

## HEXA HELIX: STAKEHOLDER MODEL IN THE MANAGEMENT OF FLOODPLAIN OF LAKE TEMPE



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### Abstract

The main problem in the management of the floodplain of Lake Tempe is the weak involvement of affected communities in disaster management. The purpose of this research is to comprehensively analyze and map stakeholders in managing floodplain. The penta helix concept is used in stakeholder mapping. This research applied mixed methods, qualitative and quantitative. Data collection was done through in-depth interviews with various parties who understand the problem of research and direct observation "pre", "whilst", and "post" a disaster occurred. Affected communities are found to be an important part of the disaster management stage. Affected communities, who have been the object of disaster, should be the subject of disaster management. The recommendation for the results of this research is that the concept of five stakeholders in penta helix was not sufficient in disaster management. Affected communities deserve to be placed as one of the stakeholders, in addition to the government, business world, universities, NGOs, mass media. This six-stakeholder concept is called "hexa helix".

## 1. Introduction

Indonesia is a disaster-prone country, because it faces disasters either at any time or in a certain time. Disaster management must be handled in an integrated, holistic and comprehensive manner. Overcoming the problem of disaster various parties have been involved, but the important role of the state cannot be ignored. The Preamble to the 1945 Constitution of the Republic of Indonesia mandates that the government must be the main party in charge of disaster management. The implementation of the mandate is that the government together with the House of Representatives of the Republic of Indonesia (DPR RI) in 2007 established the Law of the Republic of Indonesia Number 24 of 2007 concerning Disaster Management as a legal basis for the implementation of disaster management.

The Disaster Management Law regulates responsibilities based on values, institutions and the distribution of authority. Although the implementation of disaster management has been regulated by law and its implementing regulations, there are still many issues that need to be reviewed, related to harmony to the role of stakeholders.

The research of stakeholders came from management and business administration studies (Brugha and Varvasovszky, 2000), this research developed and was applied in broader scientific studies, such as in political science, public policy, development studies and environmental studies. The concept and understanding of stakeholders depend on the academic interests

or perceptions of the scientists who research them (Billgren and Holme, 2008). The researchers clarified their views in line with their beliefs and positions about who can be seen as stakeholders so that there is no bias in identifying stakeholders (Stoney and Winstanley, 2001). The opinion of Christopher Stoney and Diana Winstanley regarding the definition and concept of stakeholders is very dependent on the viewpoint of the researcher.

Freeman stated that stakeholders are a group of people or individuals who influence each other and are influenced by the achievement of certain goals of the organization (Freeman, 1984). Biset believes that stakeholders are people with an interest or attention to an issue (Azheri, 2012). Steve Rowlinson and Yan Ki Fiona Cheung define stakeholders as each individual or group that can influence the performance and achievement of organizational or project goals (Rowlinson and Cheung, 2008). Derek Walker, Arthur Shelley and Lynda Bourne define stakeholders as individuals or groups who have interests, rights or ownership in the project, and can contribute, influenced by the project, both work or project results (Walker et.al., 2008).

Some of these definitions indicate that stakeholders are individuals or groups who have an interest in the problem or activity to be resolved. Stakeholders who will be examined in the management of floodplain of Lake Tempe are individuals or groups/institutions involved and either directly or indirectly affected by the flood disaster.

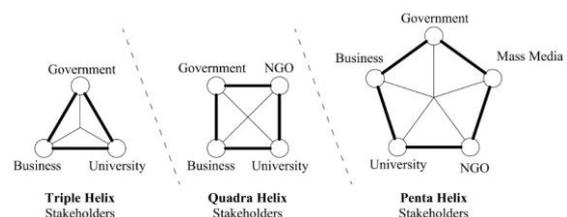
The penta helix stakeholder analysis model is a comprehensive stakeholder theory. The concept of penta helix defines stakeholders into 5 (five) groups, namely (1) government; (2) business world; (3) universities; (4) non-government organizations (NGOs); and (5) mass media (Mohr and Spekman, 1994). Collaboration of 5 (five) stakeholders is expected to synergistically interact with each other so as to realize a quality policy and oriented to the public interest. The penta helix concept was built and developed on two previous stakeholder models of the triple helix theory and the quadra helix theory. Triple helix theory consists of government (government), business (business) and university (academician), while quadra helix stakeholders are added by one stakeholder namely civil society or civil society organizations (non-government organizations). The penta helix stakeholders are perfected to 5 (five) by adding mass media.

The concept of the triple helix can be traced to its development since the second world war. The second world war brought out the concept of a comprehensive relationship between science (academics), the industrial sector or trade (business world) and the public sector (government). This trilogy relationship is very clear and interdependent. The public sector, namely the

government, uses a tax base to fund knowledge institutions in researching innovative technologies and products, especially the technology and innovation of war armaments. The business sector yields the results of research and innovation and finally the public sector, namely the government, gets results through tax collection. Another theory of the triad partnership is known as the "iron triangle" theory and the "Advocacy Coalition Framework" theory (AFC). The iron triangle theory is based on the thought of Ralph Pulitzer (1919), which explains that there are three very influential forces in the administration of government namely the legislative, executive and interest groups (Reynolds, 2015). The basic concept of this theory is actually based on the idea that the bureaucracy always tries to build its power like any other organization. Whereas the most influential interest groups are business and industry groups who lobby for the executive and legislative branches. Quadruple helix is a stakeholder concept that perfects the previous concept by incorporating the fourth dimension, each of which has a very valuable contribution in an activity. The fourth dimension, namely "users" from the perspective of the company (economy), seems to be treated as a consumer rather than a partner for the creation of shared innovation. Several studies have shown that this fourth dimension is interpreted as a stakeholder of a non-governmental organization that has a stake in solving a problem. Quadruple helix brings the actors closer and brings the conversation to the lowest level of stakeholders.

The latest development of the stakeholder model is penta helix. Penta helix goes far beyond, technology and science enter the dimensions of space involving previously existing models. The fifth stakeholder is the media. The media is considered capable of influencing and becoming a part that must be taken into account in stakeholder mapping. The penta helix concept is an ideal tool for mapping the complexity of stakeholders, for example in the economic world the penta helix concept is able to provide a solution to the consumer market-based business innovation model.

**Figure 1.** Triple Helix Stakeholder Concept, Quadra Helix and Penta Helix



**Source:** Processed by researchers from various 2019 sources  
Several previous studies have shown that empirically the concept of penta helix is a comprehensive concept in stakeholder mapping. Sturesson, Lindmark and Roos research concluded that



### 3.1 Stakeholder Mapping

The results of research applying the penta helix theory in stakeholder mapping for floodplain management can be explained as follows:

#### 3.1.1 Government

The government is a stakeholder that has the biggest role in the flood management. The government is the main role because it is supported by the ability of funding, regulation, number of personnel and adequate infrastructure to be involved in disaster management.

Law of the Republic of Indonesia Number 24 of 2007 concerning Disaster Management (UU-24, 2017), states that the disaster management coordinator is the central government in this case BNPB and/or BPBD for provincial/district/city governments). BNPB / BPBD as the coordinator communicates in preparing action plans that need to be taken especially in the case of an emergency including in preparing the command of all stakeholders in disaster management (Perka-BNPB, 2008). Specifically in the case of Lake Tempe flooding, the BPBD at the district level coordinates and communicates with all stakeholders involved without exception, so that disaster management can be carried out quickly, effectively, efficiently and remains targeted. The government organizations involved include the parliament to the organization of technical implementing devices including the military and police as well as the lowest elements of government namely the village/village administration. The government has strong financial support in disaster management through relevant agencies that have prepared budgets for activities in the happening of a disaster (PP-22, 2015). Provision of funding is based on regulations on the use of funds.

Regulatory support is used to mobilize available resources, including personnel and supporting facilities/equipment. The amount of personnel and equipment comes from military support, police and social disaster organizations, including members of the fire brigade and civil service police units (UU-34, 2004; UU-2, 2002; PP-16, 2018). This great support shows the government is a very dominant stakeholder in flood disaster management. In accordance with the mandate of government regulation has the obligation and responsibility to pay attention to disaster victims in each cycle of disaster management in a planned manner.

The military, police and Satpol PP, and Pusdalops (Centers for controlling disaster management operations) are government organizations that have a role in providing disaster data and information support related to the flood disaster exposure to Lake Tempe [19]. The data and information support helps all stakeholders involved can make policies according to the level of

disaster. Another stakeholder from the government element is the Disaster Preparedness Team that is actively involved with other volunteers to participate in disaster management (Perka-BNPB, 2008).

#### 3.1.2. Business World

The business world gives attention as a form of social obligation to disaster casualties. Funding support as an embodiment of Corporate Social Responsibility (CSR) and (charity) from entrepreneurs. CSR is provided in the form of logistics to disaster affected communities. The business world cooperates with the government in the distribution of aids, although sometimes it also distributes the aids directly to the community.

The results of identification of the business world as a stakeholder show that national scale companies up to local businessmen are involved in charity activities around flooded areas. National scale companies pay attention by channeling aid through CSR as a form of corporate social responsibility with the environment in which the company is located. Local entrepreneurs individually or collectively channel aid in the form of charity.

#### 3.1.3 Universities

Universities conducted many studies on Lake Tempe. The research was conducted on the physical characteristics and life of the community around Lake Tempe, so that the general public can understand Lake Tempe more comprehensively. The universities, which is located in the vicinity of the flood area, also provided assistance, both in the form of physical helps and basic needs for disaster casualties.

#### 3.1.4 NGOs

Non-governmental communities (NGOs) involved in handling the floodplain of Lake Tempe were identified from religious communities and other organizations that have a concern for disasters. This communities became volunteers, and provided assistance in the form of equipment and logistics. NGO involvement in disaster management coordinates with the government and other parties. The involvement of NGOs was quite large, especially the support of personnel or volunteers. Many volunteers were deployed to the location of the flood directly together with other stakeholders. This community in general have been equipped with skills related to disaster tasks so that their existence is considered to be very helpful in managing at every stage of the disaster.

#### 3.1.5 Mass Media

The mass media has a role in the dissemination of information on disasters that occurred, both in the form of printed, electronic and

internet media. Access and dissemination of information related to disasters can open opportunities for disaster casualties to get attention and assistance. Internet media, especially social media, is very instrumental in providing information quickly and accurately to other stakeholders. The use of social media was the most effective and efficient means.

### **3.1.6 Affected Communities: Object or Subject?**

In each stage of the disaster cycle it is always associated with very complex stakeholders (Brilly and Polic, 2005). The penta helix concept is a mapping of the involvement of external stakeholders. External stakeholders tend to view affected communities as objects worthy of assistance. The results of the research through in-depth interviews, direct observation strengthened by statistical tests showed that stakeholders who have a very strong influence on the disaster management of floodplain of Lake Tempe flood disasters other than the government are the affected communities themselves.

Significance test to determine the effect of each stakeholder on disaster management was done by using multiple regression statistical analysis techniques. This analysis technique is called as quantitative data quantification technique which is transformed from quantitative data. Quantification was likely to ranking purposes (Tashakkori and Teddlie, 1998).

Statistical test results show that 6 (six) mapped stakeholders represent 94.8% of the stakeholders involved. F test results prove that 6 (six) stakeholders that have been mapped jointly influence the management of the floodplain disaster of Lake Tempe. The results of the t test statistic indicate that the affected communities as stakeholders have a high level of significance and ranks second which influences the management of floodplain of Lake Tempe after the government (see the attachment of the results of statistical analysis). The statistical test results show that in the management of floodplain of Lake Tempe, affected communities should not be placed in positions as objects but subjects that must be involved as stakeholders. This finding means that the use of the Penta Helix concept in stakeholder mapping for the management of the tempe lake flood disaster needs to be updated to six stakeholders namely the government, the private sector, NGOs, universities, mass media and affected communities.

The placement of affected communities as subjects in flood management is strengthened by the results of research showing the ability of affected communities to adapt to floods that come twice every year. The ability to adapt is a form of social capital. Social capital can be identified as "social bonding capital", which is a bond or close feeling between people who are in the same situation. Forms of social capital Bonding include: (1) family ties;

(2) culture, religion, customs and language; (3) livelihoods; (4) social facilities and public services; (5) social norms; (6) legal and customary rules; (7) settlements and (8) have long lived [22].

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Affected communities who belongs to the casualties of floods have an independence in managing floods, so that if a "catastrophic" flood comes they are ready to deal with taking various actions at each stage of the disaster. The community does not fully view floods as mere disasters, but as an annual routine that brings blessings to the economic life of the family. The income of the fishing community will increase when the flood arrives. Flooding makes Lake Tempe become more widespread. This condition means the area of fishing becomes wider. Flooding also provides an opportunity for fish to develop properly because dry land that has been flooded for several months can provide a large food source for fish.

## **4. Conclusion**

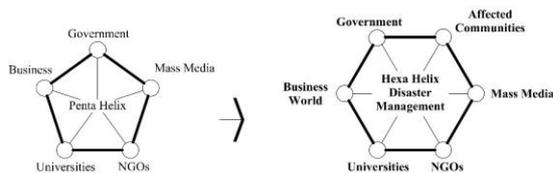
Stakeholders in the concept of the penta helix consist of the government, business world, universities, NGOs and the mass media play a role in every stage of disaster management of floodplain of Lake Tempe. The government is the main stakeholder in the management of floodplain of Lake Tempe.

It was found that there were other stakeholders who played an important role but were not mapped with the concept of penta helix stakeholder analysis, namely affected communities as disaster casualties. Disaster casualties are important parts of the disaster management stage, because before other stakeholders are involved disaster casualties have already taken action that needs to be prepared in managing the disasters. Affected communities should be part of the solution to the problems caused by flooding.

Affected communities should not have seen as objects but should be considered as subjects.

From the results of qualitative and quantitative data analysis, it was concluded that stakeholder mapping with the concept of penta helix has not been able to comprehensively describe the stakeholders involved in the disaster management of the floodplain of Lake Tempe. Researchers provide recommendations to improve the concept of Penta Helix to Hexa "Hexa Helix" by adding one stakeholder, the affected community. The new concept of Hexa helix stakeholders consists of 6 (six) actors, namely: (1) government; (2) business world; (3) universities; (4) NGOs; (5) mass media; and (6) affected communities (see figure 3). The placement of affected communities as the sixth stakeholder because they have the ability to adapt to floods and have a role as the spearhead in flood management.

**Figure 4.** New Hexa Helix Stakeholder Concept



**Source:** Research Results

The results of the statistical analysis (see t test in the appendix table), if arranged based on the value of the t test, then the sequence of stakeholders can be arranged as follows:

1. Government
2. Affected Communities;
3. NGOs;
4. Business World;
5. Mass Media; and
6. Universities.

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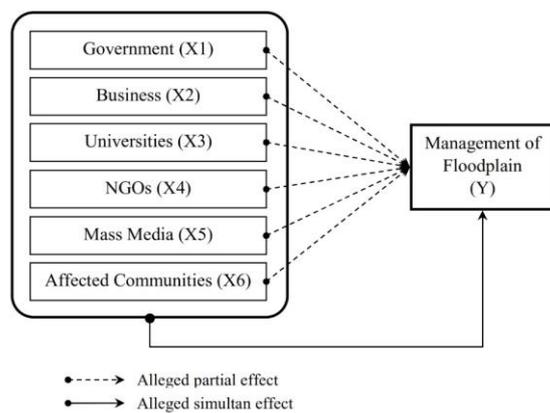
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### APPENDIX of Statistical Analysis

The framework of the conceptual model of statistical analysis testing the results of stakeholder mapping is as follows:

Figure 5. Conceptual Model Analysis Framework



Source: Researcher Analysis Results

The results of multiple regression tests were carried out with the help of SPSS application version 25. The test results in this research will be explained in the form of: (1) determination coefficient; (2) F test; and the last (3) t test. Following are the results of each test:

#### 1. Determination Coefficient

The determination coefficient is to measure how far the ability of the model in explaining the variation of the dependent variable. The following table is the coefficient of determination generated in the research:

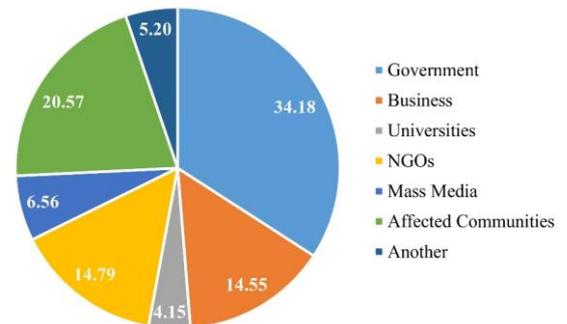
Table 1. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.974	0.948	0.939	0.313

Source: Research Regression Analysis 2019

Based on the table above it can be seen that the value of R<sup>2</sup> is 0.948, this means that of the 6 (six) mapped stakeholders who have represented the stakeholders involved at 94.8%. While there are still other unmapped stakeholders of 5.2% (100% - 94.8% = 5.2%). Mapped stakeholders are the most dominant stakeholders in the management of floodplain of Lake Tempe.

Figure 6. Percentage of Stakeholder Engagement with Management of Floodplain of Lake Tempe



Source: Processed from Research Regression Analysis Results

#### 2. Simultaneous Significance Test (Test F)

The F test shows whether all independent variables (6 stakeholders) included in the model have a joint (simultaneous) effect on the dependent variable (disaster management). The results of the F test calculation, in the following table:

Table 2. Simultaneous Significance Test Results (Statistical Test F)

<i>Model</i>	<i>Sum of Squares</i>	<i>df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
1 Regression	59.170	6	9.862	100.741	0.000
Residual	3.230	33	0.098		
Total	62.400	39			

Source: Research Regression Analysis 20193.

Based on ANOVA test or F statistical test, the calculated F value is 100.741 with a probability level of 0.000. The probability is smaller when compared to 0.05, then the regression model can be said to be an independent variable (6 stakeholders) simultaneously (simultaneously) significantly influencing disaster management.

### 3. Partial Influences Significance Test (t Test)

The t test shows how far the influence of one independent variable (6 stakeholders) individually (partial) in explaining the dependent variable (disaster management).

**Table 3.** Partial Influences Significance Test (t Test)

<i>Model</i>	<i>Unstandardized Coefficients</i>		<i>Standardized Coefficients</i>	<i>t</i>	<i>Sig.</i>
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>		
(Constant)	3.780	0.493		7.670	0.000
Government	0.255	0.030	0.555	8.377	0.000
Business	0.101	0.028	0.187	3.567	0.001
Universities	0.035	0.034	0.043	1.016	0.317
NGOs	0.125	0.034	0.203	3.627	0.001
Mass Media	0.078	0.049	0.065	1.608	0.117
Affected Communities	0.128	0.025	0.243	5.043	0.000

Source: Research Regression Analysis 2019

T test results indicate the significance value of the mass media and the university does not significantly influence the

management of floodplane of Lake Tempe because of the value (significance level > 0.05). While the government, business world, NGOs, and affected communities have a significant influence in the management of Lake Tempe flooding (significance level < 0.05).