



From Social Assistance to Disaster Insurance Schemes: The Evolution of Financing Policy Disaster Risk from the Perspective of Narrative Literature Review

Pristiwanto Bani

Sekolah Tinggi Manajemen Asuransi Trisakti, Indonesia

Corresponding Author: pristiwanto.bani@gmail.com

Abstract. Natural disasters are a significant source of fiscal risk for developing countries, including Indonesia, which has a high level of disaster vulnerability. So far, disaster financing in Indonesia remains dominated by a post-disaster social assistance approach that is reactive and depends on the State Revenue and Expenditure Budget (APBN). This approach has limitations: it can increase fiscal pressures and does not provide a long-term risk-management mechanism. This study aims to analyze the evolution of disaster risk financing policies from a social assistance approach to a disaster insurance scheme, and to formulate an integrative model of disaster risk financing relevant to Indonesia. The research uses the Narrative Literature Review (NLR) method by examining academic literature, international policy reports, and regulations related to disaster risk financing for the period 2016–2025. The results of the study show that the evolution of disaster financing policies comprises three main phases: the social assistance approach, the hybrid approach based on risk layering, and the development of disaster insurance schemes, including parametric insurance. The risk-layering approach enables more efficient risk sharing through risk retention, risk transfer, and risk-sharing mechanisms. This study proposes an integrative model of disaster risk financing consisting of government reserve funds, compulsory property insurance in high-risk areas, national and international reinsurance, and the use of capital market instruments such as catastrophe bonds to strengthen fiscal resilience and post-disaster financing stability.

Keywords: Disaster Financing; Disaster Insurance; Fiscal Resilience; Narrative Literature Review; Risk Layering.

1. INTRODUCTION

As a country located at a dynamic geological crossroads, Indonesia is constantly tested by natural disasters, ranging from devastating earthquakes to widespread floods (Achmad, 2023; Marlina et al., 2024). Global climate change is now exacerbating these conditions, triggering an increase in the frequency and intensity of extreme weather events. In the midst of this challenging reality, there is an urgent need to revolutionize our approach to disaster risk. In the past, government responses tended to be reactive, relying on post-disaster social assistance (Maduro & Fontainha, 2023). However, over time, it was realized that this method was no longer sustainable. The government budget has its limits, and the cost of post-disaster reconstruction continues to swell (Handoyo et al., 2023). What is more, the most vulnerable groups of people are often the hardest hit and in the greatest need of stronger, more sustainable financial protection. This is what drives the paradigm shift from simply addressing impacts to proactively managing risks through schemes such as disaster insurance (Maduro & Fontainha, 2023).

Law Number 24 of 2007 concerning Disaster Management has indeed become a strong legal foundation. However, its implementation in realizing an inclusive disaster risk financing

scheme still faces a steep road. One of the main obstacles is low insurance literacy and low community participation in protection programs (Handoyo et al., 2023; Shalih & Nugroho, 2021). This is unfortunate, given that risk transfer schemes, such as insurance, have proven effective in providing immediate financial assistance tailored to regional conditions (Dubelmar et al., 2020).

Low-income communities, for example, have difficulty providing adequate earthquake-resistant housing, making insurance a vital financial mitigation measure to transfer disaster-related risks (Handoyo et al., 2023; Kalfin et al., 2022). Continuous reliance on government compensation is not a long-term solution, as it will burden state finances at both the national and regional levels (Handoyo et al., 2023). In fact, community participation in risk transfer schemes is still very low, with only about 12.1% of households benefiting (Handoyo et al., 2023). Natural disasters have become a strategic issue in sustainable development and public risk management. Earthquakes, floods, tsunamis, volcanic eruptions, and other hydrometeorological disasters not only cause casualties but also damage assets, disrupt economic activity, and place great fiscal pressure on the government. In many cases, the state's response to disasters remains dominated by a post-disaster approach, especially through social assistance and emergency budget allocations.

The social assistance-based financing model has advantages in terms of speed of response and social legitimacy. However, it is reactive and is not designed as a long-term risk management mechanism. The high dependence on the state budget and international aid makes the system vulnerable to fiscal constraints, delays in fund disbursements, and financing uncertainty. This condition is increasingly problematic as the frequency and intensity of disasters driven by climate change and environmental degradation rise. In this context, the public and economic policy literature is increasingly emphasizing the importance of a more proactive, sustainable approach to disaster risk financing. One widely discussed instrument is disaster insurance, in both conventional and public forms, as well as reinsurance and innovative schemes such as parametric insurance. Disaster insurance is seen as capable of shifting some risk to the financial markets, accelerating post-disaster liquidity, and reducing dependence on the state budget.

This research is formulated to answer the main question of how the evolution of disaster risk financing policies in Indonesia has moved from an ex post social assistance approach to a more systematic and risk management-based insurance scheme, as well as the fiscal implications of this transformation on the structure of the state budget and the country's financial resilience. In addition, this study questions the integrative model of disaster risk

financing that is most relevant and applicable to Indonesia, a country with a high level of disaster exposure. The purpose of this study is to comprehensively analyze the development of disaster risk financing policies from the perspective of the evolution of public policy, identify policy gaps in national practices and regulations, and formulate an insurance-based financing model that is adaptive, risk-layering, and in line with the principles of prudent and sustainable state financial management. The Narrative Literature Review approach was chosen to capture conceptual dynamics, policies, and practices across disciplines that rigorous quantitative or systematic review methods cannot fully explain.

2. RESEARCH METHODOLOGY

This article uses the Narrative Literature Review (NLR) method, which aims to find meaning, develop understanding, and interpret the results of previous research in order to draw relevant conclusions and implications about a phenomenon (Noble, 2023; Fuady et al., 2021). Its main characteristics include: (1) A comprehensive overview that can present a broad overview of a subject, identifying key themes, trends, and gaps in the existing literature (Zoromba et al., 2024). (2) Flexibility: In contrast to the rigid Systematic Literature Review, the narrative method offers more flexibility in synthesizing various perspectives, models, and theories (Aldosari, 2025; Zoromba et al., 2024). (3) Perspective integration is ideal for integrating diverse viewpoints and evaluating various models holistically (Zoromba et al., 2024).

Although not as rigorous as a systematic review, the narrative method still requires structured steps to ensure that the results are accurate and valid (Noble, 2023; Turnbull et al., 2022) as follows: (1) Initial review and screening: conducting an initial search to understand the topic and ensure the relevance of the information (Noble, 2023). (2) Literature search: collecting literature from reputable sources (scientific journals or well-known publishers) and ensuring the suitability of the literature method with the research objectives (Bachmann & Jodlbauer, 2023; Noble, 2023). (3) Data extraction: retrieving relevant data such as key findings, research methods, sample sizes, results, and conclusions from each source (Noble, 2023). (4) Data analysis: using techniques such as thematic analysis, content analysis, or narrative synthesis to group similar data (Noble, 2023; Maulidia & Prafitasari, 2023). (5) Interpretation and presentation: interpreting the results of the analysis to conclude and presenting them in a clear and structured report (Bachmann & Jodlbauer, 2023; Noble, 2023).

The literature search is conducted through scientific databases such as Scopus, Web of Science, and Google Scholar, as well as institutional sources from international organizations

relevant to disaster and insurance issues from 2016-2025. The keywords used include disaster risk financing, disaster insurance, post-disaster aid, public insurance, and parametric insurance. The selected literature was then thematically analyzed to identify patterns, paradigm shifts, and key debates in disaster risk financing.

In contrast to a systematic literature review, NLR does not aim to synthesize statistics or meta-analysis, but rather to present a comprehensive and contextual understanding of the evolution of concepts and policies. NLR is helpful for practitioners or researchers seeking an in-depth understanding of a topic in an easy-to-read format (Bachmann & Jodlbauer, 2023). Thus, this approach allows the author to narratively relate a variety of theoretical and empirical perspectives.

3. RESULTS AND ANALYSIS

The Evolution of Disaster Risk Financing Policy

Phase I: Relief-Oriented Model

In the early phase, disaster risk financing in Indonesia was dominated by a reactive social assistance approach (relief-oriented model). In this context, the allocation of the disaster budget, including social assistance, needs to be strictly regulated, as regulated by Presidential Regulation Number 22 of 2008, which covers the pre-disaster, emergency, and post-disaster stages, with social assistance resources that can come from national loans (Triyanti et al., 2022). The scheme relies on the Ready-to-Use Fund managed by the National Disaster Management Agency, on Unexpected Expenditure (BTT) in the APBD, and on support for social assistance and international grants. Normatively, this framework derives its legitimacy from Law Number 24 of 2007 on Disaster Management, which affirms the state's responsibility for disaster management. However, the financing structure is essentially ex-post, i.e., funding is allocated only after a disaster occurs, so the fiscal mechanism is more oriented towards emergency response than long-term risk mitigation. However, the effectiveness of social assistance programs relies heavily on the proper identification and targeting of beneficiary groups, including low-income households, marginalized communities, people with disabilities, the elderly, orphans, and victims of crises or displacements, to ensure that assistance is distributed to those most in need (Simbolon, 2022).

The main characteristic of this approach is the dominance of risk retention, with the state as the primary risk bearer of economic losses from disasters. From a fiscal risk management perspective, this model increases reliance on budget flexibility and expenditure reallocation, which, in practice, can put pressure on the stability of the state budget. The OECD (2020)

confirms that countries without adequate risk-transfer instruments tend to experience higher fiscal volatility during catastrophic events. Thus, a social assistance approach without an insurance-based financing mechanism could increase the country's fiscal risk exposure.

The results of a review of the international literature show that the relief-based financing model increases vulnerability to fiscal shocks, a condition in which a disaster event significantly disrupts the fiscal balance and forces the government to make sudden budget adjustments (Clarke & Dercon, 2016; Hallegatte et al., 2017). Reliance on post-disaster financing also creates a crowding-out effect, in which long-term development spending must be sacrificed to meet rehabilitation and reconstruction needs. Therefore, although the social assistance approach reflects the constitutional responsibility of the state, it does not fully reflect the principles of preventive and sustainable risk management.

Phase II: Hybrid Approach – Risk Layering

The second phase in the evolution of disaster risk financing is marked by a shift from a purely social assistance model to a hybrid approach based on risk layering. This approach integrates various risk management instruments to mitigate financial losses arising from natural disasters, especially multihazard or combined events, accounting for the likelihood and magnitude of losses (Hochrainer-Stigler et al., 2024). High-frequency but low-impact risks are generally borne through the government's reserve fund or risk retention mechanism; intermediate risk is transferred through conventional insurance. Meanwhile, extreme or catastrophic risk is transferred through reinsurance and capital market instruments such as catastrophe bonds. This framework allows governments to optimize the combination of internal financing and external risk transfer more efficiently. The risk-layering approach is systematically developed and promoted by the World Bank through the Disaster Risk Financing and Insurance (DRFI) program as part of fiscal resilience strategies for developing countries (World Bank, 2014; World Bank, 2021).

Conceptually, this hybrid approach improves fiscal stability because risks are no longer fully borne by the state but are shared according to fiscal and financial market capacity. The OECD (2020) emphasized that layered financing strategies can reduce budget volatility and accelerate post-disaster economic recovery. In addition, Clarke and Dercon (2016) show that ex-ante risk-management-based financing planning is more effective than the reactive approach, as it provides certainty about funding sources before disasters occur. Thus, the risk-layering phase represents an important transition towards more structured, adaptive, and sustainable fiscal risk governance, as well as the foundation for developing a more comprehensive national disaster insurance system. This model identifies the need for a detailed

catalog of risk reduction measures to support evidence-based decision-making in multi-risk disaster risk reduction (FathiAzar et al., 2024).

Phase III: Disaster and Parametric Insurance Scheme

The third phase in the evolution of disaster risk financing is characterized by the strengthening of disaster insurance schemes, especially through the development of parametric insurance. Unlike conventional insurance, which requires verification of actual losses, parametric insurance pays claims based on pre-agreed-upon measurable parameters, such as earthquake magnitude, rainfall intensity, or wind speed. When these parameters exceed a certain threshold (trigger point), claim payments are made automatically without a lengthy loss-assessment process. This approach is widely developed within the framework of Disaster Risk Financing and Insurance (DRFI) promoted by the World Bank as a faster and more efficient fiscal and social protection instrument (World Bank, 2021). The concept of parametric insurance gives birth to insurance-linked financial instruments, such as catastrophe bonds, which allow the capital market to invest in insurance risks (Oramas-Dorta et al., 2021)

The main characteristics of parametric insurance include rapid payouts, objective parameter transparency, and reduced potential moral hazards. Because payments are based on measurable, independent external indicators, the risk of claims manipulation or loss valuation disputes can be minimized. The OECD (2020) emphasizes that the speed of fund disbursement in the parametric model is essential to maintain local economic stability and prevent the adverse impacts of post-disaster poverty. In addition, Clarke and Dercon (2016) argue that a parameter-based financing system allows the government to conduct more measurable fiscal planning because the amount of risk exposure has been calculated in advance. Conventional insurance models are often inadequate to address the complexity of natural disaster losses, especially in remote or hard-to-reach areas, so parametric insurance offers innovative solutions that can improve financial security (Steinmann et al., 2023). This approach can significantly mitigate the economic impact of disasters, especially in developing countries such as Indonesia, where conventional insurance has low penetration and disaster risk absorption remains dominated by public budgets (Pleterski, 2025).

In the Indonesian context, the development of disaster and parametric insurance schemes cannot be separated from the Financial Services Authority's role as a regulator of the financial services sector. OJK has a mandate to regulate, supervise, and encourage insurance product innovation, including strengthening the general insurance industry to have adequate underwriting and reinsurance capacity. The integration of parametric insurance into the national system has the potential to strengthen fiscal resilience and expand financial inclusion,

especially in high-risk areas. Thus, this phase represents a transformation towards a more modern, data-driven, and aligned disaster risk financing system with the principles of preventive fiscal risk management.

The Government of Indonesia has committed to reducing disaster risk in accordance with the Sendai Framework, which aims to minimize casualties, reduce economic losses, and improve access to multi-hazard early warning systems (Lessy et al., 2025). In this context, community-based disaster insurance can play a strategic role in supporting risk mitigation efforts by enabling local risk management and empowering affected communities to recover independently from financial losses caused by disasters (Purwandari et al., 2024). Factors such as earthquakes, floods, landslides, and fires have caused an annual average loss of about 0.3% of Indonesia's Gross Domestic Product between 2005 and 2015 (Skoufias et al., 2021). These losses highlight the urgent need for more effective financial protection mechanisms, especially given the significant impact of natural disasters on the stability of rural banking and household well-being in Indonesia (Dartanto, 2022; Idroes et al., 2023). This effective financial protection is crucial because natural disasters can plunge people into a cycle of poverty, especially in developing countries such as Indonesia, where financial market and government support are often inadequate (Salignac et al., 2021).

Policy Analysis in a Fiscal Perspective

The paradigm shift in disaster risk financing is an important issue in modern fiscal policy. For decades, many countries, including developing countries, have relied on post-disaster relief as the primary mechanism to finance the economic impact of natural disasters. This approach is usually implemented by allocating the government's emergency budget after a disaster occurs. However, such models often create fiscal uncertainty because the magnitude of the funding need cannot be accurately predicted, which can put pressure on the state budget (Clarke & Dercon, 2016). Therefore, many countries are shifting to a more proactive, risk-management-based approach to insurance-based risk financing.

The transformation from a social assistance mechanism to a disaster insurance system reflects a change in the government's strategy for managing fiscal risks from disasters. This approach emphasizes risk-sharing among governments, the private sector, and global financial markets through instruments such as disaster insurance, reinsurance, catastrophe bonds, and sovereign risk pools (OECD, 2021). Thus, this policy not only aims to increase post-disaster financing capacity but also to strengthen fiscal stability and encourage risk-mitigation behavior in the community.

Fiscal Resilience in Disaster Risk Financing

One of the main implications of this policy transformation is the increase in the government's fiscal resilience. In traditional social assistance systems, governments often have to allocate large funds from the State Revenue and Expenditure Budget (APBN) suddenly after a disaster occurs. This can lead to significant fiscal pressures, especially if disasters recur or occur on a large scale. In addition, dependence on emergency budgets can also interfere with other development priorities because governments must reallocate budgets quickly (World Bank, 2020). In Indonesia, disaster events significantly put pressure on the fiscal balance at the district and provincial levels (Wiyanti & Halimatussadiah, 2021). This impact is not only limited to physical damage, but also disrupts budget stability through two main pathways: decreased revenues and unplanned spending spikes (Wiyanti & Halimatussadiah, 2021).

The use of disaster insurance schemes can reduce dependence on the post-disaster state budget, as some of the risk has been shifted to the insurance sector and the global reinsurance market. Through this mechanism, the government can obtain claim payments quickly based on specific parameters or insured losses. This increases the predictability of disaster financing, enabling the government to plan fiscal policies more stably and sustainably. According to the OECD (2021), an effective disaster risk financing strategy can reduce fiscal volatility and strengthen countries' capacity in the face of major disaster events.

In addition, this approach allows the government to integrate disaster risk financing into risk-layering strategies, which divide risks by the frequency and impact of disasters. Risks with high frequency and small impact can be addressed through government budgets, while risks with large impacts can be diverted to insurance markets or other financial instruments (Clarke & Dercon, 2016). This approach helps create a more efficient and sustainable disaster finance system from a fiscal perspective.

Mitigation Incentives through Insurance Mechanisms

In addition to increasing fiscal resilience, the implementation of disaster insurance also serves as a policy instrument to encourage risk mitigation incentives. In contrast to social assistance, which is reactive, premium-based insurance systems create a direct link between the level of risk and the cost of protection that the policyholder must pay. In this context, insurers can apply risk-based pricing that reflects vulnerability to disasters. Insurance is not just a risk-transfer tool but also an instrument that actively promotes risk reduction. One of the main ways is through risk-based premiums. In this system, the amount of premiums is adjusted to the level of disaster risk faced by policyholders (Hudson & Berghäuser, 2022).

The differential premium mechanism provides economic signals to individuals, companies, and local governments to increase risk mitigation efforts. For example, areas that have good spatial planning systems, earthquake-resistant building construction standards, or effective early warning systems can earn lower premiums. In contrast, regions with high risk levels will be subject to higher premiums. Thus, the insurance system can serve as an economic instrument that encourages investment in disaster mitigation and risk reduction (Kunreuther & Michel-Kerjan, 2018).

This approach also helps increase public awareness of the importance of disaster risk management. When premium costs reflect the true level of risk, communities have a stronger incentive to reduce risk exposure through a range of mitigation measures, such as building more resilient infrastructure to disasters, better environmental management, and sustainable spatial planning. Thus, the insurance system not only serves as a risk-transfer mechanism but also as a policy tool to increase people's resilience to disasters.

Public-Private Partnerships in Disaster Insurance Development

The implementation of the disaster insurance system at the national level generally requires a partnership between the government and the private sector through the Public-Private Partnership (PPP) scheme. This is due to the risk of large-scale disasters that often exceed the financial capacity of domestic insurers. Therefore, the government needs to play the role of a facilitator or guarantor of last resort to ensure the sustainability of the insurance system.

Through the PPP scheme, the government can work with insurance and reinsurance companies to build national risk pooling, a mechanism for collecting risks across various regions or economic sectors. Risk pooling enables broader risk diversification, thereby increasing overall disaster financing capacity. In addition, this system can also be supported by global reinsurance markets and financial instruments such as catastrophe bonds to increase protection capacity against extreme disaster risks (World Bank, 2020).

The PPP model in disaster insurance has been implemented in various countries, such as the Japan Earthquake Reinsurance Scheme, the Turkish Catastrophe Insurance Pool, and the Caribbean Catastrophe Risk Insurance Facility. International experience shows that collaboration between the public and private sectors can improve the efficiency of disaster financing systems while expanding insurance coverage for communities (OECD, 2021). In developing countries, this approach can also strengthen integration among fiscal policy, disaster risk management, and sustainable economic development.

Implementation Challenges in Indonesia

The results of the study show that one of the main challenges to implementing disaster insurance in Indonesia is low community insurance literacy. The level of public understanding of insurance, especially disaster insurance, remains relatively limited, so the penetration rate of national insurance remains low compared to other Asian countries. This condition leads people to rely on government assistance after a disaster, thereby reducing the incentive to protect against risk independently through insurance mechanisms (OECD, 2021).

The second challenge concerns the limitations of integrating national disaster risk data. The development of disaster insurance products requires comprehensive data on the frequency, intensity, and distribution of disaster risks. However, the data is often scattered across various institutions, such as BNPB, technical ministries, research institutions, and local governments, so it has not been integrated into a single national risk data system for use by the insurance industry and policymakers. This data limitation can hinder the development of accurate actuarial models for determining risk-based premiums (Hallegatte et al., 2018).

In addition, Indonesia also does not have a mandatory national disaster insurance scheme as implemented in several other countries, such as Turkey through the Turkish Catastrophe Insurance Pool or Japan through the national earthquake insurance system. The absence of a policy framework requiring insurance protection against disaster risks means that coverage remains very limited and depends on voluntary initiatives by the community or the private sector (World Bank, 2020).

Another challenge, no less important, is the dominance of the fiscal approach based on the state budget (fiscal dominance) in disaster financing. In many cases, the government remains the primary party responsible for the cost of post-disaster recovery through the state budget. This approach is often considered the quickest solution in an emergency. However, in the long run, it can pose significant fiscal risks if disasters occur repeatedly and require a large allocation of funds (Clarke & Dercon, 2016).

Disaster Insurance Policy Integration Opportunities

Despite facing various challenges, there are several strategic opportunities to develop Indonesia's disaster insurance system. One of them is integration with economic protection programs for micro-, small-, and medium-sized enterprises (MSMEs). MSMEs are a sector highly vulnerable to the impact of disasters due to limited capital and access to recovery financing. By integrating disaster insurance into MSME financing programs, the government can increase the sector's economic resilience and expand insurance penetration in the community.

Another opportunity lies in integrating with Environmental, Social, and Governance (ESG)-based financing schemes. In recent years, the concept of sustainable finance has become an increasing concern in the global financial sector. Disaster insurance can be part of an ESG strategy because it strengthens people's economic resilience to the risks posed by climate change and natural disasters. In this context, financial institutions and insurance companies can play a role in providing risk-protection products aligned with the principles of sustainable development (OECD, 2021).

In addition, the development of disaster insurance can also be supported through strengthening national reinsurance capacity. Reinsurance has an important role in absorbing the risk of large-scale disasters that domestic insurers cannot fully cover. By strengthening national reinsurance institutions and increasing integration with the global reinsurance market, Indonesia can significantly increase its disaster risk financing capacity. This approach also enables the establishment of national risk pooling, which can increase financial system stability in the face of major disasters (World Bank, 2020).

Indonesia's Integrative Model of Disaster Risk Financing

The increasing frequency and intensity of natural disasters in recent decades pose a serious challenge to the country's fiscal stability, especially in developing countries with high levels of disaster vulnerability, such as Indonesia. The economic impact of disasters not only affects people's welfare but also puts great pressure on the state budget, as it requires financing emergency response and post-disaster recovery. In practice, many countries still rely on government budget-based financing mechanisms, such as emergency funds or social assistance, which are often reactive and less able to provide long-term financing certainty (Clarke & Dercon, 2016).

To overcome these problems, various international institutions recommend a risk-layering-based approach to disaster risk financing. This risk management strategy combines financing instruments according to the level of disaster frequency and impact. This approach allows governments to allocate risk more efficiently between domestic risk retention mechanisms and risk transfer to global financial markets (World Bank, 2020). In the Indonesian context, developing an integrative model of disaster risk financing is important for strengthening fiscal resilience and enhancing the effectiveness of the protection system against the impacts of disasters.

The Concept of Risk Layering in Disaster Risk Financing

The risk-layering approach is a conceptual framework that divides disaster risk into several financing layers based on the frequency and magnitude of losses. This division of risk

layers generally includes low, medium, and high risks, with each layer requiring a different approach in mitigation and financing to minimize the economic impact of disasters (Hochrainer-Stigler et al., 2024). Risks with high frequency but relatively small impact are usually addressed through risk retention mechanisms by governments or communities. In contrast, risks with large but low frequency are more effectively managed through risk-transfer mechanisms such as insurance, reinsurance, or capital-market instruments (Clarke & Dercon, 2016).

This strategy allows the government to optimize the use of fiscal resources while leveraging the financial sector's capacity to absorb disaster risks. In addition, this approach can increase fiscal stability because the government does not need to bear all disaster costs directly through the state budget. Thus, risk layering is one of the main strategies in the modern disaster risk financing system applied in various disaster-prone countries (OECD, 2021).

Integrative Model of Disaster Risk Financing in Indonesia

Based on the risk-layering approach, the integrative model of disaster risk financing in Indonesia can be structured into four complementary financing layers. The first layer is the government's reserve funds through the State Budget and Regional Budget, which function as a risk retention mechanism for disasters with high frequency but relatively small impacts. These funds can be used to finance emergency response, humanitarian assistance, and initial rehabilitation. The use of government reserve funds remains an important component of the disaster finance system because it enables a quick response to a disaster event without waiting for other financing mechanisms.

The second layer is the implementation of mandatory property insurance in areas with a high level of disaster risk, such as areas prone to earthquakes, floods, or volcanic eruptions. This scheme aims to expand financial protection for the community while reducing dependence on government assistance. The implementation of compulsory insurance has proven effective in several countries, such as Turkey, through the Turkish Catastrophe Insurance Pool, which has increased insurance penetration and strengthened national disaster financing capacity (World Bank, 2020).

The third layer is the use of national and international reinsurance to absorb disaster risks with greater impact. Reinsurance allows domestic insurers to transfer a portion of the risk to global reinsurers, thereby increasing the capacity to protect against large-scale losses. In the Indonesian context, strengthening national reinsurance institutions is also a strategic step to increase financial system stability in the face of disaster risks.

The fourth layer is the use of financial market instruments such as catastrophe bonds at the ASEAN regional level. Catastrophe bonds are financial instruments that allow the government to transfer disaster risks to investors in the capital market. If a disaster meets certain criteria, the funds raised through the bond can be used to finance recovery efforts. Various countries have used this instrument to increase disaster financing capacity while expanding funding sources outside the state budget (OECD, 2021).

Basic Principles of the Integrative Model

The integrative model of disaster risk financing combines three main principles in risk management. The first principle is risk retention, the ability of the government and the public to bear part of the risk through a reserve fund or risk-savings mechanism. This principle is important to ensure a quick response to disasters with small to medium impacts.

The second principle is risk transfer, which is a mechanism for transferring risk to other parties through financial instruments such as insurance, reinsurance, or disaster bonds. Risk transfer allows governments to reduce the fiscal burden arising from large-scale disasters. Meanwhile, the third principle is risk sharing among the government, the private sector, and global financial markets. This approach allows for the creation of a more sustainable and stable disaster finance system in the long term (Hallegatte et al., 2018).

4. CONCLUSIONS AND RECOMMENDATIONS

This study shows that the evolution of disaster risk financing policies in Indonesia has shifted from a reactive social assistance model to a more systematic, sustainable risk management approach, driven by insurance-based schemes. The dominant social assistance-based financing model does provide social legitimacy and a quick response to emergencies, but from a fiscal economy perspective, it increases vulnerability to state budget volatility. The findings of this study confirm that a risk-layering approach that integrates government reserve funds, disaster insurance, reinsurance, and capital market instruments such as catastrophe bonds is a more effective framework in strengthening fiscal resilience and accelerating post-disaster economic recovery. The main contribution of this research lies in developing an integrative model of disaster risk financing that combines the principles of risk retention, risk transfer, and risk sharing as a policy strategy to reduce dependence on post-disaster state budget financing and to expand the financial sector's role in disaster risk management.

Based on these findings, this study recommends reforming disaster financing policy by strengthening the national disaster insurance system, increasing public insurance literacy, integrating national disaster risk data, and developing public-private partnership schemes for

the management of catastrophic risks. The government also needs to consider implementing mandatory property insurance for disasters in high-risk areas and strengthening national reinsurance capacity to increase financial system stability in the face of major disaster events. For the next research agenda, an empirical study is needed that tests the effectiveness of the risk layering model on the country's fiscal stability, an analysis of the optimal design of national disaster insurance policies for developing countries, and an exploration of the application of innovative instruments such as parametric insurance, sovereign risk pools, and regional catastrophe bonds in the context of integrating disaster risk financing and sustainable development.

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