Collaborative Stakeholder Model for Flood Disaster Response Policies

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Abstract. This study looks at how collaborative governance is utilized to mitigate floods in Medan City that are brought on by both natural (like heavy rainfall) and man-made (such as inadequate drainage infrastructure and a lack of environmental awareness among the general people). It is believed that cross-sector cooperation between the public, corporate, and community sectors could lower the danger of flooding and improve the efficiency of disaster mitigation. Data for this study was gathered through interviews with stakeholders, including the Medan City Regional Disaster Management Agency (BPBD), the Environmental Service, the Water Resources, Higways, and Construction Service (SDABMBK), and impacted communities, using a descriptive qualitative methodology. The study's findings demonstrate that cross-sector cooperation has been successful in lowering the severity of floods by implementing policies like river normalization, better drainage systems, group waste management, and retention pond construction. Budgetary restrictions, subpar interagency collaboration, and minimal community involvement, however, continue to hinder the program's efficacy. To increase Medan City's resilience to flooding, recommendations include enhancing cross-sector collaboration, expanding infrastructural capacity, educating the public, and creating early warning-based technology.

Keywords: collaborative governance, flood mitigation, cross-sector collaboration, Medan City

1 Introduction

Disasters are a type of tragedy or sequence of events that endanger or impact the living conditions of a community. They can be brought on by natural, man-made, or non-natural sources and can cause property damage, fatalities, environmental harm, and psychological distress [1]. Generally speaking, the interplay between vulnerabilities and threats (hazards) causes disasters. Law Number 24 of 2007 defines the threat of disaster as an incident or event that has the potential to result in a disaster. The flood phenomena are one of the hydrometeorological disasters that frequently happen in Indonesia [2]. Since about 30% of Indonesia's 500 rivers flow through highly populated areas, the country's vulnerability to flooding is undoubtedly a result of its geographic circumstances. 63.7 million people reside in places that frequently experience flooding, according to data compiled by the BNPB [3]. According to BNPB data, during ten months in 2023, floods were Indonesia's most common natural calamity. According to these figures, 898 of the 3,089 disasters that occurred during that time were floods [4].

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Law Number 24 of 2007 concerning Disaster Management was passed by the government because flood management calls for an all-encompassing and sustainable strategy. The adoption of collaborative governance will improve flood disaster management by accommodating all disaster management efforts from stakeholders, human resources, and flood management infrastructure. The government is not the sole entity responsible for flood control; everyone has a role to play. To maximize flood control efforts and generate more optimal and fruitful solutions, collaborative governance in flood management can bring together local communities, businesses, and government agencies [5].

According to [6], collaborative governance is the direction of a specific organization that incorporates other stakeholders in a group process, agreement, and discussion. As a result, collaborative governance is also described as a stage that necessitates the participation of multiple parties in order to accomplish the public objective and cannot be executed in a single element [7]. [6] outlined the key justifications for enacting collaborative governance as a reaction to the failure of policies that had been implemented, as well as political considerations that influenced the type of regulation and the ensuing costs.

An area of 12,805 km2 (17.86%) in North Sumatra Province is frequently affected by natural calamities, particularly floods. 600 of the 5,590 major rivers in Indonesia have the potential to produce floods, according to the Directorate of Irrigation and Water Resources [8], and 1.4 million hectares make up the primary river area that is vulnerable to flooding. Urban places, like Medan City, the capital of North Sumatra Province, are among those at risk of floods since they are hubs of social and economic development on a local and global scale. The community's social and economic activities, including rapid population expansion, economic activity growth, environmental deterioration, and urbanization processes in urban areas that lack proper city planning and administration, can be the cause of this [9].

Several locations in Medan itself frequently flood, these locations are categorized into five classes, including the very high class (extremely prone to flooding), which covers all of Medan City's subdistricts and has an area of 8,236.10 ha (31.07%) [10]. With an area of 7,780.73 ha (30.10%), the high class (prone to floods) encompasses nearly all sub-districts except Medan Denai and Medan Area sub-districts. The sub-districts of Medan Deli, Medan Helvetia, Medan Johor, Medan Labuhan, Medan Marelan, and Medan Sunggal are included in the medium class, which has an area of 291.35 ha (1.10%). The districts of Medan Belawan, Medan Marelan, Medan Labuhan, Medan Deli, West Medan, Medan Polonia, Medan Selayang, Medan Amplas, Medan Sunggal, and East Medan comprise the low class (least vulnerable to flooding) which covers an area of 7,024.50 ha (26.50%). With an area of 2,977.32 hectares (11.23%), the districts of Medan Selayang, Medan Tuntungan, Medan Belawan, and Medan Johor are included in the very low class (not prone to floods).

According to the Medan City Regional Disaster Management Agency (BPBD), Medan City floods at least seven times a year, with moderate to severe flooding. The number of flood incidents in a year can rise to 15 or more in years with exceptionally high rainfall. Around four significant flood events occurred in 2022, while five flood events occurred in 2023, causing infrastructure damage and population displacement, according to a report from the Medan City BPBD [11]. High rainfall,

high population density, uncontrolled urban development that is not in line with regional spatial planning and lacks environmental awareness, and inadequate drainage due to inappropriate drainage systems, lack of drainage infrastructure, and lack of maintenance are the main causes of flooding in Medan City, albeit with varying intensities. Other factors include: (5) unclear status and function of channels, (6) lack of public awareness due to littering, and (7) the length of the Public Works Department's repair or construction process due to budget [12].

There are inundation spots for floods in Medan City in every district. Since Medan City has 280 waterlogging locations as of 2023, flooding has happened in practically every subdistrict. Driving may be hampered by floods in Medan City, which can reach thirty centimeters or an adult's calf [11]. Data on waterlogging locations in Medan City in 2023 is included below.

Table 1. List of Waterlogging Points in Medan City in 2023

No	Location	Number of Flood Points
1	Medan Kota	12
2	Medan Timur	15
3	Medan Barat	18
4	Medan Selatan	10
5	Medan Utara	20
6	Medan Baru	22
7	Medan Tuntungan	14
8	Medan Helvetia	25
9	Medan Petisah	18
10	Medan Marelan	16
11	Medan Labuhan	20
12	Medan Deli	19
13	Medan Denai	12
14	Medan Amplas	14
15	Medan Johor	16
16	Medan Polonia	8
17	Medan Maimun	11
18	Medan Area	15
19	Medan Sunggal	17

No	Location	Number of Flood Points
20	Medan Selayang	13
21	Medan Perjuangan	19

Source: Medan City Government, 2024

The locations of waterlogging points in Medan City as of 2023 come from 15 sub-districts, according to the data table for inundation points in Medan City above. With a total of 25 waterlogging locations, the Medan Helvetia District has the most inundation points. Nearly every area of the Medan Helvetia District has waterlogging spots. The Medan City Government has built retention ponds and drainage or water channels in an attempt to address this flood calamity. This retention pond takes the place of infiltration in the construction of buildings like offices or homes. However, flooding still happens in several Medan City locations despite the Medan City Government's efforts to install retention ponds and other measures. This suggests that the sector's management and development initiatives are still subpar. Therefore, cooperation among all parties involved in flood management in Medan City is necessary, including the government, the community, the private sector, and other parties that could be able to contribute to the process [13]. As long as the actors' potential is supported by their active role and responsibility, the collaborative order in flood control creates excellent prospects for success.

Several parties claim that the flood that happened for the umpteenth time was caused by more than only the aforementioned elements. The inability of the government to coordinate and work together to combat the flood was another factor contributing to the aforementioned flood problem's stagnation [14]. Neise & Diez (2018) conducted study in Jakarta and Semarang that provided evidence of the effectiveness of collaborative governance in addressing floods. They demonstrated how the involvement of private businesses significantly decreased the likelihood of floods. Similar to this, Sunarharum et al. (2014) claimed that collaborative governance can get past a number of social challenges, including: a) disparities in how the community and government view flood management; b) a lack of technical literacy and knowledge of the impacted community; and c) a lack of government ability to develop focused mitigation policies. [17]conducted a comparative study on flood management in Ayutthaya, Thailand, and Samarinda, Indonesia, which also shown how collaborative governance significantly aids the government in assessing flood hazards, including vulnerability and community adaptation capability.

Several linked agencies should be involved in the Medan City Government's implementation of collaborative governance [18]. Structured cooperation with the community and a clear separation of responsibilities amongst government departments are key components of Medan City's institutional framework for flood management. Planning and developing effective drainage infrastructure while taking public health and transportation factors into account requires close coordination between agencies like the Environmental Agency, the Regional Disaster Management Agency, and the Water Resources, Highways, and Construction Agency. Additionally, community involvement in reporting drainage issues and preserving environmental cleanliness supports flood control initiatives. It is anticipated that strict adherence to land use and spatial planning laws will lessen the effects of

flooding. Officers from different agencies and community volunteers are among the human resources (HR) involved in this instance; they require training to improve their ability to mitigate and handle disasters. To facilitate evacuation and relief distribution, facilities such as disaster response stations, disaster control centers, and adequate drainage infrastructure are required.

A variety of collaborative governance models are available for examining stakeholder collaboration. Kirk Emerson, Tina Nabatchi, and Stephan Balogh's Collaborative Governance Regime (CGR) model is one of them [19]. The CGR model, which examines the collaboration process from input, drivers, and impact, is thought to be straightforward but comprehensive. Numerous elements of collaborative governance are integrated into the CGR framework, including the system context and drivers, collaboration dynamics, actions, impacts, and adaptation. This model highlights the need for sustained cooperation as the foundation for the collaboration process between governmental and non-governmental actors.

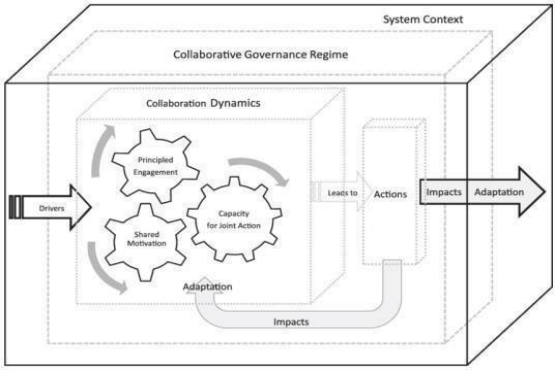

Figure 1. Collaborative Governance Model Framework Source: Emerson, Nabatchi, and Balogh (2012), "An Integrative Framework for Collaborative Governance"

The collaborative process theory from [19] was selected by the researcher since it saw the application of thorough and pertinent components in addressing the issue. Through the production of short-term actions and effects before the major impact and adaptation to short-term impacts, the Collaborative Governance Regime (CGR), also known as the collaboration process theory, provides a detailed explanation of how the cooperation process is dynamic and cyclical. The CGR box contains the aforesaid collaboration procedure. This study reveals the collaboration phenomena using a variety of CGR components. 1) Collaboration dynamics, 2) Collaboration actions, and 3) Temporary impacts and adaptations of the collaboration process are the several components that make up the collaboration process.

2 Research Method

This study employs a descriptive methodology and a qualitative approach. Qualitative descriptive research is frequently employed in social analysis of events, actions, or circumstances [20]. Maxwell defines qualitative research methods as those that seek to identify and characterize the traits and

social factors that quantitative methods are unable to describe [21]. Research that gathers information based on characteristics that support the object of study and then analyzes these aspects to determine their role is known as descriptive research [22]. The Medan City Regional Disaster Management Agency (BPBD), the Environmental Service, the Water Resources, Highways, and Construction Service (SDABMBK) of Medan City, and the local community were among the various regional government organizations in which this study was carried out. The researcher's specific goals are to observe the model of collaboration among stakeholders in the execution of flood disaster management policies in Medan City and to provide the best model for implementation.

This study's data sources include primary data collected directly from research participants and secondary data collected indirectly by researchers using media accessed and recorded by third parties. Techniques for gathering data are conducted through interviews and documentation with nine informants. The interactive model of Miles and Huberman, which begins with raw data collection, data display, data reduction, and data verification and conclusions, will be used in this study to employ data analysis methodologies [23]. The author of this study used researcher triangulation, in which investigators gather the necessary data and information by means of observations, interviews, and documentation of every action that has been conducted.

3 Result And Discussion

The purpose of this study is to ascertain the informant's response to the information the author wishes to collect. The research on "Collaboration Model Between Stakeholders in the Implementation of Flood Disaster Management Policies in Medan City" is described below, along with the informant's response from the interview. The informant's answer is presented in a resume that answers questions from each question in the interview guideline. Before presenting data on collaboration between stakeholders in flood disaster management, the researcher first presents the findings regarding policy strategies in flood management.

3.1 Policy Strategy in Flood Management

Strategy formulation, according to [24], entails establishing a vision and mission, recognizing external opportunities and threats from an agency, assessing internal strengths and weaknesses, establishing long-term objectives, launching alternative strategies, and selecting particular strategies to accomplish. Since developing a strategy is the most crucial aspect of strategy management, it needs to be done thoroughly and meticulously. Aspects of emergency and logistics, rehabilitation and reconstruction, and preparedness and prevention make up the strategy design process used to overcome floods. For the emergency and readiness components, things like socializing and providing the required information must be ready while dealing with floods. Additionally, with regard to emergency and logistics, the Medan City BPBD will ascertain the requirements of the impacted areas in order to facilitate cooperation in the execution of evacuations or the preparation of evacuation sites, ultimately culminating in the rehabilitation and reconstruction phase. Since the government and the community need to learn from past floods and understand the variables that contribute to success and failure in flood recovery, the rehabilitation and rebuilding components can be considered to reformulate the strategy for

overcoming floods. As a result, by modifying the internal and external features of the flood, the strategy will continue to be developed and implemented frequently based on field conditions.

[25] defines strategy implementation as the actualization of a planned strategy's concept. Implementing a strategy involves examining how agencies allocate resources as efficiently as possible, including budgetary constraints, infrastructure and facilities, and people resources responsible for carrying out the strategy. The residents of Medan City understand the value of education and socializing. They understand that education and socialization are done to reduce the damages brought on by floods by asking people to dispose of their trash properly or by implementing other flood prevention measures. As a result, more people are aware of the significance of preventing floods and how to deal with them. The community's actual efforts to keep things clean, particularly by refraining from littering, clearly demonstrate this increase. Thus, it can be concluded that Medan City's floods have been effectively prevented by the community and the government working together.

According to [26], the last phase of strategic management is strategy evaluation. Reviewing the internal and external elements that constitute the foundation of the present strategy, monitoring performance, and taking corrective action are the three core tasks of strategy evaluation. In order to limit flooding and prevent it as soon as possible, the community and the Medan City government must work together. In order to prevent floods from becoming an everyday occurrence, the community's various goals can be significant. One of them is a recommendation for enhancing the structures of water reservoirs. The government can take notice of this recommendation and evaluate it before deciding whether to incorporate it into the strategy.

The process of managing a strategy does not end with strategy review. However, it is a first step toward reformulating workable ways to reduce floods in Medan City. As a result, the Medan City government needs community involvement in order to reduce flooding. Additionally, the community is always able to hear and comprehend the government's instructions and appeals. In order to ensure the success of the set strategy, a variety of activities in strategy management are repeated acts.

3.2 Governance Aspect

3.2.1 Policy and Implementation

One calamity that frequently happens, particularly in locations that are vulnerable to flooding, is flooding [27]. Through several relevant agencies, the government has implemented technical measures and developed strategic policies to manage and lower the danger of floods. The researcher in this interview focuses on the actions done by the SDABMBK Service to manage water resources, the pollution control policy of the Environmental Service, and the function of the River Basin Center (BWS) in anticipating flood patterns and analyzing hydrological data. Better drainage systems, dam and embankment maintenance, and the creation of infiltration wells in urban areas are examples of technical actions done. With the use of sensors and satellites, the SDABMBK Service also uses real-time river water discharge monitoring technology. The community may get

ready for possible flooding by using the data gathered to forecast increases in water output as an early warning.

The interview's findings demonstrate that each associated agency the BWS, the Environmental Service, and the SDABMBK Service has a strategic role in mitigating flood risks using a complementary policy approach. The Environmental Service contributes to pollution control and environmental protection, the SDABMBK Service concentrates on building and maintaining flood control infrastructure, and the BWS monitors and forecasts flood patterns using hydrological data. The three authorities are doing everything in their power to safeguard the community against the risk of floods through comprehensive policy and execution, despite obstacles including industry non-compliance and financial limitations.

3.2.2 Inter-Agency Collaboration

To accomplish complicated objectives, including flood control, communities, the private sector, and different government agencies work together in interagency collaboration [28]. Because each agency has distinct tasks, responsibilities, and areas of expertise, this coordination is crucial. Together, they can enhance one another's design, execution, and assessment of policies, leading to more thorough and efficient solutions. Collaboration among agencies in flood control entails coordination in several areas, including risk prevention, drainage management, community education, and emergency response during floods. In addition to improving efficiency, this synergy fortifies each party's ability to tackle issues that frequently encompass wide-ranging domains and responsibilities. Aligning objectives, assigning responsibilities, and coming to a consensus on cooperative action are challenges encountered in this partnership. Despite frequent cross-sector discussions, it might be difficult to come to fruitful agreements because each side has distinct resources, budgetary restrictions, and points of view. This increases the possibility of competing priorities that impact flood management's efficacy and speed. Building drainage infrastructure, for instance, could take a while, yet emergency measures call for a quick reaction in the event of flooding. Long-term development initiatives, such reviving green spaces or water channels to stop the loss in groundwater absorption, frequently conflict with the need to reduce short-term dangers.

The lack of an integrated and transparent evaluation mechanism that enables each stakeholder to impartially measure the accomplishments of this collaboration was another problem that surfaced during the interview. The reporting and accountability system is poorly designed, despite consensus on accomplishment indicators like lowering flood duration and inundation. To ensure that the community can clearly perceive the outcomes of the partnership, the monitoring system that can spot roadblocks in the field and permit sporadic improvements still needs to be enhanced.

Despite its difficulties, this cross-sector cooperation is a crucial step toward Medan City's successful and long-term flood control. This collaboration needs a solid basis of collaborative governance principles, such as openness, transparency, and a dedication to

shared accountability, to function at its best. To make sure that this flood management is not only successful in the short term but also capable of producing long-term solutions that affect the welfare of the people in Medan City, it will be crucial to strengthen evaluation procedures, clearly define roles, and integrate the opinions of all parties.

3.2.3 Community Role and Participation

Particularly in metropolitan locations with high flood hazards like Medan City, the community's role and engagement in flood management are crucial and have a significant impact on the effectiveness of flood mitigation and adaptation measures [29]. The community is strategically positioned to support various government initiatives while actively participating in efforts to avoid, manage, and recover from flood catastrophes because they are the ones who experience the effects of floods firsthand. Participation in the community can take many different forms, ranging from active participation in community decision-making to preventive measures at the individual level. Raising awareness and information about the causes of flooding and self-implementable preventive measures is one of the community's primary responsibilities in flood management. A crucial first step is to educate the public on the value of keeping the environment clean, particularly in order to avoid trash obstructing waterways. This program is frequently implemented by the government or non-governmental organizations (NGOs) in a number of major cities through community training and environmental campaigns. The likelihood of drainage blockages brought on by household trash can be greatly decreased, assisting in the natural prevention of flooding, by raising public knowledge of the significance of ecologically friendly behavior.

Communities can take an active role by putting basic preventive measures into place in their surroundings in addition to increasing awareness. Effective waste management, such as sorting and recycling organic waste, is one way to do this. As part of initiatives to improve groundwater absorption, communities can also grow plants around their residences or public spaces, particularly in places with little green space. As the rainy season draws near, communities can also voluntarily maintain nearby water channels, clean gutters, or drains. At the local level, these easy actions can make a big difference in flood avoidance.

Communities can also help flood mitigation efforts by forming alliances with academic institutions and the commercial sector. Communities can persuade the business sector to fund environmental measures or flood-resilient infrastructure by launching community projects. The most recent findings or technological advancements that promote flood mitigation techniques, including early warning systems or more effective water management, are also available to communities that collaborate with academia or educational institutions.

Strong collaboration between the community and the government is necessary for Medan City's flood management to be successful. The community plays a significant role in keeping the environment clean, taking part in preparedness training, and actively

participating in policy discussions and monitoring, while the government, through affiliated agencies, is in charge of providing proper infrastructure, education, and training. It is anticipated that inclusive, open, and long-term cooperation will improve Medan City's flood management policies and initiatives and make the community more flood-resistant.

3.3 Distributive Accountability Aspect

In flood management, the Distributive Accountability component highlights how crucial it is for all parties government, communities, non-governmental organizations (NGOs), the private sector, and individuals to fairly and effectively share accountability and responsibilities. Each participant in this situation has a distinct and quantifiable responsibility to play in ensuring that flood management is implemented more successfully and on schedule. Among the essential components of distributive accountability are: 1) The role and accountability of NGOs and local communities; 2) Community participation and responsibility; 3) The private sector and social responsibility; 4) Transparency and Reporting; 5) Transparency and Reporting; and 6) Joint Monitoring and Evaluation. In general, distributive accountability in flood management refers to making sure that everyone is held accountable to one another and works together harmoniously to attain the best outcomes. In this manner, each participant can be held responsible for their role in lowering the risk of flooding in addition to having clear tasks. With this concept, the government and a more resilient community may work together to prepare for future flood disasters [30].

3.4 Transparency and Accountability

All things considered, this interview demonstrates that cooperation amongst Medan City's flood management stakeholders has produced favorable outcomes. The implementation of collaborative governance values, including accountability, openness, and stakeholder coordination, has started, according to all parties. From the SDABMBK Service's infrastructure development to the Environmental Service's environmental management to BPBD's emergency response, each partner in this partnership has a distinct responsibility to play. This partnership is more successful because of the use of the trust principle, clear work division, and strong commitment. But there are still issues, particularly with field coordination and public information dissemination. The government should do more to make information easily accessible, according to some locals, who believe that access to information is still restricted. Additionally, field coordination still has to be strengthened, particularly to ensure that operational level activities align with the planned plans. It is anticipated that by enhancing these areas, flood control in Medan City will be more successful and that the community as a whole will benefit more.

Interviews make it very evident that everyone must be dedicated to and cooperative in flood mitigation measures. It is envisaged that Medan City's flood management will become more optimal with transparency, effective coordination, and ongoing assessment, reducing the effects on locals and eventually building a more secure and resilient environment.

3.5 Distribution and Justice Assistance

In flood management, distributing aid fairly is essential to ensuring a fair recovery and fostering public confidence in the government. Communities are affected by flood catastrophes in a number of ways, including health risks, property loss, and housing damage. As a result, for recovery to be inclusive and successful, aid must be distributed specifically to all parties involved. According to the fairness principle, aid is distributed depending on the needs of each impacted citizen rather than on a fixed sum for everyone. In this instance, fairness entails allocating support proportionately based on the degree of vulnerability and impact encountered, rather than merely splitting equally. Families who lose their houses, for instance, require greater help than those who simply sustain minor damage. Due to their constraints in responding to disasters, vulnerable groups such as the elderly, children, and families facing financial hardships are also given precedence when it comes to relief distribution.

Based on the results of the interviews, it is evident that even though the government has made an effort to ensure a fair distribution of help by giving priority to vulnerable groups and collaborating with local communities, the optimal distribution process is nevertheless impacted by logistical difficulties and roadblocks in the field. Disparities are still seen by some locals, particularly in regards to the quantity and speed of assistance in particular places. In order to make aid distribution more efficient and equitable in the future, it is anticipated that efforts to improve coordination and transparency amongst institutions will continue to advance.

3.6 Collaborative Action

This endeavor was executed with a thorough and cooperative approach, engaging several parties, including BPBD, SDABMBK Service, DLH, River Region Office, and the local community, according to the findings of informant interviews. There are two primary phases to the flood control program's design: short-term and long-term. While the long term involves building more infrastructure, such as reservoirs and canals, to control water discharge and plans to install automatic water level monitoring equipment, the short term is on river normalization and drainage cleaning in susceptible locations. To determine the elements that help and hinder this program, a SWOT analysis was carried out. Community involvement is very important in its execution, particularly when it comes to keeping the drainage system and surrounding area clean to avoid clogs. The efficiency of this initiative may be hampered by ongoing issues, such as financial limitations and the habit of some individuals who continue to litter.

Regarding funding, the Medan City Budget, central government monies, and private sector assistance are used to support this program. A more thorough and long-lasting program execution is made possible by these funding. The community also showed support for the program, but they wished for more education on the value of keeping the area clean to avoid flooding. Overall, Medan City's flood management program showed a dedication to sustainability and innovation and garnered positive support from a range of stakeholders. Despite financial obstacles and behavioral shifts in the community, the dedication to cross-sector cooperation is anticipated to have a long-term beneficial effect on flood control in this city.

3.7 Impact and Adaptation

Overall, the different actors engaged responded favorably to the outcomes of Medan City's flood mitigation initiative. Despite several obstacles, including financial limitations and waste issues, the majority of stakeholders believed that the program had significantly lessened the effects of floods in places that were already at risk. Although the community still hopes that the government will clean the channels more frequently and address places that are still vulnerable to flooding, they also felt the benefits of better drainage and water channels. In order for this initiative to function more efficiently, they hope that community involvement in preserving environmental cleanliness would rise. Participants in this program, such as BPBD, Dinas SDABMBK, DLH, Balai Wilayah Sungai II, and the community, demonstrated a strong dedication to enhancing program execution and upholding sustainability. By including more stakeholders from the public and commercial sectors, they intend to expand the program's execution to places that are still vulnerable to flooding and raise its funding.

The flood mitigation initiative in Medan City has significantly reduced the risk of flooding, despite ongoing implementation challenges, according to the findings of interviews with the many actors involved. Particularly in regions that were formerly often impacted by flooding, actions including river normalization, drainage restoration, and water channel cleaning have had favorable outcomes. Nevertheless, this program's effectiveness has not yet been fully dispersed, and certain sectors still need attention. It is envisaged that this program would continue to be enhanced and expanded by taking into account feedback from different parties, resulting in a flood mitigation system that is more long-term advantageous for Medan City's residents and more sustainable.

4 Conclusion

This study emphasizes how crucial stakeholder cooperation is to Medan City's flood disaster management. According to this study's strategic management analysis, the strategy development emphasizes socialization and education to raise public awareness and comprehension of environmental cleanliness in order to minimize flooding. In order to restore damaged structures and give residents of Medan City who have been impacted by flooding peace and comfort, implementation also emphasizes rehabilitation and reconstruction efforts. In order to enhance public awareness of the significance of flood prevention and management, the government has asked the public to be willing to evacuate and to participate in socialization and education initiatives as part of the strategy evaluation.

Additionally, this study's section on stakeholder collaboration comes to the conclusion that cross-sector collaboration between the public, commercial, and community sectors is crucial to Medan City's flood control. Numerous mitigation initiatives, including drainage system enhancement, river normalization, and cleaning campaigns, have been successful in lowering the frequency and severity of flooding, particularly in areas that are susceptible, according to the application of the collaborative governance model.

Although policies and infrastructure have been put in place, their efficacy still differs from one location to another because of issues with funding, interagency collaboration, and community involvement that still require improvement. Additionally, the community has expressed gratitude for the government's efforts to establish accountability and openness in the flood program's implementation, citing improvements in environmental welfare in a number of sectors. In order to preserve the program's efficacy and the necessity of prompt action in areas that have not yet been fully addressed, the community still wishes for continual evaluation.

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Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

1. Wiro Oktavius Ginting has contributed ideas, concepts, frameworks, and research ideas.
2. Muhammad Arifin Nasution for describing social facts and literature facts, and generalising research findings.
3. Februati Trimurni has collected various policy documents and research literature.
4. Simson Ginting has conducted observations and is responsible for grammar and social academic analysis.

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Conflict of Interest

The authors have no conflicts of interest to declare.