 2, the structural model shows a strong predictive capability. All latent variables present R-square values above 0.5, signifying that more than 50% of the variance in the dependent variables can be explained by the model. Specifically, Civic Engagement has an R-square of 0.716, Economic Resilience 0.779, Environmental Resilience 0.751, Management Resilience 0.739, Social Network Support 0.578, Social Resilience 0.658, and Trust and Cooperative Norms 0.601. These values collectively demonstrate that the model effectively captures the relationships among the constructs of social capital and community resilience.

Figure 5 highlights the explanatory power of each dependent variable. Economic Resilience emerges as the construct with the highest predictive capability (R-square = 0.779; adjusted R-square = 0.773), followed by Environmental Resilience (0.751; 0.744) and Management Resilience (0.739; 0.732). Social Network Support records the lowest

values (0.578; 0.575), suggesting that additional factors not included in the model may influence it. Trust and Cooperative Norms (0.601; 0.596) and Social Resilience (0.658; 0.649) demonstrate moderate explanatory power. The small gaps between R-square and adjusted R-square across all constructs indicate that the model is not significantly affected by overfitting, reinforcing its reliability and generalisability.

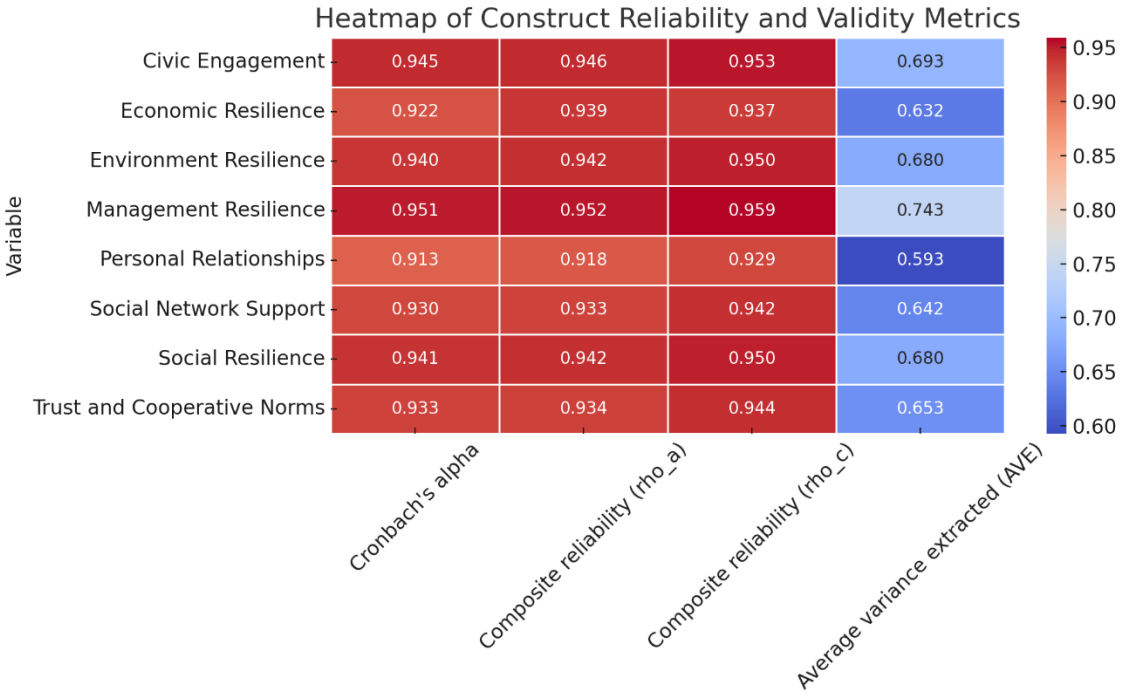


Figure 4. Heatmap of Construct Reliability and Validity Metrics Characteristics
Source: Processed by the authors (2024)

Table 2. Evaluation of Structural Models
Source: Processed by the authors (2024)

Variable	R-square	R-square Adjusted
Civic Engagement	0.716	0.714
Economic Resilience	0.779	0.773
Environment Resilience	0.751	0.744
Management Resilience	0.739	0.732
Social Network Support	0.578	0.575
Social Resilience	0.658	0.649
Trust and Cooperative Norms	0.601	0.596

The analysis also reveals important relationships between variables, as outlined in Table 3. Notably, Civic Engagement has a significant relationship with both Economic Resilience and Environmental Resilience, while its association with Management

Resilience and Social Resilience is statistically insignificant. These rejected relationships suggest that the impact of civic engagement on community resilience may not be uniform across all dimensions. Conversely, Social Network Support shows a very strong and statistically significant relationship with Civic Engagement, supported by high t-values and low p-values. Trust and Cooperative Norms also demonstrate significant positive relationships with all four dimensions of resilience.

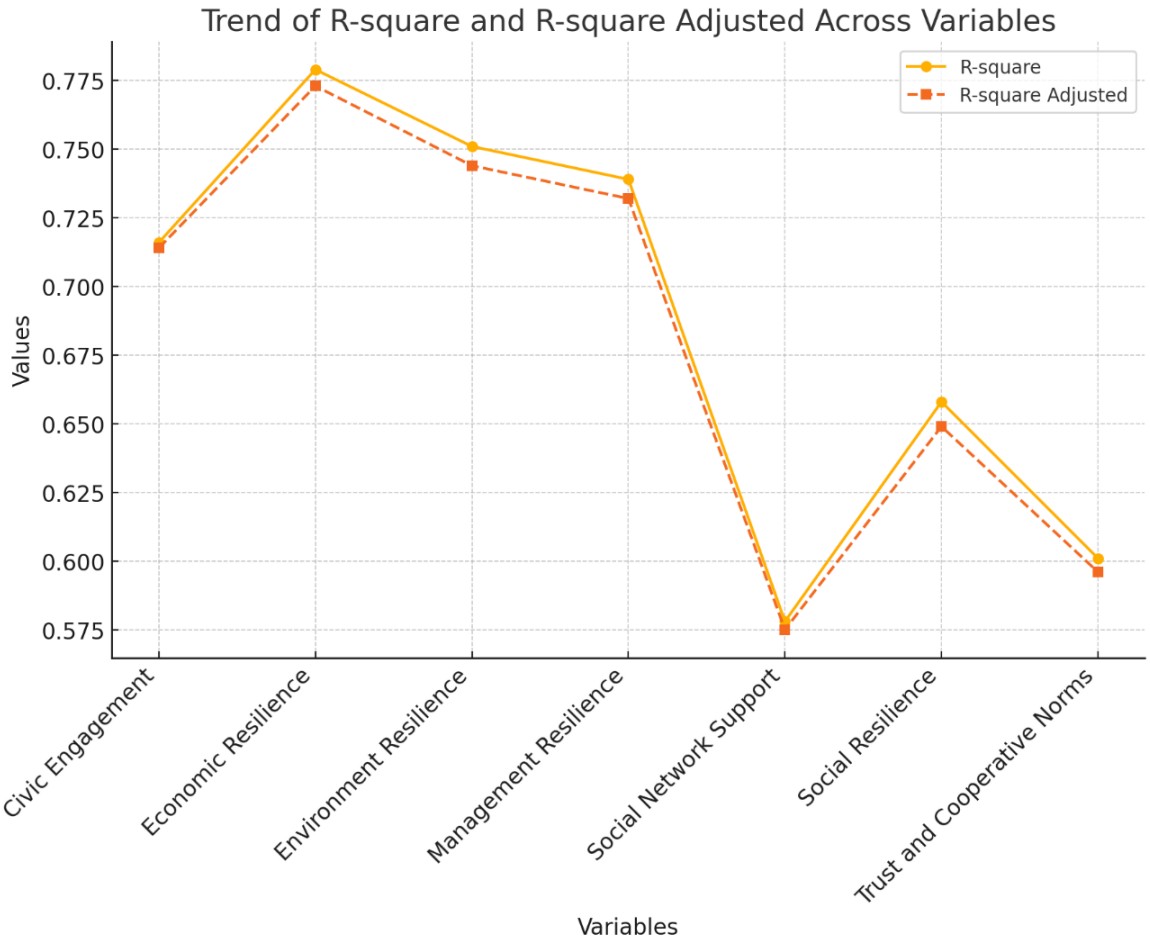
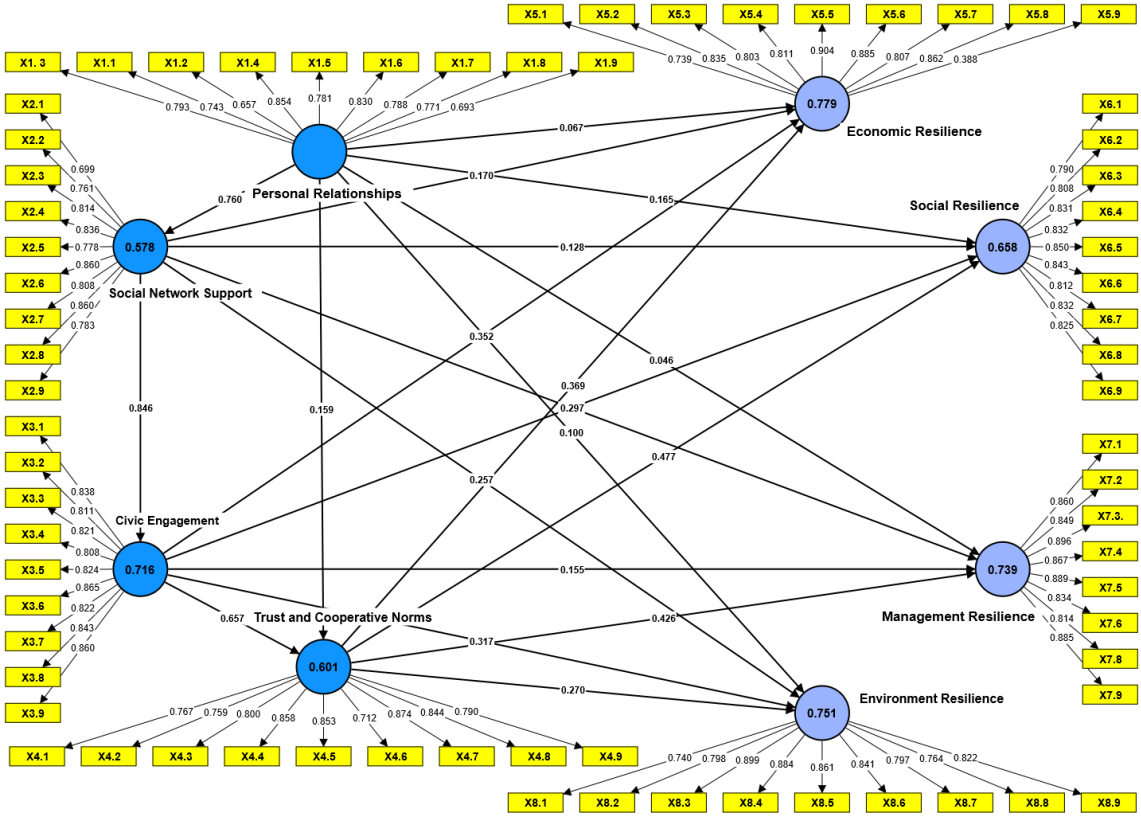


Figure 5. Trends of R-square and Adjusted R-square Across Variables
Source: Processed by the authors (2024)

Figure 6 visualises the Structural Equation Modelling-Partial Least Squares (SEM-PLS) analysis, which explores the relationships among the key social capital variables and dimensions of resilience. Based on responses from 150 individuals across 15 institutions, the model confirms that Personal Relationships, Social Network Support, Civic Engagement, and Trust and Cooperative Norms are all interrelated with Economic, Social, Management, and Environmental Resilience.

The findings concerning Civic Engagement—particularly its insignificant relationships with Managerial and Social Resilience—raise important questions and challenge widely held assumptions. Rather than being interpreted as shortcomings, these results offer an opportunity for deeper inquiry into the contextual factors that influence the effectiveness of civic engagement in resilience-building processes.



Note: X represents 150 respondents drawn from 15 institutions, effectively representing the entire population identified for this study.

Figure 6. Structural Model Displaying Path Coefficients (Model P)
Source: Processed by the authors (2024)

These outcomes suggest that civic engagement may not uniformly enhance all aspects of resilience. Instead, its influence may vary across different socio-economic or institutional settings, depending on local governance structures, cultural norms, and the level of community capacity. This highlights the need for more context-sensitive approaches in future studies examining the role of civic participation in disaster resilience.

While the rejection of these two hypothesised relationships may initially appear discouraging, they present a valuable opportunity to refine theoretical frameworks. A more nuanced and context-sensitive analysis may reveal hidden patterns and mechanisms influencing resilience outcomes. These findings underscore the need for future research to explore under what conditions civic engagement meaningfully contributes to community resilience, especially in managerial and social domains.

Table 3. Hypotheses Testing Summary

Source: Processed by the authors (2024)

Hypothesis Relationships	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Assessment of Hypothesis
Civic Engagement -> Economic Resilience	0.352	0.348	0.093	3.782	0.000	Accepted
Civic Engagement -> Environment Resilience	0.317	0.301	0.131	2.421	0.016	Accepted
Civic Engagement -> Management Resilience	0.155	0.149	0.1	1.54	0.124	Rejected
Civic Engagement -> Social Resilience	0.122	0.121	0.131	0.936	0.349	Rejected
Civic Engagement -> Trust and Cooperative Norms	0.657	0.641	0.124	5.288	0.000	Accepted
Personal Relationships -> Economic Resilience	0.067	0.075	0.081	0.829	0.407	Rejected
Personal Relationships -> Environment Resilience	0.1	0.114	0.093	1.075	0.283	Rejected
Personal Relationships -> Management Resilience	0.046	0.052	0.086	0.534	0.594	Rejected
Personal Relationships -> Social Network Support	0.76	0.768	0.047	16.085	0.000	Accepted
Personal Relationships -> Social Resilience	0.165	0.149	0.133	1.238	0.216	Rejected
Personal Relationships -> Trust and Cooperative Norms	0.159	0.177	0.121	1.321	0.186	Rejected
Social Network Support -> Civic Engagement	0.846	0.845	0.035	24.461	0.000	Accepted
Social Network Support -> Economic Resilience	0.17	0.165	0.153	1.111	0.267	Rejected
Social Network Support -> Environment Resilience	0.257	0.256	0.132	1.951	0.051	Rejected
Social Network Support -> Management Resilience	0.297	0.297	0.133	2.24	0.025	Accepted
Social Network Support -> Social Resilience	0.128	0.143	0.182	0.7	0.484	Rejected
Trust and Cooperative Norms -> Economic Resilience	0.369	0.371	0.111	3.33	0.001	Accepted
Trust and Cooperative Norms -> Environment Resilience	0.27	0.274	0.114	2.377	0.017	Accepted
Trust and Cooperative Norms -> Management Resilience	0.426	0.425	0.093	4.593	0.000	Accepted
Trust and Cooperative Norms -> Social Resilience	0.477	0.481	0.142	3.361	0.001	Accepted

Community Resilience and Disaster Risk

Community resilience is a foundational component of disaster risk reduction and plays a vital role in advancing the Sustainable Development Goals (SDGs) (Hu et al., 2023). In particular, SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action) are closely linked to community resilience and disaster preparedness (Salvador & Sancho, 2021). Key strategies such as strengthening social networks, enhancing preparedness, and promoting sustainable recovery efforts contribute significantly to mitigating disaster risks and supporting long-term development. Collaborative efforts among governments, policymakers, and local communities are essential to mainstream resilience-building into broader sustainable development agendas.

Resilience within communities exerts a profound and multidimensional influence on disaster risk by shaping how communities prepare for, respond to, and recover from hazardous events (Deng et al., 2022). Building such resilience is a complex but critical undertaking in disaster risk reduction, particularly as the intensity and frequency of disasters continue to increase. As noted by Zaman and Raihan (2023), the urgency of understanding and reinforcing community resilience has grown in tandem with global climate-related challenges.

Community resilience plays a pivotal role in disaster risk mitigation and management, representing a community's collective capacity to absorb shocks, maintain or restore core functions, and adapt to evolving circumstances (Sousa & Moss, 2022). This capacity determines how well a community can anticipate, withstand, and recover from disaster events. Consequently, recognising the significance of community resilience is crucial for effective disaster risk management and the development of strategies that enhance local capabilities.

The first major influence of community resilience on disaster risk lies in the area of preparedness (Maurischa et al., 2023). Resilient communities are often equipped with more effective early warning systems, clear evacuation procedures, and widespread public education regarding disaster risks (Houser, 2022). These preparedness measures can significantly reduce disaster impacts by saving lives and minimising material and economic losses. Routine planning exercises and community drills also help ensure that residents are well-informed and capable of responding swiftly and effectively in crisis situations.

During disaster events, community resilience significantly shapes the response phase. Communities that possess strong social capital, trust, and cohesive networks are better positioned to mobilise resources and coordinate actions efficiently (Omar Chong & Kamarudin, 2023). Such rapid and unified responses are crucial for limiting immediate harm. Moreover, resilient communities tend to be more adaptive, capable of devising innovative coping strategies to confront uncertainties. This flexibility facilitates quicker stabilisation and accelerates the recovery process.

In the aftermath of a disaster, resilience continues to play a decisive role in recovery and reconstruction. Communities that exhibit resilience are more likely to engage in organised recovery activities, provide mutual support, and rebuild in a manner that

reduces vulnerability to future hazards. As noted by Contreras and Niles (2022) and X. Yang et al. (2022), resilient communities learn from experience and often emerge stronger, using the recovery period not merely to restore what was lost but to improve and build back better—ultimately reducing the risk of future disasters.

Economic Resilience and Disaster Risk

Economic resilience constitutes a vital element of disaster risk reduction. Disasters frequently disrupt local economies, leading to job losses, infrastructure damage, and financial instability. To mitigate these adverse impacts, it is essential for governments and communities to invest in economic diversification, resilient infrastructure, and robust financial safety nets. Strengthening local enterprises, supporting adaptive industries, and ensuring access to financial resources can significantly accelerate post-disaster recovery. Furthermore, embedding disaster risk considerations into economic policies fosters long-term sustainability and reduces economic vulnerability. In the absence of a strong economic foundation, recovery efforts may be prolonged, inequalities may be exacerbated, and the broader goals of sustainable development may be undermined. Thus, economic resilience should be positioned as a core pillar within disaster risk management strategies to ensure communities are not only able to withstand disasters but also to thrive in their aftermath.

As a critical dimension of both community and national resilience, economic resilience plays a pivotal role in shaping disaster risk and determining the scale of disaster impacts (Wei et al., 2020). It refers to the capacity of an economy to absorb shocks, adapt to changing conditions, and recover from disruptive events, such as natural hazards, economic crises, or other systemic shocks. The influence of economic resilience on disaster risk is multifaceted—affecting both the immediacy of a disaster response and the durability of long-term recovery and reconstruction efforts.

Regions characterised by strong economic resilience are typically better prepared to absorb the initial shock of a disaster (Grabner, 2021). Such preparedness is often rooted in economic diversification, the presence of stable financial institutions, and access to fiscal reserves. In these contexts, disasters are less likely to trigger prolonged economic crises or severe downturns. Moreover, economically resilient countries often have better access to international financial instruments, including aid, insurance, and credit, which facilitates the rapid mobilisation of resources for disaster response and recovery.

Conversely, economic vulnerability—marked by poverty, unemployment, and inequality—exacerbates the impact of disasters and slows recovery (He et al., 2022). Communities with limited economic opportunities are more likely to suffer disproportionate harm and face greater difficulty rebuilding. In contrast, countries that have invested significantly in human capital, infrastructure, and innovation are not only better protected against immediate disaster impacts but are also more agile in post-disaster recovery. Economic resilience therefore supports sustainable livelihoods and provides the necessary resources to implement long-term risk reduction and reconstruction measures.

In the long-term recovery phase, economic resilience remains a key determinant of a society's ability to rebuild in a sustainable and forward-looking manner. Resilient economies are generally more adaptable, able to restructure sectors, diversify activities, and integrate risk reduction into economic and development planning (Lee et al., 2023; Mayor & Ramos, 2020; Tóth et al., 2022). This adaptability not only minimises the effects of future disasters but also reinforces inclusive economic growth. Ultimately, embedding resilience into economic systems contributes to a development pathway that is robust, equitable, and capable of withstanding future shocks.

Social Resilience and Disaster Risk

Social resilience refers to a society's capacity to prevent, prepare for, respond to, and recover from disasters. Enhancing this resilience requires coordinated efforts between communities and governments to strengthen social systems, networks, and institutions at multiple levels (Bell et al., 2023). As a complex and context-dependent phenomenon, social resilience contributes to a community's adaptive and transformative capacity when faced with disruption and adversity.

Key elements that shape social resilience include interpersonal relationships, trust in public institutions, and active participation in risk communication processes. These factors are particularly influential in determining community responses to disasters such as flooding (Cvetkovic & Ivkovic, 2022). Social support networks also play a critical role in managing crisis and trauma during disaster events, offering both emotional and practical assistance to affected individuals.

The degree of social resilience is shaped by intersecting dimensions such as institutional, physical, and participatory resilience (Chenggang Zhang & Wang, 2022). Together, these dimensions reflect the broader social and cultural capacity of a community to respond effectively to disaster risks. Social resilience is not limited to immediate disaster response; it also plays a vital role in shaping long-term recovery strategies and community adaptation over time.

By fostering trust, collective identity, and inclusive participation, socially resilient communities are better able to mobilise resources, communicate risk effectively, and support one another through each phase of the disaster cycle. As such, social resilience directly influences the effectiveness of disaster risk reduction and significantly contributes to the sustainability and wellbeing of affected populations.

Managerial Resilience and Disaster Risk

Managerial resilience refers to the capacity of organisations and systems to anticipate, respond to, and recover effectively from disruptions, including those caused by natural disasters (Borowski et al., 2023). This form of resilience plays a central role in disaster risk management, as it directly shapes the ability to mitigate disaster impacts and facilitate efficient recovery processes. The effectiveness of managerial resilience significantly influences how well a community can safeguard its population, infrastructure, and economy from the shocks and stresses associated with disasters.

A key element of managerial resilience is the ability to anticipate and prepare for potential risks. Organisations with high levels of resilience proactively identify threats and implement strategies to reduce their potential impact. This includes conducting regular risk assessments, formulating contingency plans, and developing early warning systems. Proactive planning helps reduce system vulnerabilities and ensures that, when disasters occur, responses are timely, coordinated, and efficient.

The influence of managerial resilience on disaster risk is substantial. National and local governments must prioritise investment in strengthening disaster resilience by building governance structures aligned with international frameworks, while also tailoring them to local realities (Behnassi et al., 2021). Resilience is now widely recognised in disaster science as a fundamental concept that enhances a system's capacity to mitigate and manage adverse events (Huq et al., 2021). Disaster risk reduction and resilience are thus essential in addressing the root causes of disaster vulnerability (Naheed, 2021). Achieving this requires a combination of physical and social interventions and must involve the full participation of affected communities and relevant stakeholders.

When a disaster occurs, managerial resilience is reflected in the ability of organisations to respond rapidly and effectively. A resilient management team can mobilise resources swiftly, coordinate with partner organisations, and adapt to changing circumstances in real time. Moreover, resilience is cumulative: each disaster experience offers an opportunity for learning and capacity-building. Over time, organisations with strong managerial resilience become more adept at navigating crises, reducing risks, and enabling faster recovery.

Environmental Resilience and Disaster Risk

Environmental resilience plays a vital role in comprehensive disaster risk mitigation strategies. It refers to the capacity of natural systems to absorb shocks, recover from disturbances, and mitigate the effects of both natural and human-induced hazards, including floods, droughts, and industrial accidents (Reilly & Ayyub, 2020; Wickramasinghe, 2021). Ecosystem-based disaster risk reduction (Eco-DRR) approaches—such as conservation, restoration, and the sustainable management of ecosystems—offer critical pathways to reducing disaster risks while also supporting recovery efforts (Wickramasinghe, 2021). The contribution of environmental resilience is significant, as healthy and stable ecosystems function as natural defences, reduce human vulnerability, and reinforce ecological and socio-economic resilience.

Highly resilient ecosystems—such as wetlands, forests, and coral reefs—act as natural buffers against environmental hazards (Mysiak & Cayron, 2023). For example, mangrove forests and coral reefs help shield coastal areas from storm surges and erosion. Similarly, upland forests and grasslands reduce the risks of landslides and flooding by stabilising soil structures and enhancing water absorption. These ecosystem services not only protect human settlements but also substantially reduce the financial burdens associated with emergency response and long-term recovery.

In addition to serving as physical barriers, environmental resilience contributes to reducing vulnerability and enhancing the adaptive capacity of communities (Sudmeier-Rieux et al., 2021). Healthy and biodiverse ecosystems provide essential services—such as clean water, food, raw materials, and income—that are indispensable to livelihoods and wellbeing (Matthews et al., 2022). Communities that rely on these ecosystems are inherently more resilient to disaster shocks if those systems remain functional under stress. Moreover, biodiversity within resilient ecosystems offers a range of adaptation options as environmental conditions change, thereby supporting the long-term sustainability of both human and ecological systems (Haggard, 2019; Hogeboom et al., 2021; Logan & Guikema, 2020; Varyvoda & Taren, 2022).

As challenges stemming from environmental degradation and climate change continue to intensify, prioritising environmental resilience becomes increasingly urgent. Investing in ecosystem health is not solely an environmental concern; it is a foundational component of effective disaster risk reduction. Robust and well-managed ecosystems safeguard lives, protect livelihoods, and enhance future sustainability. Ultimately, environmental resilience must be recognised as both a strategic necessity and a moral imperative in securing human and planetary wellbeing.

Conclusion

The resilience of Gowa, Indonesia, at the local level, is deeply rooted in its social capital, which serves not only as a protective buffer against disaster risks but also as a catalyst for proactive adaptation. Social capital enhances a community's capacity to organise, mobilise resources, and respond effectively to disasters. Beyond its immediate function in disaster response, it plays a strategic role in building long-term resilience through trust, collaboration, and collective action.

Social capital also contributes significantly to other dimensions of resilience. It fosters economic stability through informal resource-sharing networks and strengthens environmental resilience via community-led conservation efforts. These interdependent functions highlight the multifaceted value of social capital and its potential to address complex disaster risks through socially embedded mechanisms. Thus, incorporating social capital into disaster risk management frameworks is crucial for developing integrated and community-driven resilience strategies.

Moreover, the resilience mechanisms observed in Gowa align with key targets of the Sustainable Development Goals (SDGs), particularly Goal 11 (Sustainable Cities and Communities) and Goal 13 (Climate Action). The capacity to leverage social capital for inclusive governance, adaptive capacity, and participatory planning directly supports the broader agenda of sustainable development. These findings illustrate that resilience, when anchored in social systems, becomes more inclusive, adaptive, and sustainable.

Ultimately, disaster resilience extends beyond infrastructure and economic indicators; it is embedded in the quality of social relationships and the strength of local institutions. Recognising social capital as a strategic resource is essential for policymakers, researchers, and practitioners striving to build resilient societies.

Investing in socially grounded, community-led approaches offers a powerful pathway not only for surviving disasters but also for transforming risk into an opportunity for sustainable and equitable development.

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