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# Social Capital - Based Model of Institutional Collaboration for Resilience to Tidal Flood: A Case Study of Panggung Lor Village, Semarang City, Indonesia

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**Abstract:** ***The institutional collaboration practice at Panggung Lor Village, North Semarang, Indonesia was an adaptive response of the community to tidal floods. After eight years of well ran and success to stop the tidal flood in 2017, nowadays the collaboration practice has been stopped and was back off to the coordination level. The absence of a problem domain causes the collaborative action to lose context and then ceased. There is a need to develop a model of institutional collaboration based on social capital that exists in the community. This study was aimed to create an operational model of institutional collaboration that was developed from empirical practice. The research was carried out using a qualitative approach, and the primary data from interviews were analyzed using the stakeholder analysis method. The results of this research showed that the operational model of social capital - based institutional collaboration consists of five components: (i) Drivers; (ii) Initial Conditions; (iii) Process; (iv) Collective Action; and Outcomes whose operational implementation is divided into three stages: precondition, process, and outcomes.***

**Keywords:** Operational Model; Social Capital; Institutional Collaboration; Resilience; Tidal Flood

## 1. Introduction

Tidal flood has been periodically threatening for many years, particularly in the coastal area at the northern part of Semarang city. It is aggravated by sea - level rise due to climate change and land subsidence caused by over - exploitation of groundwater and a load of constructions (Harwitasari & Ast, 2011; Kreibich et al., 2017; Mahya et al., 2021). Land subsidence in the northern part of Semarang can exceed 8 cm/year or more. North Semarang is a sub - district area with the largest number of people affected by tidal flooding that is 128.110 persons. The flood causes people to live in hazardous conditions and become vulnerable to many disaster risks. The optimistic prediction of potential economic loss due to inundation and land subsidence is 28, 081 trillion IDR by 2030 (Suhelmi et al., 2014). As a whole, tidal flood undermines the people life and livelihood, and make it degraded from time to time. Therefore, people need to respond to the emerging pressures that change the state of living in certain environmental conditions by all impacts and implications. Adaptation is needed as a response to the disaster by reducing all forms of vulnerabilities and while creating resilience.

The frequently asked questions (FAQ) about adaptation are: (i) What to do to adapt dor?; (ii) In what manner is the adaptation supposed to be?; and (iii) How is the way to make an adaptive response? Adaptation can be consists of at least three domains those are: protection, behavioral change, and coping to reduce all risks both in a structural or non - structural manner. Tidal flood is a complex problem that needs a comprehensive approach and collaboration amongst all parties (Witteveen + BOSS, 2021). Collaboration as a form of behavioral change in a non - structural manner. For more than 27 years from 1994 to 2020, the community at Panggung Lor Village, Northern Semarang sub - district, Semarang city, have been collaborating to cope with the tidal flood. Collaboration is the social collective action at the communal level in society. The smallest social unit in Indonesia, and also in Semarang city is called “Rukun Tetangga (RT) ”, the neighborhood of people on the site. The second bigger social unit in the village is called “Rukun Warga (RW) ”, the neighborhood of people who live at the site which is larger and farther than the RT’s site. Panggung Lor Village consists of 14 RW, and each RW contains many RTs. Formerly, the collaborative action covered three RWs only. It was caused by the fact that the three RWs are located at the residential site “Tanah Mas” which belongs to the private company PT. Tanah Makmur. The idea was proposed in 1994 by PT. Tanah Makmur to protect the assets and property along with the communities at the site. The common problem for collective action was the tidal flood, and the context of intervention was the same. It was a simple and single context that is at risk for getting stagnant whenever the collaborative action has been succeeded. Technically, the intervention was accomplished in two ways: (i) pumping back the tidal water to the sea; (ii) improving the drainage system; and (iii) closing the watercourse. The idea was refused by the other RWs due to their objection to the stormwater to their site because of the closure action. After a very long time (15 years from 1994 to 2010) brainstorming and negotiating, 12 RWs were agreed to take collaborative action, while the other two RWs refused.

The preliminary results of this study showed many facts: (i) the collaborative action had institutionalized as a non -

governmental organization (NGO) that is Paguyuban Pengendalian dan Penanggulangan Air Pasang Panggung Lor (P5L); (ii) at first the collaborative action was carried out by three sectors those are public sector, private sector, and the people as the third sector. They form the new form of bottom - up public – private – people partnership, where the stipulative meaning of 'people' in this context is commensurate with civil society organization (CSO). Each party played its role and function integratively. PT. Tanah Makmmur acted as the sponsor and advisor that gave its resources and expertise until 2015; (iii) The investment for the construction of 8 pump houses was financed by PT. Tanah Makmur and assistance from the government, while the operational financing is funded from community contributions; (iv) Simultaneously with the handover of residential assets to the Semarang municipality in 2015, full institutional autonomy was granted to P5L; (v) after going on for 8 years, the tidal flood had subsided totally in late 2017 at last. This is supported by the reality that Panggung Lor remained dry, while the other areas around heavily inundated when there was a huge flood on February 6th, 2021; (vi) The absence of tidal flood at Panggung Lor area since late 2017, brought up a new challenge for P5L due to the loss of its context of action. There was a needs to make the new comprehensive context of action due to maintaining institutional sustainability. The new context is "environmental management", so the acronym of P5L has been changed to be "Paguyuban Pemberdayaan Pengendalian dan Pengelolaan Lingkungan Panggung Lor". P5L will be developed into an institution with a bigger arena and scale of action than ever, but the reality is on the contrary.

Institutionally, P5L has stagnated and regressed as seen from the unclear direction of its development, as well as the reduced number of parties involved in collaborative action. After the change of leadership in 2016, private companies and non - governmental organizations are no longer involved in the collaboration. In addition, the type of leadership is no longer facilitative and transformational, but directive and authoritarian. The partnership culture is dominated by the dominant culture of the government bureaucracy due to too close P5L interaction with the city government so that its position is no longer neutral but tends to be used as a tool to make government programs successful, as well as fulfill personal interests or dominant elite groups. Preliminary research results also reveal the fact that P5L collaborative action is not designed by applying knowledge management but based on habitual practice. Therefore, P5l requires an operational model of institutional collaboration so that its sustainability can be maintained. On the other hand, there is a conflict of interest amongst participants of collaboration, where some residents in 4 RWs sued P5L to the state court demanding the disbandment of the institution. This is because they are reluctant to continue to pay dues, while the tidal flood is no longer there and pumping activities have drastically reduced. This situation reflects the reality of the strengthening of asymmetry due to the emergence of hidden agendas from dominant individuals or elite groups, as well as the weakening of cohesion and social ties that had previously succeeded in gluing and unifying participants in one agenda and collective action goals. All of these facts reflect the reality that P5L is institutionally unstable and its sustainability is threatened. Whereas, on the other hand, its past success has allowed it to scale up on a larger spatial and temporal scale in urban areas.

## 2. The Aim of the Study

This study is intended to investigate why P5L institutionally stagnates even when it has achieved success? The answers to these questions will be used to reveal the reality of what is happening, and then find solutions to the problems at hand, especially in the context of institutional collaboration. The purpose of this study is to investigate the components and elements that make up the architecture of institutional collaboration, and then design an operational model that can be implemented in the field. The significance of this operational model engineering is to develop institutional collaboration practices so that they can be applied to various problem domains and contexts at different spatial and temporal scales. The problem domain and context should not be too simple and singular, but comprehensive, such as climate change and resilience.

## 3. Problem Statements

The research is based on some identified problems that stated below:

a) Structurally, Structurally, the components and institutional elements in the P5L collaboration practice in the Panggung Lor sub - district, North Semarang are unclear, so they have not formed a systematic and structured architecture.
b) Weakening of cohesion and social ties, as well as changing patterns of relations and interactions due to the loosening of socio - cultural values that had previously succeeded in unifying the participants.
c) Several structural and non - structural obstacles hinder the development of institutional collaboration and even trigger conflicts that threaten its sustainability.
d) Institutionally, P5Lneeds a collaborative operational model with a more comprehensive holistic approach, domain, and problem context.

## 4. Research Questions

Based on the problem statements above, some research questions can be arranged are as follows:

1) How is the construction of effective components and elements that make up the institutional collaboration model?
2) What is the operational model of sustainable institutional collaboration in the context of disaster resilience?

## 5. Research Method

This study is a type II development research that aims to develop an operational model of institutional collaboration as a solution to the setbacks of collaborative practice at the Panggung Lor sub - district. The choice of type II is based on the following reasons: (i) the practice of institutional collaboration at Panggung Lor has not used a particular design or model, so a new model needs to be designed; (ii)

correct any deficiencies or weaknesses in the components and elements of the process or results; (iii) developing the implementation of collaborative practices on a wider scope with a larger scale (Richey et al., 2003). The approach in this study is qualitative, where reality is seen as something subjective, relative, plural, and specific depending on the point of view and context used.

The paradigms used are constructivism and pragmatism. The constructivism paradigm views reality as relative and can be constructed through a process of contextualization and conceptualization, while the pragmatism paradigm emphasizes the acquisition of results and practicality at the operational level (Creswell, 2014; Lewis, 2015). The strategy chosen in this research is a case study, where the selection is based on the following reasons: (i) the case is unique because it stagnates when it is successful; and (ii) the boundary between phenomenon and context is unclear or even non - existent (Yin, 2003). The study used primary and secondary data. Primary data were collected in two ways, namely interviews and field observations.14 informants were interviewed about their experiences during performing collaborative actions in the past, and the effective components and elements of collaboration also.

## 6. Theoretical Framework

The problem of tidal flooding is a pressure that evokes a response from actors, stakeholders, and affected groups. The response is in the form of intervention actions aimed at reducing vulnerability, risk, and improving the status of previously vulnerable to less vulnerable or resilient. In the perspective of the DPSIR (Driving Force - Pressure - State - Impact - Response) approach, the problem of tidal flooding becomes the driving force (D) that generates three forms of pressure (P), namely: (i) Physical pressure in the form of "changes in structure and function" from the system; (ii) Psychological pressure on a personal and communal level to create “resilience”; and (iii) Social pressures at the communal level to overcome dependence, uncertainty, and resource constraints through collaboration (Nathan & Reddy, 2008). P5L institutional collaboration practices in the past (1994 - 2015) can be highlighted as a cycle of adaptive change according to the adaptation cycle theory and panarchy from Holling & Gunderson (2002).

P5L institutional collaboration practices in the past (1994 - 2015) can be highlighted as a cycle of adaptive change according to the adaptation cycle theory and panarchy from Holling & Gunderson (2002), as illustrated in the following figure (Westerveld, 2014; Sundstrom & Allen, 2019):

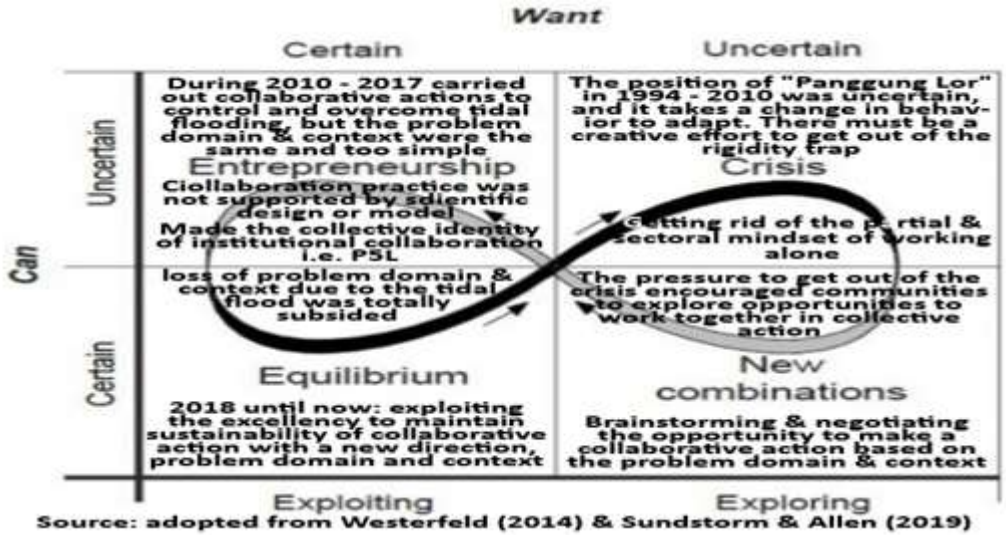


**Figure 1:** The Adaptive Cycle Changes of Collaborative Action at Panggung Lor Village, North Semarang During 1994 - 2020

From 2018 until now, the collaborative practice at Panggung Lor is in the development phase (r), where the practice can be developed so that it can be applied to a larger spatial and temporal scale, namely: the mesoscale in the sub - district of North Semarang and the macro scale in the city of Semarang. as illustrated in the following figure:

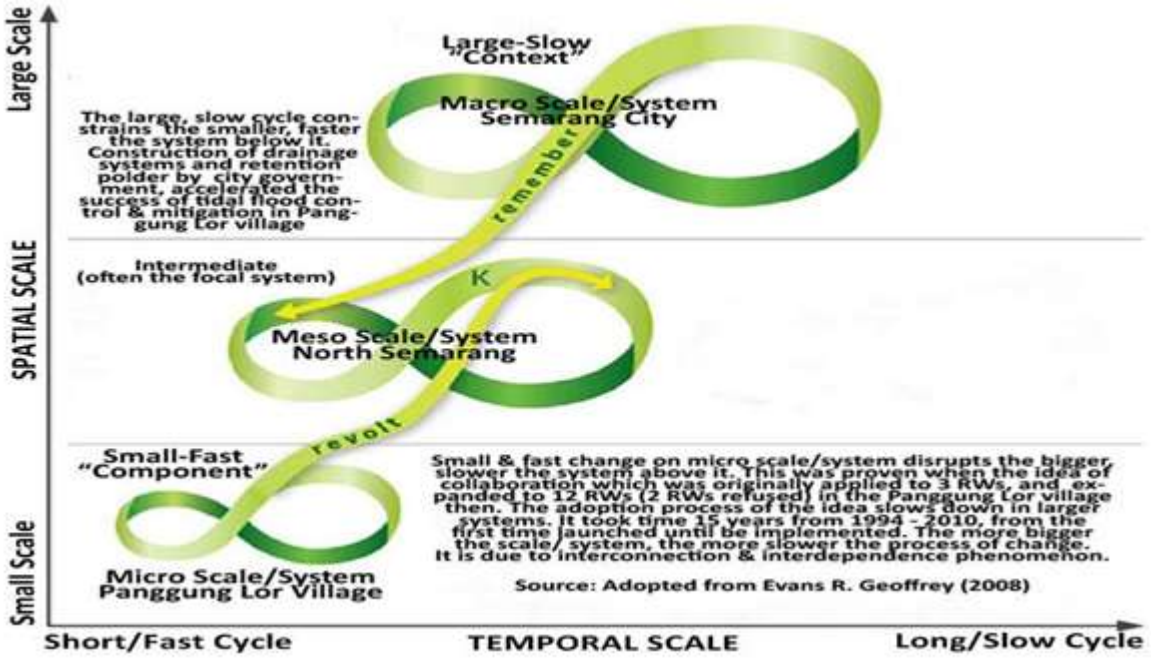


**Figure 2:** Scaling up the Collaborative Action at Panggung Lor Village into Different Spatialand Temporal Scale In the Urban Area of Semarang City

**1) The effective components and elements of the institutional collaboration model**

**a) The driver of institutional collaboration**

Problem domains, interdependence, resources, leadership, and social capital are effective elements of the components that drive institutional collaboration. The state of all elements is vital, which means it must be in the driving component. Amongst the five elements, the score of interest in the resource is the highest. Among five elements, the interest in the resource score is the highest, meaning that the resource was the key factor that participants first considered when collaborating.

**Table 1:** Recapitulation of the Mean Scores of Interview Statements

| *Component* | *Element* | *Rating* | | | | *Total* | *Status* |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | |
| **Driver** | Problem domain | A (33) | D (27) | B (23) | C (17) | 100 | Vital |
| | Interdependency | A (29) | B (26) | C (25) | D (20) | 100 | Vital |
| | Resources | A (35) | D (28) | B (22) | C (15) | 100 | Vital |
| | Leadershp | A (30) | B (28) | D (24) | C (18) | 100 | Vital |
| | Social Capital | A (34) | B (29) | C (21) | D (16) | 100 | Vital |
| **A: interest; B: usability; C: ease of use; D: utility** | | | | | | | |

Some informants stated their opinions about the driver of institutional collaboration as the following:

". . . . . collaboration is always driven by collective problems that cannot be solved alone because of their complexity. Responding to crises such as tidal flooding, it is necessary to take into account the interdependence of the available resources. Leadership is needed to initiate, direct, and facilitate the process to achieve goals. In addition, cooperation depends on the existence of social capital in the form of social networks, both for the already exist and those that must be constructed, In the Panggung Lor sub - district community in particular, and Indonesia in general, the manifestations of social capital are social institutions such as RT, RW, and PKK (Family Welfare Development), local socio - cultural values, and social ties that can be utilized to forming a new institution, namely P5L…"

**Proposition 1:**

**"Problem domains, interdependence, resources, leadership, and social capital are the effective elements of institutional collaboration which are classified as driving components in the precondition stage".**

**b) Initial Condition**

**Table 2:** Recapitulation of the Mean Score of Interview Statements

| Component | Element | Rating | | | | Total | Status |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | |
| **Initial Condition** | System Context | A (38) | C (26) | B (20) | D (16) | 100 | Vital |
| | Idea | A (41) | C (24) | B (21) | D (14) | 100 | Vital |
| | Participant | A (42) | C (25) | B (19) | D (14) | 100 | Vital |
| **A: interest; B: usability; C: ease of use; D: utility** | | | | | | | |

Based on the level of interest, the ranking of the three elements of the initial condition components respectively are participants, ideas, and system context.

The summary of the interview result about three elements of the initial condition can be described are as follows:
". . . the problem must be translated based on a certain context to be specific so that it can be described concretely with clear orientation, goals, and objectives. The context should not be singular and too simple, but comprehensive so that the action is not limited to a certain place, space, and time. The risk is that collaboration will stop or conflict will arise when the context becomes lost due to the success of collaborative action. The problem pressure elicits the idea of collaborative action that leads to a common vision, mission, and goals. The role of participants who are highly committed, having the resources, and willing to sacrifice their time, thoughts, energy and materials is necessary. . . . ".

**Proposition 2:**
The context of the system, ideas, and participants are vital elements of the initial condition components in the precondition stage that need to be maintained and developed continuously.

**c) Relation and Interaction**

**Table 3:** Recapitulation of the Mean Score of Interview Statements

| Component | Element | Rating | | | | Total | Status |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | |
| RELATION & INTERACTION | Relationship form | A (42) | C (23) | B (20) | D (15) | 100 | Vital |
| | Interaction Pattern | A (35) | B (29) | C (19) | D (17) | 100 | Vital |
| | Communication | A (30) | C (28) | B (22) | D (20) | 100 | Vital |
| A: interest; B: usability; C: ease of use; D: utility | | | | | | | |

**Proposition 3:**
Relationship form, interaction patterns, and communication are effective elements of the sub - components of non - structural processes. These three elements are the relational dimension that becomes the platform of the institutional collaboration process.

**d) Values System**

**Table 4:** Recapitulation of the Mean Score of Interview Statements

| Component | Element | Rating | | | | Total | Status |
|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | | |
| **SISTEM NILAI** | Togetherness | A (35) | B (28) | C (22) | D (15) | 100 | Vital |
| | Kinship | A (37) | C (26) | B (25) | D (22) | 100 | Essential |
| | Trust | A (40) | C (27) | B (18) | D (15) | 100 | Vital |
| | Openness | A (30) | C (28) | D (22) | D (20) | 100 | Essential |
| **A: interest; B: usability; C: ease of use; D: utility** | | | | | | | |

Togetherness and trust are two vital elements of the value system as the basis of collaborative behavior. Kinship value, although it has become a principle for society, is not necessarily used, therefore it is included in the essential category (important but if it is not used there is still a substitution). The value of openness is essential as a logical consequence of the value of trust. After the level of interest, the practical values of kinship, trust, and openness become important. If the three values are easy to put into practice, their usefulness and benefits will arise.

Several informants expressed their opinion about the value system that underlies the behavior of institutional collaboration as follows:

". . . . . Cooperation at any level requires basic values to carry it out. In the Indonesian context, these basic values include togetherness, kinship, and unity which are used as philosophical foundations. Kinship values are even used as the basis for organizing life together. At least three basic values are needed, namely: togetherness, trust, and openness to build effective cooperation. In the Panggung Lor Village, and Indonesia in general, the value system of togetherness and kinship are the two fundamental values that underlie the emergence of the other two values. If both exist, and the orientation and target are in the public interest, the value of trust and openness will immediately grow. In the context of Panggung Lor Village, the public interest is a disaster caused by the tidal flood. Cumulatively, the expression of togetherness and kinship values is seen as a socio - cultural attribute in the form of "gotong - royong". Concrete manifestations of these two values can be seen when community members work together to tackle floods, fires, volcanic eruptions, and so on. The action was formed spontaneously and did not expect anything in return, they were even willing to sacrifice their property. . . . . "

**Proposition 4:**
Togetherness and trust are vital values, while kinship and openness are essential values that become elements of the non - structural process sub - component: Value System.

**e) Structure**

**Table 5:** Recapitulation of the Mean Score of Interview Statements

| Component | Element | Rating | | | | Total | Status |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | |
| Structure | Governance | A (41) | C (26) | B (20) | C (13) | 100 | Vital |
| | Institutional | A (35) | B (24) | C (22) | D (19) | 100 | Vital |
| | Autonomy | C (31) | B (28) | C (25) | A (16) | 100 | Non Essential |
| | Framework | A (38) | B (26) | C (21) | D (14) | 100 | Vital |
| | Administration | A (33) | B (28) | C (12) | D (18) | 100 | Vital |
| | Norms | A (36) | B (25) | C (23) | D (16) | 100 | Vital |
| **A: interest; B: usability; C: ease of use; D: utility** | | | | | | | |

Governance, institutions, frameworks, administration, and norms are vital elements, while autonomy is a non - essential element of the collaboration structure. Autonomy is not always required. Governance is a complex and complicated matter so that after the value of its interest, the practical value becomes the priority. If governance is easy to practice, the value of its usability and usefulness will be optimal.

The results of interviews with some informants regarding the structural components of institutional collaboration are as follows:

". . . . . the complexity of the process, the potential for differences, conflicts, and incompatibilities in collaboration require good governance given that the risk of failure is high. There are some values and work processes that must be institutionalized and supported by group norms and good administration for effective cooperation. Autonomy is not an important factor, it is often an obstacle if you can't manage it. In practice on the collaboration at Panggung Lor, autonomy is the cause of wrong or deviant in making decisions, and the emergence of hidden agendas from individuals or groups that trigger and exacerbate conflicts and divisions. . . "

**Proposition 5:**
"Governance, institutions, frameworks, administration, and norms are effective elements of the sub - components of the structural collaboration process".

### f) Collective Action

**Table 6:** Recapitulation of the Mean Score of Interview Statements

| Component | Element | Rating | | | | Total | Status |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | |
| Collective Action | Commom goal | A (41) | B (23) | C (21) | D (15) | 100 | Vital |
| | Action Sistem | A (40) | B (22) | C (19) | D (19) | 100 | Vital |
| A: interest; B: usability; C: ease of use; D: utility | | | | | | | |

Common goals and systems of action are vital elements of the collective action component. The system of action is based on the goals that are agreed upon consensus in the decision - making process.

Some participants stated their opinion about collective action is as follows:
". . . . . the manifestation of collaboration in practice is a series of activities or actions of people who are consciously involved and participating to achieve a common goal that has been agreed upon. This common goal is the cumulative expression of previously different individual or group interests. In the socio - cultural perspective of Panggung Lor or Indonesia in general, this cumulative expression appears as an attribute called the 'public interest'. The manifestation of collective action is seen as a series of actions that are interwoven as a system and are socially institutionalized in various forms and scales. An example is a collective action for disaster management of floods, fires, volcanic eruptions, and so on…"

**Proposition 6:**
Shared goals and systems of action are vital elements of the collective action component that make up the collaboration model architecture.

### g) Outcome

**Table 7:** Recapitulation of the Mean Score of Interview Statements

| Component | Element | Rating | | | | Total | Status |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | | |
| Outcome | Collective Identity | A (37) | C (27) | B (19) | D (17) | 100 | Vital |
| | Functional Integration | A (42) | B (22) | C (21) | D (15) | 100 | Vital |
| | Resilience | A (40) | C (23) | B (20) | D (17) | 100 | Vital |
| | Institutional Agility | A (29) | C (26) | D (23) | C (22) | 100 | Essential |
| A: interest; B: usability; C: ease of use; D: utility | | | | | | | |

Function integration is a measure of the success of the structural process so that the interest score is the highest (42). Followed by resilience with a score of interest = 40 as the main result to be achieved according to the context. Resilience will become a concrete reality if the integration of collaboration functions is realized. The next important result is collective identity (score of interest = 37) as a manifestation of the process of institutionalizing collaborative action. Collective identity is necessary to gain recognition, legitimacy, forum, political and social support. All three are vital elements of the outcome component, while the element of institutional agility (score of interest = 29) is included in the essential category because agility is a by - product obtained after collective identity and function integration can be realized.

The opinions of actors and stakeholders regarding the outcome of institutional collaboration to create disaster resilience are as follows:
". . . . . the outcome of collaboration must of course be under the context of the action and the goals to be achieved. If the context of the action is resilience to eliminate tidal flooding, then 'absence of tidal flooding' can be stated as a result. On the other hand, an 'identity is needed so that collective action

can be accounted for both philosophically, juridically, and sociologically. The integration of functions is a logical consequence of the diversity of functions and participants involved in the collaboration, and over time the process of cooperation will produce an institutional skill as a by - product…"

**Proposition 7:**
Collective identity, integration of functions, resilience are vital elements of the components of collaboration with the context of resilience, while institutional agility is an essential element.

Based on seven propositions regarding the components and elements of effective institutional collaboration designed according to the stages, systematics, and functional hierarchies, the architecture of institutional collaboration can be formulated as follows:

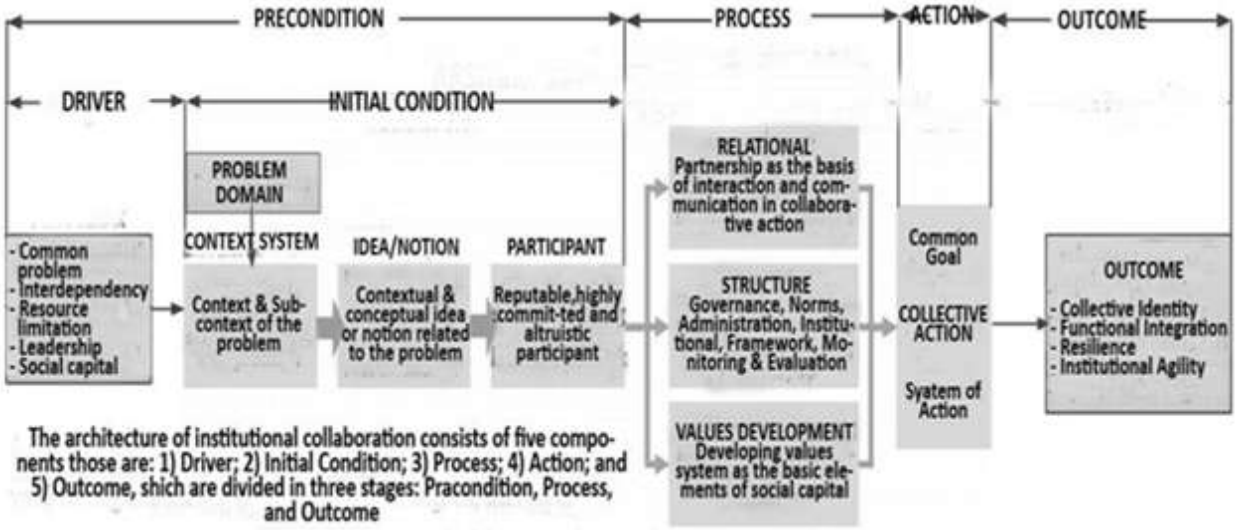


**Figure 3:** The Architecture of Institutional Collaboration

Institutional collaboration architecture is a set of effective components and elements that are contained in a unified system of actions and arranged systematically and hierarchically based on their functional priorities to form a basic structure that becomes a platform for various types and models of collaboration. Model is a form of application of architecture to meet the interests, objectives in special situations and conditions. The model automatically contains the architecture that is the foundation. There are three types of institutional collaboration models according to the special conditions that accompany them, namely sharing, specialization, and allocation types. The basic/primary model of institutional collaboration that is practiced in the Panggung Lor Village is the sharing - type primary model. This is due to the operation of the elements of the value system, namely togetherness and kinship originating from collectivism. In the communities of Panggung Lor and Indonesia in general, which have a collectivist pattern, the public interest is above personal interests, and the collective pressure in the form of the tidal flood disaster will be distributed personally to all members of the community.

### 2) The Operational Model of Institutional Collaboration

The institutional collaboration architecture, as illustrated in Figure 3, can be developed into an operational model by establishing a comprehensive problem domain and context, and conceptualizing aspects of emergent elements. The problem domain was expanded from the original tidal flood to climate change. while the context is expanded from the original tidal flood to resilience. The development effort was based on the idea of designing an operational model that was developed from the empirical practice of institutional collaboration at Panggung Lor. The aim is that the model can be applied to various problems and contexts, at various spatial and temporal scales.

The conceptual framework that is used as the basis for model development efforts is as follows:

**Table 8:** Framework for Operational Model Development

| Element | Existing | Development |
|---|---|---|
| Problem domain | Tidal flood | Climate change |
| Context | Tidal flood | Resilience |
| Sub - context | - | 7 sub - context |
| Idea | Uncontextual &unconceptual | Contextual & Conceptual |
| Engagement | Two sectors only | Three sectors |
| Leadership | Authoritarian & transactional | Facilitative & trandormational |
| Participation | Two bottom lines | Three bottom lines |
| Social Capital | Values weakening | Values reinforcement |
| Governance | Bad governance | Good governance |

| | | |
|---|---|---|
| Conflict resolution | Win – Loose Solution, Litigation | Win - Win Solution, Non - litigation |
| Asymmetry | Strengthened | Reduced or minimized |
| Hidden agenda | Increasing | Decreased or minimized |
| Trust | Decreased | Increase |
| Opportunistic behavior | Strengthened | Weakened |
| Surveillance | Weak | Strong |
| Common goal | Unclear & ambiguous | Clear and focused |
| System of action | Unsystematic & unstructured | Systematic & structured |
| Function Integration | Low integration | Highly integrated |
| Resilience | Partial, technical only | Techno - Socio - Ecologically |
| Institutional Agility | Low | High |
| Design or model | No | Yes |
| Framework | No | Yes |

Based on the development framework as described in table 8, the operational model of institutional collaboration is formulated as follows

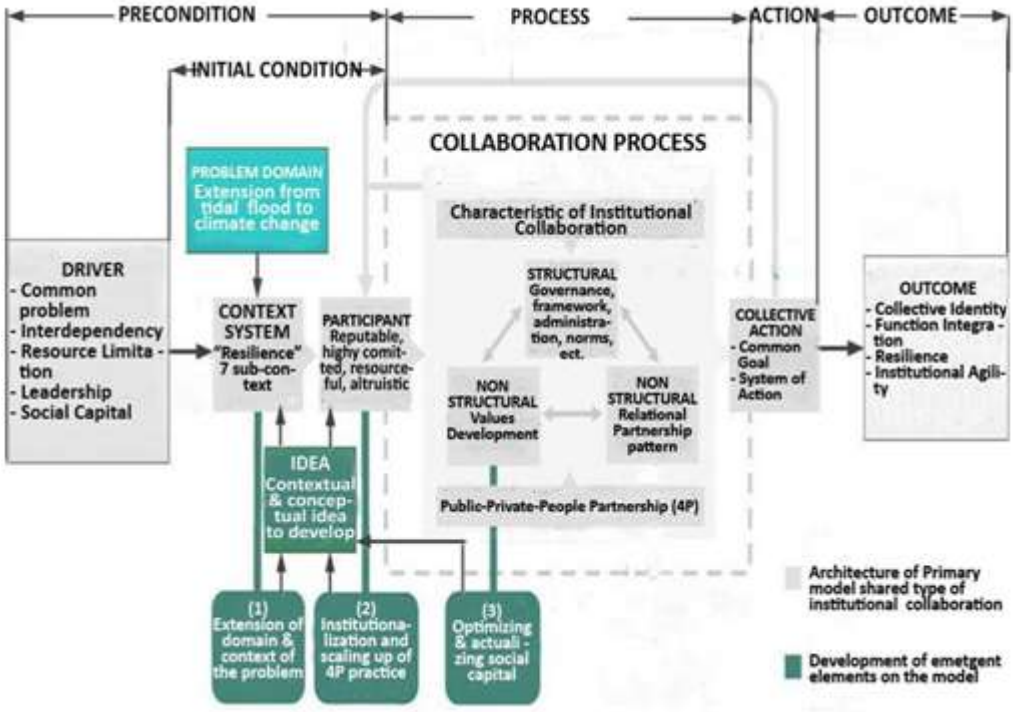


**Figure 4:** The Operational Model of Social Capital Based Institutional Collaboration

## 7. Discussion

The tidal flood disaster is a pressure that creates vulnerability to some risks of infrastructure damage, ecosystem degradation, people's lives, and livelihoods disruption. These pressures generate a mitigation and adaptation response that is carried out through risk management efforts. Mitigation aims to mitigate or reduce the impact, while adaptation is an effort to adjust to changes in external conditions. The risk management process covers at least three key aspects, namely: (i) Protection against structural and functional damage; (ii) Behavior change, one of which is institutional collaboration; and (iii) Coping. Coping aims to reduce risk and vulnerability, and thus at the same time create resilience. The complexity of the flood disaster problem does not allow it to be handled alone but must collaborate with all parties involved. The approach also cannot be partial and sectoral, but holistic and integrated.

In the context of the Panggung Lor Village, the category of tidal flooding has reached the level of disaster so that the status of the area in 1994 was in a state of crisis. Referring to Holling's adaptive cycle, the Panggung Lor situation is in phase K (Conservation), where there are more individual or communal resources that can be used without cooperation. In addition, the condition of society is trapped in a rigidity trap so that it becomes conservative. The only way of thinking that exists is to protect each other's assets and property in dealing with disasters.

The condition of interdependence and limited resources has pushed the Panggung Lor community into the Ω (release) phase. That is, making creative destructive efforts to release the old - fashioned mindset and replace it with a creative mindset. The mindset of working alone is partially and sectorally replaced with a holistic and integrated collaboration mindset. The creative destruction effort, which began in 1994, yielded results in 2010 with the establishment of a P5L collaboration institution to control and cope with tidal flooding. P5L is the result of the creative destruction process in the omega phase that brought the Panggung Lor community into the α (reorganization) phase.

In practice, the reorganized functions are (i) pumping tidal floodwater back into the sea; (ii) improvement of the drainage system; (iii) collection of stormwater in retention polders; and (iv) social relations and interactions within the framework of collaboration. The 8 - year reorganization process from 2010 to the end of 2017 gave the following results: (i) integration of functions of pumping, drainage, water retention, inter - agency relations & interactions; (ii) technical resilience to tidal flooding as evidenced by the absence of tidal flooding since the end of 2017, and institutional agility even at a minimal level.

The success of the reorganization process in the phase led P5L to the r (growth) phase. P5L and the Panggung Lor community are currently in a situation of choice, whether to stop because they have succeeded or continue the collaborative practice. At this point, P5L faces new problems and challenges related to the development and sustainability of collaboration. This happens because the collaboration that has been carried out so far does not use a knowledge - based design or engineering model and is not based on a certain conceptual framework. As a consequence, P5L faces pressures of conflict and division that threaten its sustainability. On the other hand, the portfolio of successful P5L collaborative practices is used as lessons learned by various parties and has begun to be applied on a larger spatial scale, namely in the North Semarang sub - district.

Regarding to the operational designed model through this study, it can be be applied as a solution to the problems faced by P5L at this time.

## 8. Conclusion

The operational model of social capital - based institutional collaboration consists of five components: (i) Drivers; (ii) Initial Conditions; (iii) Process; (iv) Collective Action; and Outcomes where the operational implementation is divided into three stages: precondition, process, and outcome

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