

# Empowerment of Civil Society and the Army in Collaborative Innovation for Emergency Bridge Construction Due to Flash Floods in Bima NTB

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## Abstract

*This article aims to analyse the empowerment of civil society and the Indonesian Army in collaborative innovation for the construction of an emergency bridge due to flash floods in Bima Regency, West Nusa Tenggara (NTB), in 2021. The flash flood had destroyed the bridge, which was the connecting access to the district market as the center of the community's local economy. The soft systems methodology (SSM) approach analyzed the complex situation involving various human activity systems in the bridge construction collaboration. The analysis results show the need for collaborative innovation between the Provincial and District Governments, Non-Government, the Indonesian National Army (TNI), the Indonesian National Police (Polri), and civil society. Especially in disaster emergency conditions, the choice of Ultra-Wide Acrow Panel Bridge technology proposed bottom-up by the NTB Provincial Government and the Military Resort Command (Korem) 162/Wira Bhakti NTB proved to be faster, more practical and more robust than the Bailey Bridge technology by the Ministry of Public Works and Public Housing of the Republic of Indonesia (Kemen PUPR RI). This collaborative innovation restored road connectivity and the local economy and improved the quality of public services in Bima District. The contribution of this article is to provide enrichment about learning collaborative innovation in disaster management efforts and bottom-up infrastructure development in disaster situations.*

**Keywords:** Flash Floods, Policy Implementation, Collaborative Innovation, Public Policy, Soft Systems Methodology, Civil Society Empowerment.

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## A. INTRODUCTION

Floods always occur every rainy season in various regions in Indonesia. Every year, rainfall is getting higher; this is because more and more forests are being destroyed to become agricultural land (Syarifuddin et al., 2022). Another cause is rapid global climate change, which has increased natural disasters due to the increase in relatively high annual rainfall (Rostati & Haryanto, 2021).

Flash floods are one of the most dangerous weather-related natural disasters in the world (Knocke & Kolivras, 2007). According to North et al. (North et al., 2014), flash floods are flood events in which the rise in water occurs during or within hours of the rainfall that caused the rise. In addition to high rainfall, flash floods occur in areas that are unable to absorb all the water that falls; they can also be caused by landslides, broken dams or embankments (Vigdor, 2021). Flash floods can cause damage to infrastructure, such as houses, bridges, roads and other facilities. People

can lose their lives and property and have a negative impact on life, especially in the affected areas. The high speed and destructive power of flash floods can make them extremely dangerous and difficult to avoid or anticipate by residents in an affected area (Aditya, 2021). This article aims to analyze the empowerment of civil society and the Army in collaborative innovation for the construction of an emergency bridge of the Ultra-Wide Acrow Panel type due to flash floods in Bima Regency NTB, which occurred in April 2021 (Zakaria, 2021). Community empowerment itself is a multifaceted meaning and its application in various activities, ranging from the development of development policies involving PKK mothers, the world of education, improving the village economy, and so on (Ekowati et al., 2021; Holikman & Susilawati, 2020; Istiqomah et al., 2022; Restapaty et al., 2021; Syahyuti, 2007).



### Figure 1. Flash Flood Disaster Map of Bima Regency

Source: Korem 162/Wira Bhakti NTB (162/WB, 2021a)

Figure 1 shows the flash flood disaster map as a result of extreme weather caused by continuous high-intensity rain for 9 hours so that the Pela Parado Dam overflowed, submerging 56 villages in 6 sub-districts (BPBD et al., 2021). This flash flood caused 9,415 households (28,208 people) to lose their homes (9,563 units), and three bridges were severely damaged, namely the Rade, Woro, and Campa Village bridges (Syarifudin, 2021).

In overcoming the flash flood disaster that occurred, the Governor of West Nusa Tenggara (NTB) and the Regent of Bima Regency NTB established the emergency response status for handling flash floods in the Bima Regency area in 2021 through Decree Number 188.45/131/06.23 of 2021. In addition, the Governor of West

Nusa Tenggara appointed the Commander of Military Resort Command 162/Wira Bhakti (from now on Korem 162/WB) as the Disaster Emergency Response Commander. Based on this decree, Korem 162/WB and BPBD NTB conducted cross-sector coordination with related agencies to evacuate and rescue victims, record a number of damaged infrastructure, and conduct a rapid assessment. The Commander of Korem 162/WB NTB submitted a report to the Chief of Staff of the Army (KASAD) on the need to install emergency bridges for 3 points in Bima Regency, namely: 33 m Rade Village bridge, 10 m Woro Village bridge, and 10 m Campa Village bridge (Abidin, 2021). Figure 2 shows three bridges that were severely damaged by flash floods in Bima District in 2021.



**Figure 2. Map of Damaged Bridges Caused by Flash Floods**

Source: Korem 162/Wira Bhakti NTB (162/WB, 2021a)

Furthermore, KASAD assigned the Construction Zeni Battalion (Yonzikon) 13, Construction Zeni Regiment (Menzikon), Army Zeni Center (Pusziad) through Order number Sprin/1276/IV/2021, to carry out the task of assisting in the handling of natural disasters in the West Nusa Tenggara Province area. Yonzikon 13 is a unit under the control of Menzikon, Pusziad and is based at Srengseng Sawah, Jagakarsa, South Jakarta. The Yonzikon 13 unit is a Combat Support Unit with the main task of organizing a Zeni Support Unit in the field of construction. It is part of the TNI Disaster Management Rapid Response Force. Yonzikon 13 has experience in tasks in the field of humanitarian assistance and disaster management. Based on this assignment, 51 personnel from Yonzikon 13 Menzikon Pusziad TNI AD departed from Jakarta to NTB Bima Regency carrying b materials and other light construction equipment. In accordance with the orders given, Yonzikon 13 soldiers worked on repairs at 3 points of bridges that were severely damaged, namely at the Rade bridge,

Woro Bridge, and campa bridge, with must be completed in no more than 14 days (2 weeks of work).



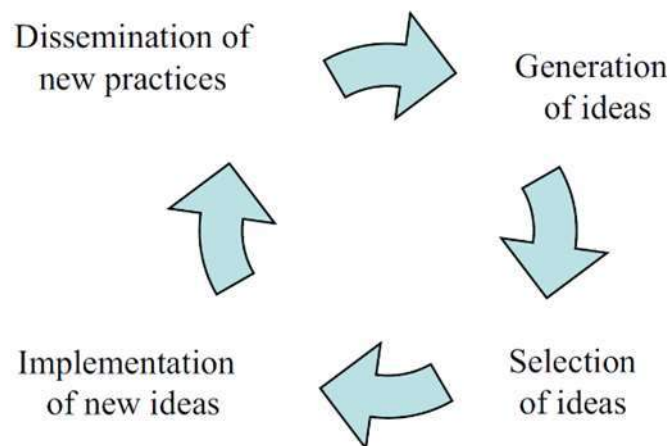
**Figure 3. Commander of Korem 162/Wira Bhakti's Direction on Bridge Construction**

Source: Korem 162/Wira Bhakti NTB (162/WB, 2021a)

Figure 3 shows the policy direction of the Commander of Korem 162/Wira Bhakti in Bridge Construction for this bridge repair work using an Ultra-Wide Acrow Panel emergency bridge, which in its implementation must be done quickly because the bridge is the main access connecting one village to another. When the bridge was cut off, the affected community became isolated, with no other access to the village on the other side of the bridge. This article analyzes the Innovation of collaboration between civilians and Soldiers of Yonzikon 13 TNI D with support from the Police, the West Nusa Tenggara National Road Implementation Center of the Ministry of PUPR, the private sector (partners, suppliers, etc.), civil society (survivors, and NGOs) and so on in building bridges that were severely damaged due to the impact of flash floods in Bima Regency. This study uses the collaboration innovation theory as a problem solver, where Innovation means opening the cycle to a diversity of actors across the hierarchy and boundaries of government organizations by leveraging extensive assets inside and outside the organization, but also leveraging internal assets (see Figure 4).

With this collaboration, innovation cycles can cross internal and external boundaries to find common ground, seek appropriate resources and expertise, and design solutions that are innovative and lead to programs inside and outside government (Sørensen & Torfing, 2011). Nambisan (Nambisan, 2008) adds that collaborative Innovation also relies on leveraging the resources and creativity of external organizations and communities (citizens and the private sector) (Nambisan, 2008). Figure 3 shows the innovation cycle from Sørensen & Torfing's article (Sørensen

& Torfing, 2011) entitled Enhancing Collaborative Innovation in the Public Sector through the following four stages



**Figure 4: Innovation Cycle**

Source: Sørensen & Torfing (2011)

The first stage in the innovation cycle is the Generation of ideas. This involves developing, presenting and cross-fertilizing ideas, but idea generation presupposes identifying problems and opportunities, clarifying relevant goals and values, and questioning long-held assumptions. The second stage is Selection of ideas. This involves deciding which ideas are worth pursuing. Ideally, the idea should be big, bold, transformative, feasible, flexible and widely accepted by stakeholders. Negotiation, compromise formation and conflict resolution are, therefore, key features in idea selection. The third stage is the Implementation of new ideas. This involves turning ideas into new procedures, practices, and services. Changing existing patterns of behavior is a difficult task that requires leadership, building ownership and creating positive incentives. Since many things can go wrong in the implementation stage, public innovators should be prepared for uncertainty, unforeseen problems and temporary setbacks. Finally, the fourth stage is the Dissemination of new practices. This involves spreading the innovation across the organization or from one organization to another. Spreading innovative practices requires highlighting the gains made by first movers, establishing contact with potential followers, overcoming standard objections such as "we do not need the change" and "it was not invented here", and adopting innovative concepts for new and different situations. The four phases do not always proceed sequentially but are often reordered, combined, mutually integrated, and repeated in and through a complex series of feedback loops (Andrew et al., 2008). Finally, the fourth stage is the Dissemination of new practices. This stage involves spreading innovations throughout the organization or from one organization to another. The spread of innovative practices requires highlighting the gains made by first movers, establishing contact with potential followers, overcoming standard objections such as "we do not need the change" and "it is not found here," and adopting innovative concepts for new and different situations (Berkhout et al., 2006). The four phases do

not necessarily follow each other sequentially but are often reordered, combined, integrated, and repeated in and through complex feedback loops. However, they are key components in the complex, nonlinear and often messy process of innovation (Rowan Gilmore, 2009).

## **B. METHODS**

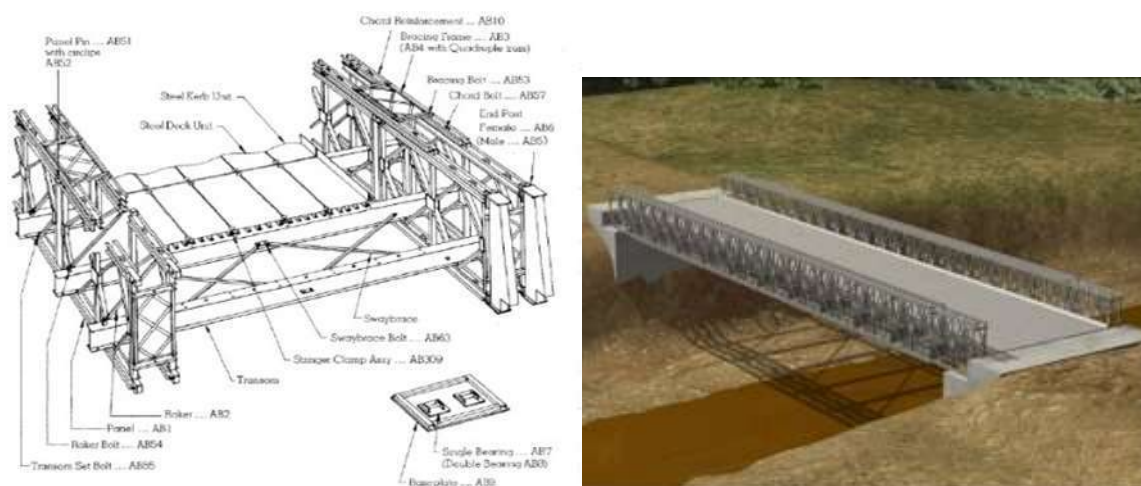
SSM aims to analyze the empowerment of civil society and the Army in collaborative innovation for the construction of an emergency bridge type Ultra Wide Acrow Panel due to flash floods in Bima Regency NTB. SSM, according to Checkland (2020; 2000; 2006, 2007, 2010; 1999), is an organized way to deal with perceptions of action-oriented (social) problem situations, which organizes thinking about certain situations so that corrective action can be taken (Budiarso et al., 2021, 2022a; Devi et al., 2023; Muhammaditya et al., 2022).

This method is appropriate to answer the complexity of the problematic situation faced in this research, where field conditions are never static and also contain many perceptions that interact with each other (Reynolds & Holwell, 2020). Each individual involved, whether as a policy actor, implementer, or policy beneficiary (target group), has a different perspective. To provide more context and understand how SSM supports exploratory learning and problem-solving, real cases will be used to validate the proposed methodology (Suryaatmaja et al., 2020). Data and information in this study were collected from three data sources, as conducted by Chandra et al. (2019) and Suryaatmaja et al. (2020): documentation or literature study, in-depth interviews, and direct observation.

## **C. RESULTS AND DISCUSSION**

Bima Regency suffered damage, especially bridges, due to a natural disaster that occurred in April 2021 (162/WB, 2021b). In handling this disaster, especially for the construction of an emergency bridge, the SSM approach is used, which has provided exploratory learning in problem-solving according to the stages of the SSM stages. (Suryaatmaja et al., 2020).

The Zeni Unit has the main task of facilitating the advance of friendly troops, inhibiting the advance of enemy troops as long as possible and ensuring the survival of friendly troops (Zeni, 2003), one of which is the special ability to install the Ultra-Wide Acrow Panel Bridge. According to the Acrow Panel Bridge Guidebook, this bridge is actually a military tactical bridge that functions to cross materials and logistical support (TNI Acrow Panel (Ultra-Wide) Bridge Guidelines, 2018). This bridge has a large carrying capacity, and the installation is very practical. In addition, it can be used to assist local governments in emergency natural disaster management (Knocke & Kolivras, 2007); according to Law Number 34 of 2004 concerning the Indonesian National Army Article 7 paragraph 2 letter b that 14 (fourteen) main tasks of the TNI in Military Operations Other than War (OMSP), namely assisting government duties in the regions (number 9) and helping to cope with the effects of natural disasters, refugees, and providing humanitarian assistance (number 12).



**Figure 5. Ultra-Wide Acrow Panel Bridge**

Source: TNI Acrow Panel (Ultra-Wide) Bridge Guidelines (2018)

## The First Stage of the Innovation Cycle: Generation of Ideas

### Stage One-Situation Considered Problematic (Unstructured Situation)

The impact of the natural disaster that occurred in Bima Regency on April 2, 2021, which caused several district roads to be damaged. This has a negative impact on the sustainability of roads in Bima, considering the importance of roads in the economic and social wheels there. (162/WB, 2021b)



**Figure 6. Civil Society Empowerment with the Indonesian Army in collaborative innovation of Ultra-Wide Acrow Panel bridge construction**

Source: Korem 162/Wira Bhakti NTB (162/WB, 2021a)

According to data from Korem 162/ Wira Bakti, the total length of the district road network in Bima Regency reaches 831.6 km. However, more than 60% of the district road segments in Bima are damaged, including severe damage. This includes damage to the Rade, Woro and Campa bridges. Meanwhile, only 285 km of roads are still in good condition. (Sulistiawati, Juliadin, & Nasrudin, 2021). Based on the results of interviews with officers from Korem 162 / Wira Bakti, an optimal solution is needed to repair damaged roads and bridges in a short time. The existence of road infrastructure is not only expected to attract and facilitate investment in an area but, more importantly, as part of the fulfillment of community rights that must be

guaranteed by the government and local governments as executors of state duties. Road infrastructure has a strategic role in achieving development goals, such as accommodating equitable development distribution, supporting economic growth, and realizing social justice (Sulistiawati et al., 2021). By considering transparency, participation, and collaboration, it is necessary to consider the right strategy for good bridge development governance (Chen, 2017), one of which is through civil society empowerment in public policy development (Coy et al., 2021; Ruiz Romero, 2012).

### **Stage Two-Problem Situation Expressed**

From the explanation that has been described in stage one, the author compiled a picture that visualizes thoughts related to situation analysis, starting from the main problems, relationships, and organizations in a rich picture (see Figure 7). To capture and analyze actors, structures, perspectives, processes and constraints or potential problems. (Reynolds & Holwell, 2020; Mingers, 2000; Budiarmo et al., 2022b) Based on the RP results, the research problem obtained is the need to build emergency bridge construction governance.

### **The Second Stage of the Innovation Cycle is: Selection of Ideas**

#### **Stage Three-Root Definitions of Relevant Systems**

At this stage, we create Root Definitions based on the concept of purposeful activity models in a thinking system. The two stages in systems thinking are developing RD and CM. RD is a relevant system related to the research problem (Budiarmo et al., 2022b) (Reynolds & Holwell, 2020). In analyzing the Root Definition, the PQR formula is also done: do P, by Q, in order to help achieve R, where PQR answers the question: What? How, and Why" (Checkland & Poulter, 2006c). The preparation of PQR is a system established and run by Korem 162 (P) through the preparation of SOPs for the governance of the bridge construction system (Q) to be supervised by the internal Inspectorate (R).

In conducting RD analysis, researchers compiled CATWOE elements to analyze the transformation process that can be seen. There are beneficiaries or consequences of the system or transformation process. These parties include the Ministry of PUPR and the local government.

The Root Definition of this study can be described as follows: Root Definition (XYZ): X Get a comprehensive picture of the important sector of bridges in Bima with Y using a modified innovation model for Z Integrated planning from the Ministry of PUPR and the Army. The review of Customers, Actors, Transformation process, World view, Owners and Environmental constraints (CATWOE) in this Root Definition is as follows.

| <b>CATWOE</b>                                                                                            | <b>Information</b>                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CUSTOMER</b><br>(beneficiaries or consequences of the system or transformation process)               | Civil society, NTB Provincial Government, Bima NTB District Government, Korem 162/WB NTB, Kodim 1608/Bima, Polda NTB, Polres Bima NTB, BNPB, BPBD, NTB National Road Implementation Center, Ministry of PUPR, partners, suppliers, civil society, NGOs, etc. |
| <b>ACTOR</b><br>(people who carry out the transformation process)                                        | Civil society, NTB Provincial Government, Bima NTB District Government, Korem 162/WB NTB, Kodim 1608/Bima, Polda NTB, Polres Bima NTB, BNPB, BPBD, NTB National Road Implementation Center PUPR                                                              |
| <b>TRANSFORMATION</b><br>(conversion from input to output)                                               | TRANSFORMATION (conversion from input to output) From NOTHING to something: Innovation of collaboration between civil society and the Army in the construction of an Ultra-Wide Acrow Panel bridge after flash floods in Bima District NTB                   |
| <b>WELTANSCHAUUNG/ WORLD VIEW</b><br>(perspective or way of seeing that makes transformation meaningful) | Implementation of collaboration innovation between civil society and the Army                                                                                                                                                                                |
| <b>OWNER</b><br>(responsible person/group who can stop the transformation)                               | Civil society, NTB Provincial Government, Bima NTB Regency Government, Korem 162/WB NTB, Kodim 1608/Bima, Polda NTB, Polres Bima NTB, BNPB, BPBD, NTB National Road Implementation Center Ministry of PUPR                                                   |
| <b>ENVIRONMENT</b> (the environment outside the given system)                                            | Environment in encouraging innovation in collaboration between civil society and the Army in the construction of Ultra Wide Acrow Panel bridges after flash floods in Bima District NTB.                                                                     |

### The Third Stage of the Innovation Cycle is the Implementation of New Ideas

The next step is the implementation of new ideas with the following activities.

1. The government must initiate the forum: in this case, the author will place the Ministry of PUPR with the Army in the review and implementation of damaged roads/bridges.
2. Non-governmental actors must participate
3. Direct Involvement of Participatory Actors: This involvement will focus on the Ministry of PUPR and the Army. The Army, which is also a representation of the state, is one of the important elements in the construction of bridges at the location of roads that have suffered major damage.
4. Official Recognition. Organized groups that meet and discuss issues together. The Ministry of PUPR, assisted by the Army, conducted a review to build the Rade bridge in particular quickly. The construction was carried out because the Rade Bridge was a bridge that was very badly damaged, so it needed rapid construction (Novalliandy, 2021).
5. Establishment of a forum to facilitate group decision-making
6. Focus on collaboration on public policy

### **Stage Four-Building a Conceptual Model**

The conceptual model is a description of the relationship between the activities and roles of each party in an effort to achieve their respective targets. Each role has a complementary relationship, and sometimes, due to the limitation factor and the high level of need will be a source of conflict that must be resolved. The Rade Bridge, which is the focal point of this article, is a real condition that occurs due to natural disasters that affect the stability of the community there. The conception of innovation between the Ministry of PUPR and the Army illustrates that the Army provides innovations in the construction of the bridge. The role of various parties needs to be carried out optimally, starting from the PUPR ministry of the Army to the local community. The government has an important role in creating regulations and policies that can accommodate the interests of various parties. The government plays a role in realizing the rules that become the norm for the implementation of supervision in the field.

### **The Fourth Stage of the Innovation Cycle is the Dissemination of New Practices Stages Five and Six-Back in the Real World and Define the Changes to be Implemented**

To evaluate the results of the implementation of the system design that has been built, further steps are taken in the form of a comparative analysis between the objectives desired by the system and the reality that occurs in the field. Several methods can be used, including:

1. Informal method by noting the differences that arise from the results of the implementation that has been carried out: the bridge connecting Rade Village and Bolo Village, Madapangga District, Bima Regency, which was broken down due to flash floods, so that the presence of a connecting bridge can strengthen the economic veins of the residents of the two villages.
2. A formal method with the first step of establishing comparison criteria, then proceeding with the process of assessing and analyzing deviations that occur from the expected target. Army assistance by building an Ultra-Wide Acrow Panel Bridge (Novalliandy, 2021).
3. System operation steps. Create a scenario based on past events, then run the scenario on the model that has been built, and analyze the extent to which the model runs according to current conditions. Namely, seeing whether the model that has been made provides relevant solutions to the expected questions. With the construction of the bridge with the Ultra-Wide Acrow Panel concept.



**Figure 7. Inauguration of Kartika Eka Paksi Bridge in Madapangga District, Bima Regency NTB**

Source: Korem 162/Wira Bhakti NTB (162/WB, 2021a)

In the inauguration of this bridge, Danrem 162/WB Brigjen TNI Ahmad Rizal Ramdhani gave the following remarks (Cariberitanews.com, n.d.; InfoBima, 2021; Koranlensapos.com, 2021; SekilasInfoNTB, 2021): "The entire community of Dena and Bolo today attended the inauguration and thanksgiving ceremony of the Kartika Eka Paksi bridge. The bridge was named Kartika Eka Paksi, based on meetings and requests from the people of Bima, as a tribute, love and affection of the people of Bima to the Indonesian Army. Kartika Eka Paksi is a symbol of honor from the Army, that is community input". (Danrem 162/WB Brigadier General Ahmad Rizal Ramdhani).

The successful construction of this bridge shows the success of stage 4 of the innovation cycle, namely the spread of innovation throughout the organization or from one organization to another (Ansell et al., 2017; Sørensen & Torfing, 2011; Torfing, 2016).

#### **D. CONCLUSIONS**

The SSM approach applied to bridge construction in Bima through the innovation cycle theory with a seven-stage SSM approach has a number of important aspects. The success of the construction of the bridge that became the economic lifeblood of Rade Village and Bolo Village, Madapangga Sub-district, Bima District, NTB, showed proof of the collaboration innovation theory approach that the bridge construction carried out by civilians and the Army became faster, more effective and a high sense of belonging from the local community. This can be seen from the request of the local community to give the name "Kartika Eka Paksi Bridge" as a form of respect for the performance of the Army as mandated by Law Number 34 of 2004 concerning the Indonesian National Army Article 7 paragraph 2 letter b that the 14 (fourteen) main tasks of the TNI in OMSP, namely assisting government duties in the regions (number 9) and helping to cope with the consequences of natural disasters,

refugees, and providing humanitarian assistance (number 12). This study implies that other OMSP activities carried out by the TNI AD, both in disaster conditions and other activities, can be written in the form of scientific articles so that they become learning models in public policy.

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