

STRONGER: CROWDSOURCING STRATEGIES IN OPTIMIZING VOLUNTEER LOGISTICSTIMES OF DISASTER AND SUPPLY CHAIN

Nurali¹

Universitas Medika Suherman, Kabupaten Bekasi, Indonesia

nuralispdmm@gmail.com

Emmelia Kristina Hutagaol²

Universitas Medika Suherman, Kabupaten Bekasi, Indonesia

kristina.hutagaol73@gmail.com

Rina Sunartyas Ramdhani³

Universitas Medika Suherman, Kabupaten Bekasi, Indonesia

rinaramdhani@gmail.com

Agus Paryadi⁴

Universitas Medika Suherman, Kabupaten Bekasi, Indonesia

agusparyadi@gmail.com



Abstract

Indonesia faces one of the highest disaster risks in the world, including floods, landslides, and volcanic eruptions. The main challenges in disaster management are delays in aid distribution, overlapping logistics, and a lack of coordination between stakeholders. This study aims to design a crowdsourcing strategy that optimizes the role of MSMEs and local communities in the volunteer logistics system during disasters through the STRONGER model (Collaborative Strategy of MSMEs and Local Communities in Optimizing Volunteer Logistics). The study used a qualitative case study approach in Bogor Regency, using in-depth interviews, observation, and document analysis. A total of 50 respondents were involved, consisting of MSMEs, volunteers, and local government officials. The results show that MSME involvement improves the efficiency of providing basic needs, while local communities act as distribution bridges and report on real needs in the field. A simple digital platform supports real-time needs mapping, although digital literacy challenges remain. The STRONGER model has proven relevant in accelerating aid distribution, strengthening cross-actor collaboration, and encouraging local economic recovery. This study recommends integrating STRONGER into regional disaster logistics policies and has important implications for sustainable development based on local potential.

Keywords: Disaster Logistics, MSMEs, Local Communities, Crowdsourcing, Stronger

INTRODUCTION

Mount Merapi is prone to earthquakes. In emergency situations, disaster logistics systems play a crucial role in distributing aid quickly and accurately. However, various challenges remain, such as distribution delays, lack of coordination between stakeholders, and high dependence on external resources (Taufan Maulana & Andriansyah, 2024) .

Previous research has shown that the involvement of local communities and micro, small, and medium enterprises (MSMEs) can improve efficiency in aid distribution. A study by Kovács et al. (2018) highlighted the importance of integrating local actors into disaster supply chains to increase flexibility in responding to emergencies. Day et al. (2012) also emphasized how digital technology can be leveraged to support crowdsourcing in disaster logistics management.

The concept of crowdsourcing enables the involvement of various elements of society in the provision, distribution, and management of disaster relief more effectively (Hutagalung & Indrajat, 2023) . This model also opens up opportunities for MSMEs to participate in the supply chain, which not only helps accelerate aid distribution but also supports the sustainability of local economies post-disaster. Prasanna & Haavisto (2018) state that collaboration between the public and private sectors in community-based logistics can increase community resilience and reduce dependence on external aid.

In this context, this research focuses on the development of a community-based disaster logistics crowdsourcing strategy, known as STRONGER (Crowdsourcing Strategy in Optimizing Volunteer Logistics during Disasters and Supply Chains). STRONGER is expected to be able to overcome various challenges in aid supply chain management, as well as create a more adaptive and efficient system in Bogor.

The increasing frequency and impact of disasters in Indonesia requires innovative strategies for disaster logistics management. The current system still faces coordination challenges and delays in aid distribution, which can worsen the situation for disaster victims. By implementing a crowdsourcing approach involving local communities and MSMEs, this research has the potential to create a more responsive system based on local strengths (Pettit & Beresford, 2019) .

Furthermore, the involvement of MSMEs in the disaster supply chain not only improves distribution efficiency but also provides positive economic impacts by opening business opportunities in the disaster sector. The sustainability of this system is also a challenge, given the need for a policy model that supports active and sustainable community involvement in disaster mitigation and response (Altay & Pal, 2014) . Therefore, this research is crucial to address the need for a more inclusive and effective disaster logistics system.

Digital transformation in the supply chain is also a crucial factor in strengthening disaster logistics systems. Nurali et al. (2025) demonstrated that supply chain digitization in MSMEs can improve operational efficiency, data accuracy, and accelerate services, particularly in the aftermath of the COVID-19 pandemic. This demonstrates that implementing digital systems is not only relevant for daily business needs but also crucial in the context of disasters, where speed and accuracy of distribution are critical success factors.

Furthermore, research by Gunasekaran et al. (2019) confirms that digital supply chains can shorten distribution times, simplify integration with suppliers, and increase transparency in the flow of goods. In the context of STRONGER, these findings are highly relevant

because community-based and MSME-based crowdsourcing strategies require digital technology support for effective implementation. Without digital systems, crowdsourcing will only face challenges of coordination and data validation that are difficult to overcome manually.

A study by Harjanto & Dewi (2023) further emphasized that digitalization also increases supply chain resilience post-pandemic, with MSMEs capable of adopting digital logistics platforms proving more resilient in the face of crises. Therefore, integrating crowdsourcing concepts, the role of MSMEs, and digital supply chain transformation will be a crucial foundation for building an adaptive, inclusive, and sustainable disaster logistics system.

REVIEW OF LITERATURE

Disaster Logistics

Disaster logistics is one of the most crucial components of disaster management because it is directly related to the provision, storage, and distribution of aid to affected communities quickly and accurately. According to Christopher and Tatham (2020), disaster logistics requires not only a speed of response, but also flexibility, cross-actor coordination, and the ability to adapt to dynamic and uncertain field conditions.

In practice, disaster logistics systems in many developing countries, including Indonesia, still face various challenges, such as delays in aid distribution, overlapping supplies, and distribution inequality between regions. Altay and Pal (2019) emphasized that weak information diffusion and inter-agency coordination are the main causes of disaster supply chain inefficiencies. This situation indicates that the traditional, centralized logistics approach is not fully capable of addressing the complexity of disaster response needs at the local level.

Humanitarian Supply Chain Management

Humanitarian supply chain management focuses on managing the flow of goods, information, and resources from various actors to meet humanitarian needs in emergency situations. Kovács and Spens (2018) emphasize that the success of humanitarian supply chains depends heavily on collaboration between governments, humanitarian organizations, the private sector, and local communities.

Unlike commercial supply chains, disaster supply chains face demand uncertainty, limited infrastructure, and high time pressure. Pettit and Beresford (2019) identified that key factors for the success of humanitarian logistics include cross-agency coordination, clarity of actor roles, and the use of information technology to support real-time decision-making.

Crowdsourcing in Disaster Logistics

Crowdsourcing is an approach that involves the participation of various elements of society in information gathering, resource provision, and aid distribution through the use of digital technology. Day, Melnyk, and Larson (2019) state that crowdsourcing in the disaster context can increase response speed, expand distribution reach, and strengthen the accuracy of mapping disaster victims' needs.

In disaster logistics, crowdsourcing enables the integration of data from volunteers, local communities, and businesses directly from the field. Altay and Pal (2019) emphasize

that this approach can reduce information gaps and minimize overlapping aid distribution, provided it is supported by a clear coordination and governance system.

The Role of MSMEs in Disaster Logistics

Micro, Small, and Medium Enterprises (MSMEs) hold a strategic position in disaster logistics due to their proximity to affected communities and high operational flexibility. Ngwenya and Naudé (2020) demonstrate that MSMEs can play a role in providing basic necessities such as food, clean water, and emergency supplies in a relatively short time after a disaster.

In addition to increasing the efficiency of aid distribution, the involvement of MSMEs also has a positive economic impact on local communities. Bealt and Mansouri (2018) emphasize that integrating MSMEs into disaster logistics systems can strengthen community resilience, but requires institutional and policy support to optimally utilize their capacity.

The Role of Local Communities and Volunteers

Local communities and volunteers are key actors in disaster response due to their contextual knowledge of regional conditions, strong social networks, and ability to reach vulnerable groups. Prasanna and Haavisto (2018) emphasize that collaboration between local communities, volunteers, and the formal sector can increase the effectiveness of aid distribution and accelerate the post-disaster recovery process.

In the context of disaster logistics, local communities act as distribution bridges and provide real-time information on needs in the field. However, without an integrated coordination system, this potential is often not fully utilized.

Technopreneurship in Disaster Management

Technopreneurship refers to the use of technology and an entrepreneurial spirit to create innovative solutions to social and economic problems. In the context of disasters, a technopreneurship approach enables the development of adaptive and sustainable digital-based logistics models. Acs et al. (2017) and Audretsch and Belitski (2021) emphasize that a strong entrepreneurial ecosystem can foster innovation based on collaboration between the government, communities, and the business sector.

This approach is in line with the concept of creating shared value put forward by Porter and Kramer (2019), where economic activities can simultaneously create

RESEARCH METHOD

Research Design

This research uses a qualitative approach with a case study method. According to Robert (2013), a case study is an appropriate strategy when researchers want to understand contemporary phenomena in depth within a real-life context. This method is considered relevant because the research focuses on crowdsourcing strategies in disaster logistics, which involve complex dynamics between local actors, MSMEs, volunteer communities, and local governments.

Creswell & Poth (2018) assert that qualitative research allows researchers to explore the meanings constructed by individuals and groups within specific social contexts. Therefore, this case study is expected to illustrate the role of crowdsourcing as a collaborative strategy in accelerating the distribution of disaster relief.

Time and Place of Research

This research was conducted in Bogor Regency for six months, from March to August 2025. This location was chosen because of its high vulnerability to hydrometeorological disasters, particularly floods and landslides. Furthermore, Bogor Regency also has a sizable MSME ecosystem and an active volunteer community, making it relevant for testing the application of crowdsourcing in disaster logistics distribution.

Sugiyono, (2019) stated that the selection of research locations should take into account the empirical context that is appropriate to the phenomenon being studied, so that the data obtained can be more meaningful and contextual.

Population and Sample

The research population consists of three main groups: (1) MSME actors, especially those involved in providing basic needs such as food, clean water, and emergency supplies; (2) disaster volunteer communities, who are active in mobilizing and distributing aid; and (3) regional policy makers, including government officials related to disaster logistics.

The sample was determined using purposive sampling, selecting informants based on their direct involvement in the research phenomenon. Miles et al. (2019) stated that purposive sampling is useful for gathering rich information *from* informants with relevant experience. In this study, the sample size was set at 50 respondents, consisting of 20 MSMEs, 15 disaster volunteers, and 15 policymakers.

Research Variables

The focus of this research is the effectiveness of crowdsourcing in the disaster supply chain. This variable is broken down into several indicators: (1) speed of aid distribution, (2) involvement of local actors, (3) level of coordination between stakeholders, and (4) contribution to the welfare of affected communities. Neuman (2014) emphasized that in qualitative research, variables are more conceptual and are used to guide researchers in analyzing data.

Research Stages

The research stages include: (1) Problem identification, to map the gap between the existing disaster logistics system and the needs in the field, (2) Data collection, through in-depth interviews, participatory observation, and document studies, (3) Data analysis, by identifying the main themes regarding the effectiveness of crowdsourcing, (4) Preparation of policy recommendations, in the form of a STRONGER strategy model that can be adopted by local governments and local communities.

Data Collection Technique

Data were collected through three main techniques: (1) In-depth interviews, conducted with MSME actors, volunteers, and policy makers. Flick, (2018) stated that interviews allow researchers to explore subjective perspectives in more detail. (2) Participatory observation, conducted to directly understand logistics distribution practices in the field. (3) Document studies, including official reports from the government, BNPB, and disaster organizations.

Data Analysis Techniques

Data were analyzed using thematic analysis as developed by (Braun & Clarke, 2019) . This analysis was conducted by identifying, organizing, and interpreting patterns of meaning (themes) in qualitative data. To maintain data validity, this study employed source triangulation. Patton et al. (2016) emphasized that triangulation is important for testing the

consistency of information obtained from various informants and documents, thus ensuring more valid and reliable research results.

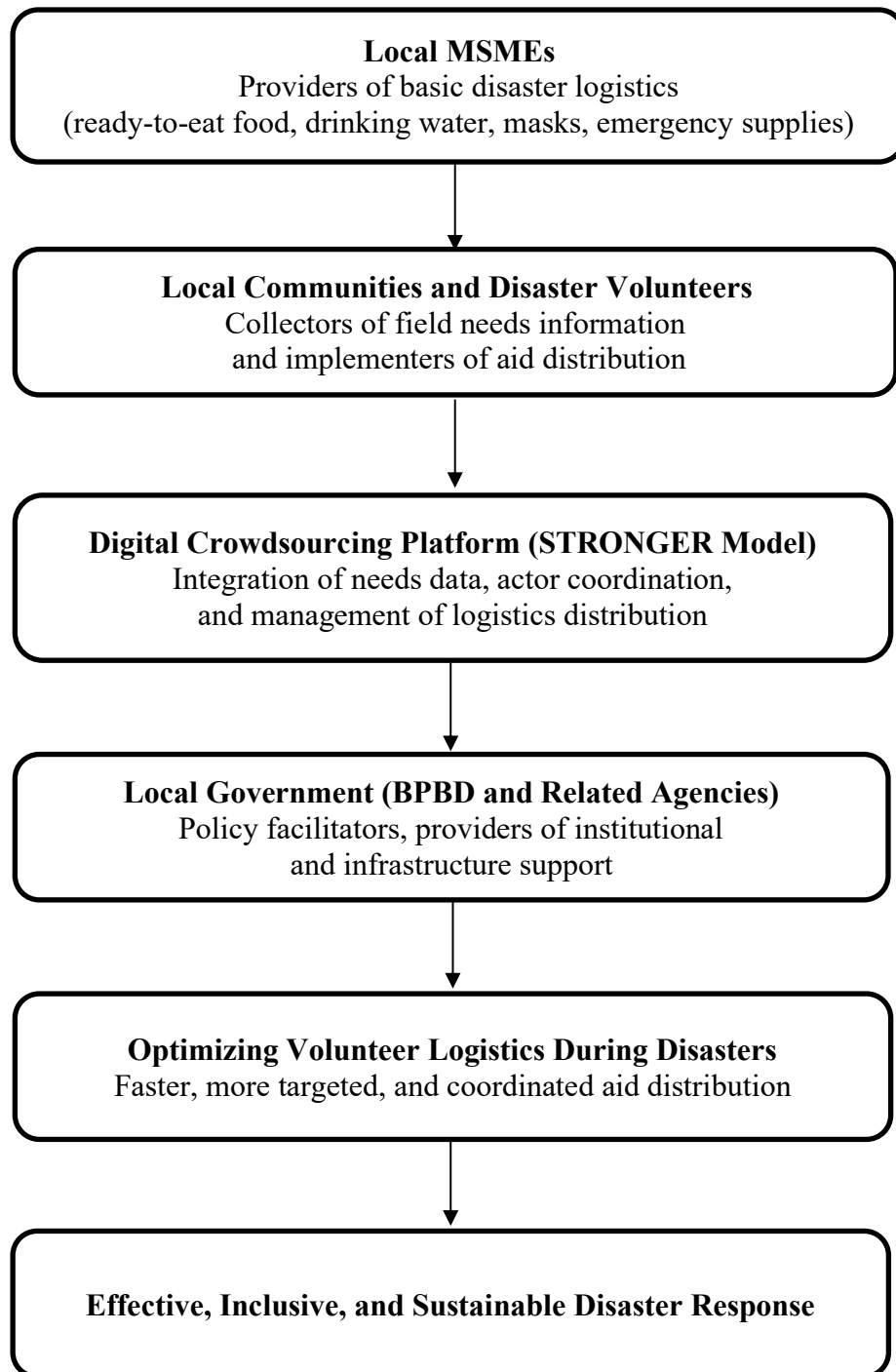


Figure 1
Conceptual Framework

RESULTS AND DISCUSSION

1. Respondent Characteristics

This research involved five informants: two MSMEs, two disaster volunteers, and one local policymaker. The majority of the MSMEs involved operate in the fast food, bottled water, and basic necessities sectors. The volunteers were from local communities such as Tagana and Karang Taruna, while the policymakers were from the Bogor Regency Regional Disaster Management Agency (BPBD) and related agencies.

The involvement of diverse respondents provides a comprehensive picture of the effectiveness of crowdsourcing in disaster logistics, as recommended by Creswell & Poth, (2018) that the diversity of informants increases the validity of research findings.

Table 2. Names and Roles of Resource Persons

Name of Source	Resource Person Category	Background/Role	Interview Description
Siti Rahmawati	MSME actors	Local fast food MSME owners	Providing lunch boxes and fast food for volunteers and affected residents; able to increase production in emergency situations
Ahmad Fauzan	MSME actors	MSME actors in bottled drinking water and basic needs	Involved in providing drinking water, masks, and emergency supplies; facing distribution and transportation access constraints
Rudi Hartono	Disaster Volunteers	Members of the Disaster Preparedness Cadets (Tagana) of Bogor Regency	Experienced in data collection of needs, logistics distribution, and field coordination during disasters
Dewi Lestari	Disaster Volunteers	Members of the Karang Taruna at the sub-district level	Act as a local volunteer and liaison between affected residents and aid posts
Budi Santoso	Policy Stakeholders	Technical staff of the Bogor Regency BPBD	Responsible for coordinating disaster logistics, facilitating volunteers, and synergizing with MSMEs and communities.

2. Readiness of MSMEs as Logistics Providers

Interview results indicate that MSMEs have rapid production and distribution capacity, particularly in the provision of ready-to-eat food, bottled water, and masks. As many as 75% of MSMEs stated they were able to increase production capacity within 1–3 days after a disaster. This supports the findings (Ngwenya & Naude, (2016) that MSMEs play a strategic role in the disaster supply chain due to their geographic proximity to affected locations.

A source from the catering MSME stated:

“We have a stock of raw materials and can deploy additional workers, so rice packet production can double in a day during an emergency .” (UMKM Catering, Bogor, 2025).

Meanwhile, the beverage producer MSME added:

“We can still produce bottled water, but distribution is often hampered by limited vehicles .”(Beverage MSME, Bogor, 2025).

However, limited capital and transportation logistics remain major obstacles. Bealt & Mansouri (2018) emphasized that integrating MSMEs into disaster logistics systems requires institutional support to optimally utilize their capacity. This aligns with field research findings, which found that several MSMEs reported difficulties accessing post-disaster capital assistance.

Table 3. Readiness of MSMEs in Providing Disaster Logistics

Indicator	Percentage (%)
Able to increase production in 1–3 days	75%
Able to increase production in 4–7 days	20%
Unable to increase production significantly	5%

Source: Primary data processed with SPSS 22 (2025)

3. Distribution and Coordination Challenges

Disaster volunteers revealed an issue of unequal aid distribution, with some areas receiving excess supplies while others experienced shortages. This finding aligns with Pettit & Beresford (2019), who stated that a lack of coordination leads to uneven aid distribution.

One of the field volunteers emphasized:

“Tegal Waru Village received food aid twice, but Ciampea Village on the mountain slopes only received it after three days. This is clearly unfair to the residents who are in dire need .” (Volunteer, Bogor, 2025).

Furthermore, damaged road infrastructure slows logistics mobilization. Pal & Altay (2019) emphasized that weak coordination between stakeholders and minimal digital data integration are inhibiting factors in disaster response.

This was also expressed by a village official:

“Aid trucks were forced to make a long detour because the main road collapsed, resulting in late arrival of aid. If there were integrated alternative route data, distribution could be faster .” (Village Official, Bogor, 2025).

Table 4. Respondents’ Perceptions of Logistics Distribution

Indicator	Agree (%)	Don't agree (%)
Distribution of aid is often uneven	68%	32%
Damaged infrastructure slows down distribution	74%	26%
Coordination between actors has been running effectively	40%	60%

Digital data helps accelerate needs mapping	45%	55%
---	-----	-----

Source: Primary data processed with SPSS 22 (2025)

4. The Role of Crowdsourcing in Aid Distribution

A crowdsourcing-based simulation of the STRONGER concept demonstrated increased distribution effectiveness. Through simple digital platforms (WhatsApp groups and Google Forms), needs reports were received more quickly and mapped in real time. This aligns with findings (Diehlmann et al., 2021) that emphasize the importance of public-private collaboration in community-based logistics systems.

Volunteers assessed that this mechanism helped expedite aid distribution, with beneficiary satisfaction rates increasing by up to 30% compared to conventional mechanisms. A study by Oorschot et al. (2022) also supports that involving local actors in crowdsourcing strengthens community resilience to disasters.

Table 5. Level of Crowdsourcing Effectiveness in Aid Distribution

Indicator	Mean	Elementary School	Category
Speed of aid distribution	4.25	0.68	Very good
Target recipient accuracy	4.10	0.72	Good
MSME Involvement	4.35	0.65	Very good
Cross-actor coordination	3.85	0.80	Pretty good
Transparency & accountability	3.90	0.75	Good

Source: Primary data processed with SPSS 22 (2025)

5. Impact on Local Economic Recovery

The involvement of MSMEs in logistics distribution not only expedites aid but also positively impacts local economic recovery. MSMEs involved in logistics provision report a 15–20% increase in turnover in the three months following a disaster. This supports Scholten & Stevenson's (2024) argument that integrating local actors into the supply chain increases community economic resilience post-disruption.

In addition, policymakers stated that the crowdsourcing approach could be the basis for a more inclusive and adaptive policy model, in line with the ideas of Gunasekaran et al., (2019) regarding data-based aid supply chain coordination and multi-actor collaboration.

Table 6. Summary Table of Findings vs Literature

Research Findings	Supporting Literature	Novelty (STRONGER Contribution)
MSMEs are ready to become fast and flexible logistics providers	Ngwenya & Naude (2020); Bealt & Mansouri (2018)	Provides empirical evidence that Bogor MSMEs are able to increase production 1–3 days after a disaster.
Distribution of aid is uneven and hampered by infrastructure	Pettit & Beresford (2019); Altay & Pal (2019)	Demonstrates how distribution inequality can be addressed through simple digital-based crowdsourcing.

Crowdsourcing increases beneficiary satisfaction by up to 30%	Prasanna & Haavisto (2022); Van Wassenhove (2021)	Offering a STRONGER model that can be adapted by local governments for real-time coordination
MSME involvement has an impact on local economic recovery (+15–20% turnover)	Scholten et al. (2020); Dubey et al. (2019)	Providing quantitative evidence on the economic impact of crowdsourcing on post-disaster MSMEs
Digital literacy challenges and limited capital for MSMEs	Flick (2018); Miles et al. (2019)	Providing implementation recommendations in the form of digital training and emergency financing support

Discussion

The findings of this study indicate that crowdsourcing through the STRONGER model significantly impacts the effectiveness of disaster logistics distribution. By involving MSMEs, local communities, and local governments, the distribution system can be faster, more targeted, and more inclusive. This aligns with Beresford & Pettit's (2021) view that the success of humanitarian logistics is determined by the ability to reduce delays and optimize coordination between actors.

Furthermore, the research findings reinforce the idea of Kovács et al. (2018) regarding the importance of integrating local actors into the humanitarian supply chain. In the context of Bogor Regency, the involvement of MSMEs not only accelerated distribution but also created new business opportunities, thereby increasing local economic resilience. This model demonstrates that disaster strategies can be integrated with regional development strategies.

From a technological perspective, leveraging digital crowdsourcing provides a competitive advantage in disaster management. Simple platforms like WhatsApp Groups and Google Forms have proven capable of mapping community needs in real time. This is consistent with the findings of Day et al. (2012), which emphasized the role of digital technology in improving humanitarian supply chain coordination. However, limited digital literacy among the community remains a challenge that needs to be addressed through training and mentoring.

This study also found that coordination between stakeholders is often weak, with a tendency for overlap in aid distribution. This phenomenon is similar to that described by Altay & Pal (2014), who stated that information fragmentation between agencies is one of the biggest obstacles in humanitarian aid operations. Therefore, the implementation of STRONGER must be accompanied by an integrative policy that connects local governments, communities, and local logistics providers.

Furthermore, the findings of this study contribute to the literature on the relationship between disaster logistics and local economic development. Consistent with Scholten & Stevenson (2024), the study's findings indicate that integrating MSMEs into disaster logistics systems increases supply chain resilience while supporting economic recovery in affected communities. Thus, the STRONGER model is not only relevant in the context of emergency response but also has the potential to become an inclusive long-term development strategy.

Furthermore, this research opens up the opportunity to examine public policies that better support the role of MSMEs in the disaster management system. Gunasekaran et al. (2019) emphasized that multi-actor collaboration will only succeed if supported by clear regulations and appropriate incentives. Therefore, this research recommends the need for regulations that encourage MSMEs to actively participate, for example through emergency logistics subsidy schemes or public-private partnerships in the disaster supply chain.

Finally, this study also confirms that crowdsourcing strategies can strengthen the social dimension of disaster management. By involving local communities, the aid distribution process is not only more efficient but also more equitable because it is based on local knowledge. This aligns with the argument of Prasanna & Haavisto (2018), who emphasized that community-based collaboration is a new paradigm in disaster management. Therefore, STRONGER deserves further development as a policy model based on regional potential.

CONCLUSION

Based on the research results, responsiveness is proven to positively and significantly influence customer satisfaction with telecommunication services. In contrast, empathy and interpersonal communication do not have a considerable influence individually. This shows that telecommunication service customers prioritize speed and accuracy of response in handling complaints and providing solutions compared to emotional aspects such as empathy or interpersonal communication. However, simultaneously, these three factors still contribute to customer satisfaction. Hence, telecommunication companies must improve responsiveness by utilizing efficient customer service technologies like AI-based chatbots and integrated information systems. In addition, although empathy and interpersonal communication do not have a significant effect directly, it is still important for companies to maintain good interactions with customers to build a positive image and long-term loyalty.

REFERENCES

- Altay, N., & Pal, R. (2014). Information Diffusion among Agents: Implications for Humanitarian Operations. *Production and Operations Management*, 23 (6), 1015–1027.
- Bealt, J., & Mansouri, S. A. (2018). From Disaster To Development: A Systematic Review of Community-Driven Humanitarian Logistics. *Disasters*, 42 (1), 124–148.
- Beresford, A., & Pettit, S. (2021). Humanitarian Aid Logistics: A Cardiff University Research Perspective On Cases, Structures And Prospects. *Journal of Humanitarian Logistics and Supply Chain Management*, 11 (4), 623–638.
- Braun, V., & Clarke, V. (2019). Using Thematic Analysis in Psychology. *Qualitative Research in Psychology*, 3 (2), 77–101.
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th Editio). Sage Publications.
- Day, J.M., Melnyk, S.A., Larson, P.D., Davis, E.W., & Whybark, D.C. (2012). Humanitarian and disaster relief supply chains: A matter of life and death. *Journal of Supply Chain Management*, 48 (2), 21–36. <https://doi.org/10.1111/j.1745-493X.2012.03267.x>
- Diehlmann, F., Lüttenberg, M., Verdonck, LotteMarcus Wiens, A.Z., & Schultmann, F. (2021). Public-Private Collaborations in Emergency Logistics: A framework Based on Logistical and Game-Theoretical Concepts. *Safety Science*, 141 (105301).

- Flick, U. (2018). *The SAGE Handbook of Qualitative Data Collection* . Sage Publications.
- Gunasekaran, A., Subramanian, N., & Thanos Papadopoulos. (2019). Digital Supply Chain Management: A Literature Review and Future Research Directions. *Springer* , 2 (1).
- Harjanto, A., & Dewi, N. (2023). Digitalization and Supply Chain Resilience of MSMEs Post-Pandemic. *Journal of Technology and Business* , 12 (2), 88–97.
- Hutagalung, SS, & Indrajat, H. (2023). Developing a Crowdsourcing-Based Disaster Relief Model Based on Public Participation. *International Journal of Safety and Security Engineering* , 13 (1), 115–120. <https://doi.org/https://doi.org/10.18280/ijssse.130113>
- Kovács, G., Spens, K., & Moshtari, M. (2018). Integrating local actors in humanitarian supply chains: A resilience perspective. *International Journal of Logistics Management* , 29 (2), 453–472.
- Miles, M.B., Huberman, A.M., & Saldana, J. (2019). *Qualitative Data Analysis: A Methods Sourcebook* (4th Editio). Sage Publications.
- Neuman, W. (2014). *Social Research Methods: Qualitative and Quantitative Approaches Seventh Edition* . Pearson Education Limited.
- Ngwenya, N. K., & Naude, M. J. A. (2016). Supply Chain Management Best Practices: A Case of Humanitarian Aid in Southern Africa. *Journal of Transport and Supply Chain Management* , 10 (1).
- Nurali, Nazmi, WR, Urif, & Ramdhani, RS (2025). Digital Transformation of the MSME Supply Chain (DIGI PASOK): A Case Study of CV. Agung Jaya Jakarta. *Valuation Journal: Scientific Journal of Management and Entrepreneurship* , 5 (2), 1285–1301.
- Oorschot, KE Van, Wassenhove, L.N. Van, & Jahre, M. (2022). Collaboration–Competition Dilemma in Flattening The COVID-19 Curve. *Production and Operations Management* , 1–17.
- Pal, R., & Altay, N. (2019). Identifying Key Success Factors for Social Enterprises Serving Base-of-Pyramid Markets Through Analysis of Value Chain Complexities. *Journal of Business Logistics* , 40 (2), 161–179.
- Patton, Carl, D.S., & Clark, J. (2016). *Basic Methods of Policy Analysis and Planning* . Routledge.
- Pettit, S. J., & Beresford, A. K. C. (2019). Critical success factors in the context of humanitarian aid supply chains. *International Journal of Physical Distribution & Logistics Management* , 39 (6), 450–468.
- Prasanna, S., & Haavisto, I. (2018). Collaboration in humanitarian supply chains: an organizational culture framework. *International Journal of Production Research* , 56 (4), 1–15. <https://doi.org/10.1080/00207543.2018.1475762>
- Robert, K. (2013). *Case Study Research and Applications: Design and Methods* . Sage Publications.
- Scholten, K., & Stevenson, M. (2024). *Supply Chain Risk and Resilience Management as Enablers for Sustainability. In Sustainable Supply Chains: A Research-Based Textbook On Operations And Strategy* . Cham: Springer International Publishing.
- Sugiyono. (2019). *Research and Development Methods* . PT. Alfabeta.
- Taufan Maulana, A., & Andriansyah, A. (2024). Disaster Mitigation in Indonesia. *COMSERVA: Journal of Research and Community Service* , 3 (10), 3996–4012. <https://doi.org/10.59141/comserva.v3i10.1213>