



## IDENTIFYING MULTI-HAZARD RESILIENCE GAPS AMONG MSMEs: AN EXPLORATORY STUDY IN KUPANG CITY, INDONESIA

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### KEYWORD

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Bibliometric Analysis;  
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### ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) are the backbone of Indonesia's economy, but remain highly vulnerable to multi-hazard threats, ranging from hydrometeorological disasters to socio-economic crises like the COVID-19 pandemic and Cyclone Seroja in 2021. Despite its crucial role, a significant gap exists regarding MSME-specific resilience mechanisms in high-risk archipelagos. This research addresses these institutional and preparedness gaps using a sequential exploratory mixed-methods design. First, a thematic bibliometric analysis of 30,288 articles (2019–2025) using VOSviewer mapped global trends, confirming that multi-hazard resilience in local contexts is understudied. Second, an empirical field study in Kupang City involved purposive sampling of disaster-affected MSMEs and in-depth interviews with key policy stakeholders. Findings reveal a critical 'resilience-preparedness gap': MSMEs prioritise short-term economic survival over proactive disaster mitigation. This is evidenced by the absence of basic safety infrastructure, accessibility, disaster education materials, and evacuation routes. Furthermore, structural policy gaps emerge as government monitoring databases stagnate due to budget refocusing. This study contributes a strategic framework bridging theoretical resilience and local realities, recommending digital data transformation, technical capacity building, and multi-stakeholder partnerships to ensure long-term business sustainability.

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### INTRODUCTION

The Micro, Small, and Medium Enterprises (MSMEs) sector is the main engine of the Indonesian economy which has a vital role in maintaining national stability in the midst of global uncertainty. Data from the Ministry of Cooperatives and SMEs projects that the contribution of MSMEs to Gross Domestic Product (GDP) will continue to increase from 61.07% in 2022 to an estimated 62.5% in 2025 (Kamar Dagang Indonesia 2023). In addition, this sector serves as a massive social safety net by absorbing up to 97% of the total. The post-pandemic recovery trend also looks positive, where Indonesia's economic growth managed to stabilize at 5%. However, this significant macroeconomic contribution stands on a fragile foundation due to the MSME business scale characteristics that are highly sensitive to external shocks (Syarifuddin 2023; Wahyuningdyah et al 2020)

This economic vulnerability is exacerbated by the geographical reality of Indonesia as the third most disaster-prone country in the world, with a Global Risk Index score of 39.8 in 2025 (IPPC 2023). The National Disaster Management Agency (BNPB) recorded more than 3,500 disaster events in one year, dominated by hydrometeorological hazards due to climate change. Specifically, East Nusa Tenggara Province (NTT) and Kupang City have a risk index in the "Medium" category with a score of 97.18 (BPBD NTT 2023). The

resilience of MSMEs in this archipelago has been tested to the extreme by the multi-hazard phenomenon, namely the impact of tropical cyclone Seroja and the COVID-19 pandemic crisis simultaneously, which paralyzed local economic activities massively.

Despite facing high risks, there is a critical *preparedness gap* in Kupang City. Until now, there is no clear resilience roadmap for the 17,475 MSME units operating in this city. Worse, there are structural failures in the ecosystem of policy supporters; Local government databases have stagnated due to budget *refocusing* policies, which have led to the cessation of routine monitoring functions. As a result, the government experiences "data blindness" regarding the real impact of disasters on the survival of MSMEs, while business actors are trapped in *survival mode* without adequate technical mitigation support and safety infrastructure. Therefore, this research is here to bridge this gap by offering (Song and Zhang 2025) *novelty through a mixed-methods approach*. The novelty of this study builds on a bibliometric analysis of 30,288 international articles (2019-2025), which confirms that studies on "multi-hazard resilience in MSMEs in the context of archipelago" are still very rare globally. By combining the mapping of the global gap with empirical field investigations in Kupang City, this study aims to evaluate the structural resilience gap and formulate a strategic framework that integrates managerial capacity, data transformation, and partnership ecosystems for long-term business sustainability.

## METHOD

**Research Design.** This study employs a sequential exploratory design, integrated with a bibliometric analysis to ensure both theoretical novelty and empirical relevance. The research workflow is divided into two distinct phases: 1) global gap analysis and novelty construction using bibliometrics, and 2) localized empirical observation (field study).

**Phase 1. Bibliometric Analysis,** to identify the research gap and establish the novelty of this study. A thematic bibliometric analysis was conducted as the initial step. Data was harvested using the Dimension.ai database. It's covering a five-year period (2019 to 2025). A total of 30,288 articles were filtered using the keywords: 'resilience', 'MSMEs', and 'disaster'. The metadata was then visualized using VOSviewer software to map the co-occurrence of terms. This phase aims to prove that the specific research on multi-hazard resilience in localized context is scarce, thus justifying the need for this study.

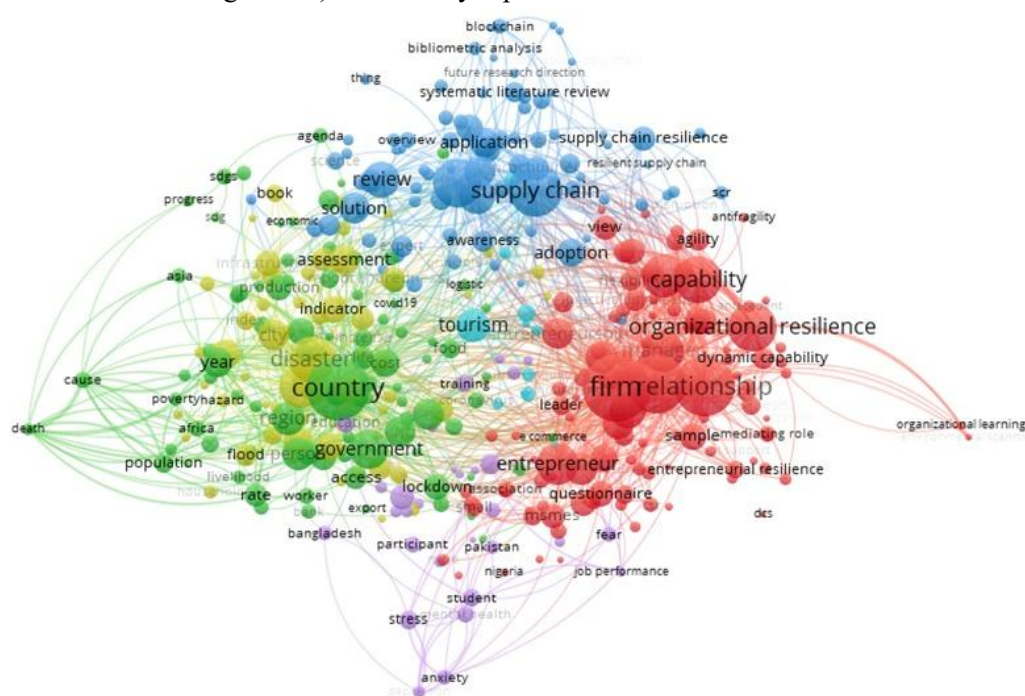
**Phase 2. Field study:** by conducting direct observation, in-depth interviews with the local policy stakeholders, and policy document review. Based on the gaps identified in phase 1, the study proceeded to the field execution in Kupang City, Indonesia, conducted between December 2024 and April 2025. By direct observation, five (5) MSMEs were purposively selected based on specific vulnerability criteria: (a) location in disaster-prone areas, and (b) historical exposure to the *Seroja* Cyclone in 2021 and the COVID-19 pandemic. These samples were selected to establish a highly focused case study capturing maximum variation among localized food and beverage businesses. This compact sample size aligns with qualitative exploratory frameworks, prioritizing data richness and granular institutional insights over broad statistical representation. The observation focused on physical resilience indicators (e.g. evacuation routes, fire extinguishers, accessibility, operating hours, number of employees, toilet, education materials on disaster, etc.). In-depth interviews: Qualitative data was gathered through semi-structured interviews with key policy stakeholders, specifically the Head of the empowerment division at the local Cooperatives and MSME agency in Kupang City. This was crucial to cross-verify the structural gaps regarding the un-updated database issue.

**Lastly, document review:** secondary data regarding the disaster risk indices and local government regulations were analyzed to support the primary findings. **Data synthesis.** Findings from the bibliometric mapping (global trends) were synthesized with field data (local reality) to formulate the proposal for strategic interventions and recommendations.

## RESULTS

### Phase 1 Finding: Confirmation of the Global Research Gap.

A bibliometric analysis conducted with the aid of VOSviewer has yielded preliminary data, indicating that thematic research exploring the interplay between Micro, Small, and Medium Enterprises (MSMEs) and disasters or resilience is not extensively undertaken. This investigation scrutinised 30,288 articles that were published within the preceding five-year period (from 2019 to 2025). These articles are readily available via Dimensions-ai (<https://www.dimensions.ai/>). The outcomes derived from VOSviewer (<https://www.bibliometrix.org/home/>) are visually represented below:



**Figure1.** Bibliometric Analysis on Global Connection Among Disaster, MSMEs, and Resilience

Referring to the bibliometric analysis above, it can explain several key things, namely: *First*, the Integration of the Psychological Dimension in Business Resilience. The most striking thing and significant novelty of this map is the appearance of a purple cluster at the bottom that contains keywords such as "anxiety", "stress", "mental health", and "job performance". In the traditional disaster management literature, the focus is often heavy on aspects of financial loss or physical damage to infrastructure (seen in green clusters: "flood", "hazard", "infrastructure"). The presence of purple clusters connected to the "entrepreneur" and "firm" networks shows a shift in the research paradigm towards Human-Centric Resilience.

This confirms that the resilience of MSMEs is no longer only measured by the financial balance sheet, but also highly depends on the psychological well-being of owners and employees as crucial intangible assets during crises. *Second*, the transition from Reactive to Dynamic Capabilities. The dominance of red clusters with large nodes in "firm", "organizational resilience", "capability", and "agility" indicates the evolution from a reactive (post-disaster management) approach to an internal strategic approach. The novelty here lies in strengthening the concepts of dynamic capability and agility as the main foundation. This analysis highlights that the current literature no longer views MSMEs as passive victims waiting for government assistance (green clusters), but as entities that actively build "relationships" and "entrepreneurial resilience" to adapt in the midst of uncertainty. *And third*, Supply Chain Interconnection and Advanced Technology. In the blue cluster, there is an interesting wedge between "supply chain", "resilience", and the emergence of the term "blockchain". This indicates an emerging trend where digital technology is starting to be seen as a key enabler of resilience.

The novelty lies in the digitalization of resilient supply chains, where technology solutions do not stand alone but are integrated as a disaster risk mitigation strategy. This opens up new research opportunities on how

MSMEs can adopt advanced technologies (such as blockchain for logistics transparency in times of disaster) that were previously thought to be only relevant for large corporations.

The image clearly shows that themes related to disasters and MSME resilience are rarely researched. This observation serves as a basis to strengthen the argument for the novelty of this research in enriching the conceptual framework.

## Phase 2 Finding: Local Resilience Gaps in Kupang City

### a. The Preparedness Survival Gap (Evidence from MSMEs)

Table 1 below provides a summary of the MSME profile based on data on operating hours, number of employees, toilet availability, accessibility for the disabled, evacuation signs, light fire extinguisher availability, emergency contact information, disaster simulations, and disasters experienced.

**Table 1.** MSME profile in Kupang City

| Key information                  | Bapote Kafe                           | Loogum Café                           | Warung Tresna                         | Beta Punk Kafe                        | Baso Ratu Sari                        |
|----------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| Operating hours                  | 11.00 AM—<br>10.00 PM                 | 10.00 AM—<br>10.00 PM                 | 05.00 AM—<br>09.00 PM                 | 05.00 AM—<br>10.00 PM                 | 08.00 AM—<br>10.00 PM                 |
| Number of workers                | 5-8 person<br>Working in shift        | 3-5 person<br>Working in shift        | 2-4 person<br>No shift                | 3-5 person<br>Working in shift        | 6-8 person<br>Working in shift        |
| Toilet                           | 3 unit, disable friendly              | 1 unit, not disabled-friendly         | 1 unit, not disabled-friendly         | 2 unit, disable friendly              | 1 unit, not disabled-friendly         |
| Accessibility for disable        | No inclined planes                    | No inclined planes                    | Inclined planes available             | Inclined planes available             | No inclined planes                    |
| Evacuation Signs                 | Not available                         | Not available                         | Not available                         | Available                             | Available                             |
| Light fire extinguisher          | Not available                         | Not available                         | Not available                         | Not available                         | Not available                         |
| Educational material on disaster | Not available                         | Not available                         | Not available                         | Available                             | Available                             |
| Emergency contact                | Not available                         | Not available                         | Not available                         | Not available                         | Not available                         |
| Disaster Simulations             | Never                                 | Never                                 | Never                                 | Never                                 | Never                                 |
| Disaster experienced             | COVID-19, Seroja cyclone, strong wind | COVID-19, Seroja cyclone, strong wind | COVID-19, Seroja cyclone, strong wind | COVID-19, Seroja cyclone, strong wind | COVID-19, Seroja cyclone, strong wind |

Based on the information provided above, it is obvious that the majority of MSMEs studied lack sufficient disaster preparedness, which contributes to the relatively low level of preparedness. This is evident from the lack of a light fire extinguisher, which is crucial for preventing small fires. Clear and convenient evacuation routes are lacking in the event of a disaster. Disaster simulations are not available for all MSMEs. Employee and visitor readiness can be improved through regular disaster simulations. There is not enough information on disasters. Because there are so few disaster education resources available, the general population still does not fully understand the importance of getting prepared.

Additionally, MSMEs are not very accessible to those with disabilities. Not all MSMEs offer disability-friendly amenities like sloping fields or toilets that are accessible to those with disabilities. The requirements of individuals with impairments are not given enough consideration by MSMEs. This demonstrates that not

all MSMEs understand how important inclusion is. The human resources of MSMEs are scarce. Each MSME has a comparatively limited number of employees, which could affect service quality and emergency response capabilities. Additionally, a barrier may be the absence of safety and disaster management training. The findings of five MSMEs' observations revealed several issues that make MSMEs more vulnerable to disasters. The issues include limited human resources, low disaster literacy, and low MSMEs' readiness for disasters.

Based on the outcomes of pre-research conversations with the Head of the Empowerment Division on December 10, 2025, the current state of MSMEs in Kupang City can be characterized as follows. Due to the Cooperatives and MSMEs Service's DIPA funding being refocused, the MSME database in Kupang City has not been updated, which has caused practical monitoring and evaluation operations to operate less efficiently. As a result, there is no MSME development program, and the issue of routinely updating MSME data is affected. Furthermore, MSME actors are reluctant to provide their data to service officers. Although Kupang City has a number of *kelurahans*, banks, and cooperative institutions that directly support MSMEs, the information on the MSMEs that are supported has not been shared with the Kupang City Cooperatives and MSMEs Service.

Because MSME actors are reluctant to give officers of the Kupang City Cooperative and MSME Service information about their business income, the income of MSMEs in Kupang City is still unclear. Premium items are not yet available from MSMEs. A number of premium goods that are in demand in Kupang City, including woven fabrics, *se'i sapi* (beef), and *se'i babi* (pork), are products made by MSMEs in Kupang Regency. In addition, most MSMEs in Kupang City are still unaware of how crucial disaster preparedness and mitigation are to ensuring the long-term viability of their business activities.

#### **b. The Institutional Data Gap (Evidence from Stakeholders)**

Based on an in-depth interview with Mrs Zogara, Head of Empowerment of the Kupang City Cooperatives and SMEs Office, it was found that there were significant structural failures in the management of MSME data. The main problem identified is the stagnation of MSME database updates due to the DIPA budget refocusing policy. This policy has caused a loss of allocation of funds for routine monitoring and evaluation activities in the field, so that the agency has lost the ability to verify the operational status of thousands of MSMEs regularly. As a result, the data currently available no longer reflects real conditions on the ground, creating a void of information that is crucial for policymaking.

This data gap creates a "*blind spot*" related to the impact of disasters on local economic resilience. The agency admits that it does not have valid data on the number of MSMEs that went out of business or that managed to survive after the double blow of the COVID-19 pandemic and Cyclone Seroja in the last 3-5 years. Without historical data on the impact of these disasters, governments struggle to accurately map the level of sectoral vulnerability, potentially causing recovery assistance programs to be off-target.

In addition to internal budget constraints, this data gap is exacerbated by resistance from MSME actors themselves. Mrs Zogara highlighted the strong reluctance of business owners to provide honest operational data to officers, especially related to income or business turnover information. This lack of financial information makes it difficult for the government to measure the actual capital capacity and financial resilience of MSMEs, so that the business risk profile in Kupang City becomes vague and difficult to analyze.

This data collection problem is increasingly complex due to cross-sectoral data fragmentation. Although various other institutions in Kupang City, such as the Kelurahan, credit distribution banks, and cooperative institutions have their own MSME fostered data, the data is not integrated with the Kupang City Cooperatives and SMEs Office. The absence of a centralized data sharing mechanism causes *siloe*d data, where the agency, as a regulator, does not hold comprehensive data on the MSME ecosystem that they are supposed to foster.

## **DISCUSSION**

The implications of this institutional data gap are very fatal to disaster mitigation efforts. Without a dynamic and integrated database, any designed development strategy be it training or capital assistance—runs without clear navigation. The absence of a specific MSME development program due to the absence of this

data confirms that the vulnerability of MSMEs in Kupang City is not only caused by natural factors, but also by the weak policy support infrastructure.

Quantitatively, the existing profile of MSMEs in Kupang City, based on the latest static data owned by the Cooperatives and SMEs Office, recorded a total business population of 17,475 units. This microeconomic structure is absolutely dominated by the trade sector with a total of 14,281 units, followed by the service sector with 1,870 units and livestock with 825 units, while other productive sectors such as industry, agriculture, and fisheries have a much smaller contribution. However, it should be emphasised that this statistic is only an inventory of the number of business units without a layer of data on disaster vulnerability status. Given that this database has not been comprehensively updated post-pandemic and Cyclone Seroja due to budget constraints, these figures have the potential to no longer represent real conditions on the ground, both in terms of the number of MSMEs that are still actively operating and their adaptation capacity in facing future disaster threats.

### **Bridging the Resilience Gaps**

Findings from Phase 1 (bibliometric analysis) and Phase 2 (field study) reveal a fundamental paradox in the MSME landscape in Kupang City. Although businesses have demonstrated tremendous economic resilience, as evidenced by their ability to maintain operating hours of up to 12 hours per day in the wake of Hurricane Seroja and the pandemic, this resilience is fragile because it is not supported by a physical mitigation foundation. The absence of basic safety infrastructure, such as light fire extinguishers and evacuation signs in all observation units, confirms that the mentality of "resilience" at the grassroots level is still interpreted narrowly as financial *survival*, not *disaster preparedness*. MSME actors are trapped in a short-term mindset, where investment in safety equipment is considered an additional cost burden that is not urgent compared to daily operational needs.

On the other hand, the internal vulnerability of MSMEs is exacerbated by systemic failures in the external supporting ecosystem. The stagnation of government databases due to *budget refocusing* policies has broken the chain of feedback necessary for effective policy interventions. Without up-to-date data, local governments experience "partial blindness" in mapping which sectors are most vulnerable to collapse when the next disaster strikes. This information gap causes aid programs to often be generic and reactive, rather than preventive and targeted.

Therefore, the resilience of MSMEs in Kupang City cannot be built only by relying on the fighting power of business actors alone. There is a need for a paradigm shift from a *top-down* and sporadic approach to a structurally integrated approach. This discussion concluded that the key to business sustainability does not only lie in working capital, but also in the synergy between technical disaster literacy at the micro level and the accuracy of monitoring data at the macro level.

### **Strategic Interventions**

To bridge the gap between economic resilience and disaster preparedness, this study proposes three main strategies designed specifically for the Kupang City context:

#### **a. Technical Mitigation-Based Capacity Development**

The first strategy focuses on transforming knowledge into action. The government and stakeholders need to move from just general socialisation to specific technical training, such as periodic disaster simulations and basic safety certifications for MSME employees. Given that field findings show the absence of (Castro Rodríguez, Barresi, and Demichela 2025), stimulus assistance programs must be prioritised on the provision of physical (Juschten, Reinwald, and Jiricka-Pürner 2025), such as subsidies for the procurement of fire extinguishers and the installation of evacuation route signs at business locations in disaster red zones. This aims to instil a culture of "occupational safety" as an integral part of business operations.

#### **b. Digital Data Transformation and Business Diversification.**

To overcome the constraints of the government's monitoring budget, the adoption of low-cost digital technology is needed that allows MSME actors to conduct *self-reporting*. This digital platform not only serves as a dynamic database for governments but also as a means for MSMEs to expand market access through *e-*

commerce (Gaspar, Wang, and Xu 2024; Rattanasang and Sukhotu 2024), which has proven to be a safety net when physical access is disrupted by disasters. In addition, product diversification towards high-value-added goods such as premium processed products-needs to be encouraged to strengthen business capital reserves in the face of economic shocks (Gladstone et al. 2025).

### c. Strengthening Multi-Stakeholder Partnership Networks

Given regional fiscal limitations, resilience strategies should involve closer cross-sectoral collaboration. It is necessary to establish a partnership forum that integrates data and resources from banks, cooperatives, academics, and local governments. This synergy aims to remove data barriers (*data silos*) between agencies, so that the distribution of post-disaster aid can be carried out precisely based on a unified dataset. In addition, partnerships with the private sector through can be directed to fill the gap in mitigation infrastructure financing that is not covered by the APBD (Setyadi, Pawirosumarto, and Damaris 2025).

## Recommendations

To bridge this gap and move from mere survival to sustainability, three imperative strategies are proposed:

- a. Technical Capacity Development: Move from general socialisation to mandatory technical certifications (e.g., fire safety and evacuation simulations) to institutionalise a culture of preparedness.
- b. Overcoming fiscal constraints by adopting a low-cost, digital self-reporting platform to update MSME databases in *real-time*, ensuring accurate aid targets (Amaya, Campoverde, and Granda 2024)
- c. Cross-Sector Partnerships: Breaking down data *silos* between banks, cooperatives, and governments to create a unified resilience dashboard that supports rapid post-disaster recovery.(Rattanasang and Sukhotu 2024).

## CONCLUSION

This study concludes that the resilience of MSMEs in Kupang City is currently trapped in a “**survivalist**” mode, which is characterized by strong economic persistence but has severe physical and structural vulnerabilities. Bibliometric analysis at the initial stage confirms that the topic wedge between "multi-hazard risk" and "resilience of island MSMEs" is a domain that is very minimally studied globally. Empirically, this study identifies two critical gaps in the local context:(a) Preparedness Gap. MSMEs exhibit a reactive mindset, prioritizing daily income over safety infrastructure, as evidenced by the absence of Light Fire Extinguishers (APARs) and evacuation plans. (b) Institutional Data Gap. Government support is hampered by "blind spots" in policy-making, caused by database stagnation and budget *refocusing* policies that break the chain of monitoring feedback. Thus, resilience in Kupang City is not limited by a lack of entrepreneurial spirit, but rather by a lack of technical mitigation capacity and integrated data support.

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