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The resilience index towards natural disaster in Indonesia

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Outline

- Introduction
- Research statement & objectives
- Methodology
- The resilience index
- Findings from Cilacap and Padang
- Conclusions and recommendations

Introduction

- Indonesia is one of many countries with high risks of natural disasters.
- According to the Indonesian National Disaster Management Authority (BNPB), in 2015 alone, 1,728 disaster events have occurred in Indonesia (BNPB, 2016).
- The impact of these disasters is multidimensional, and takes a considerable of time to recover. Considering the significant impact of a disaster, it is important to determine the level of disaster risk in a country's area.
- Understanding about the level disaster risk in certain areas should be followed up by the assessment of level of resilience toward the disasters.

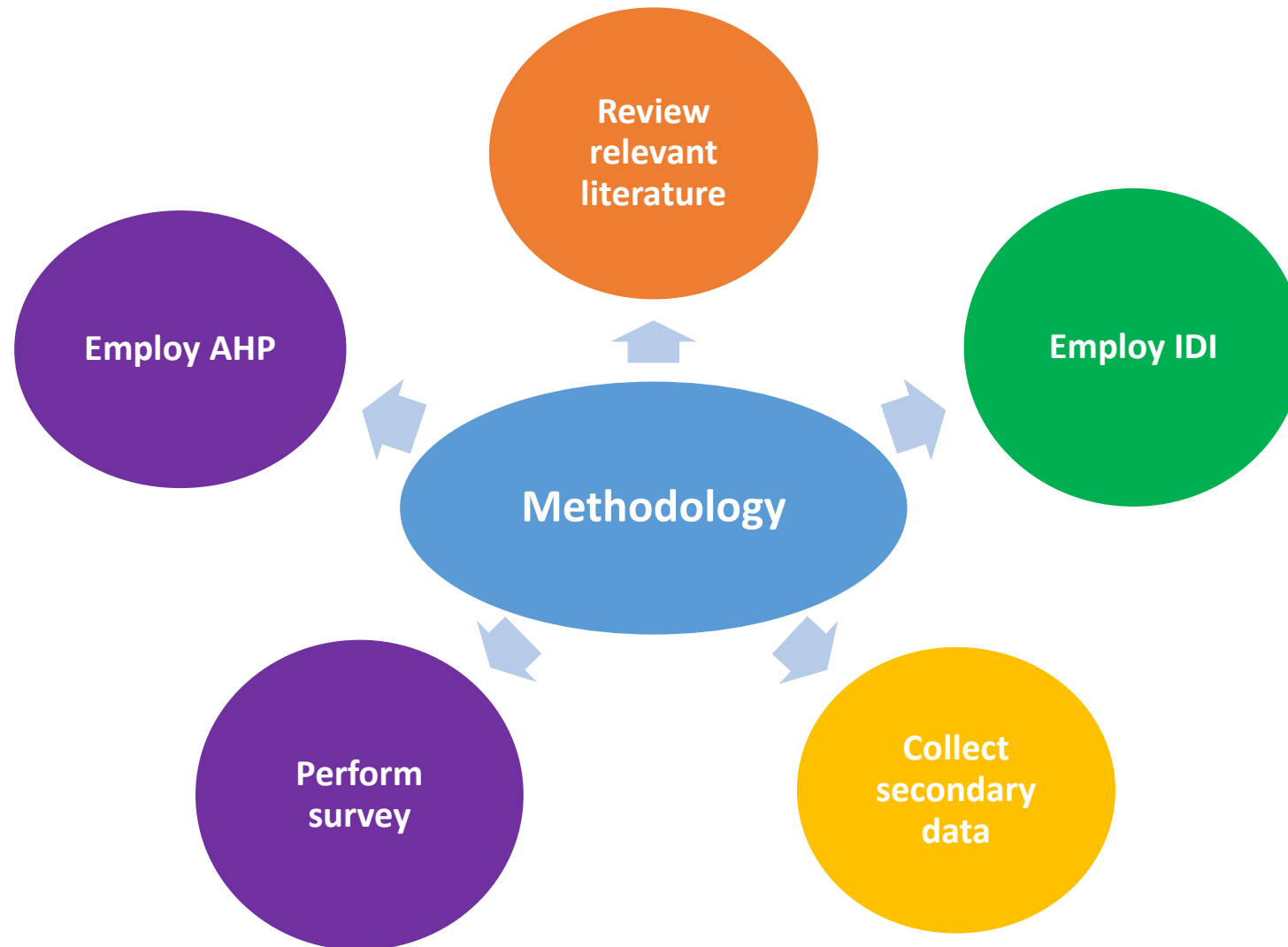
Research Statement

- Given the significant impact of natural disaster, it is important to determine the level of resilience toward natural disaster in different aspects.
- We observed two areas which were considered as disaster-prone areas, namely Cilacap regency and the city of Padang.

Research Objectives

- To develop the method to assess the resilience in two disaster prone areas, namely Cilacap and Padang.
- To determine the resilience levels of those areas.

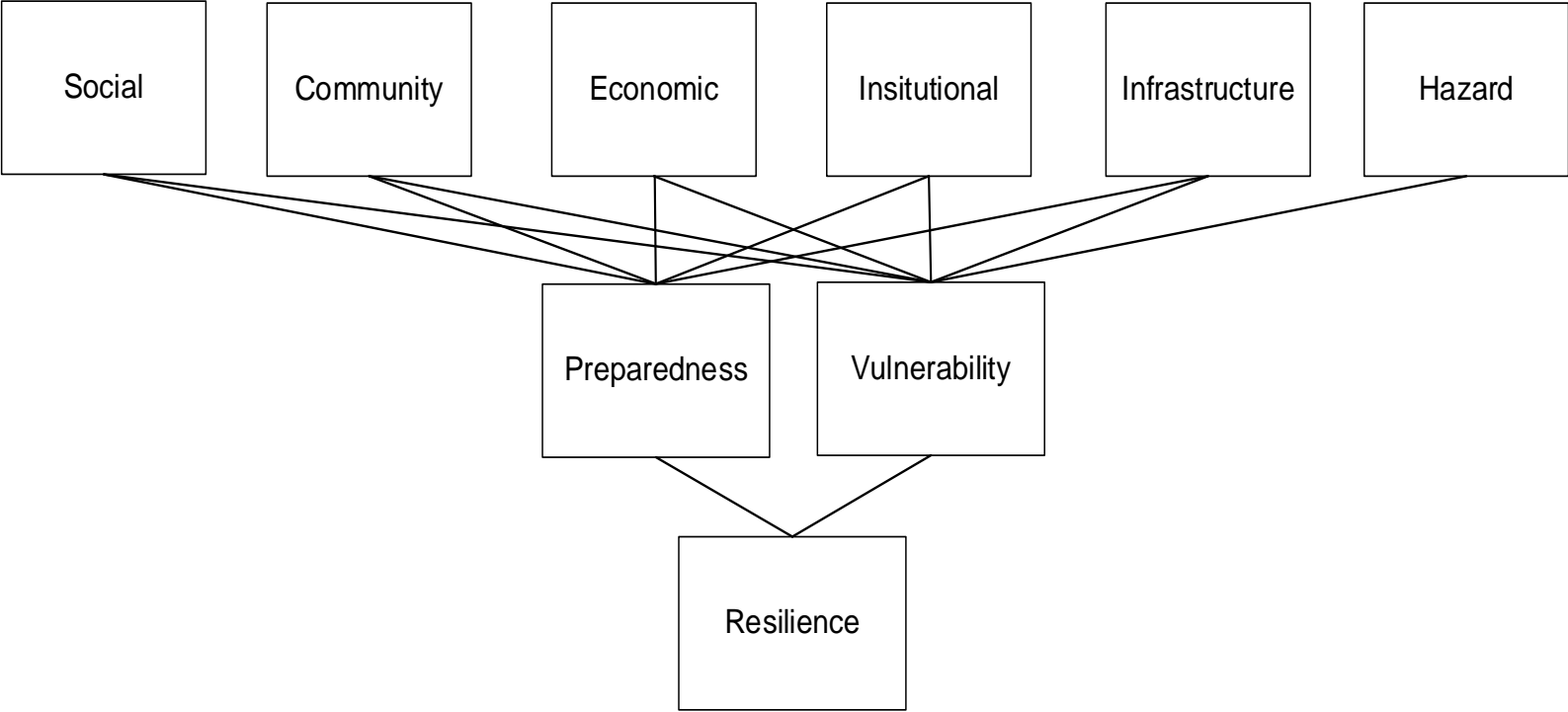
Methodology



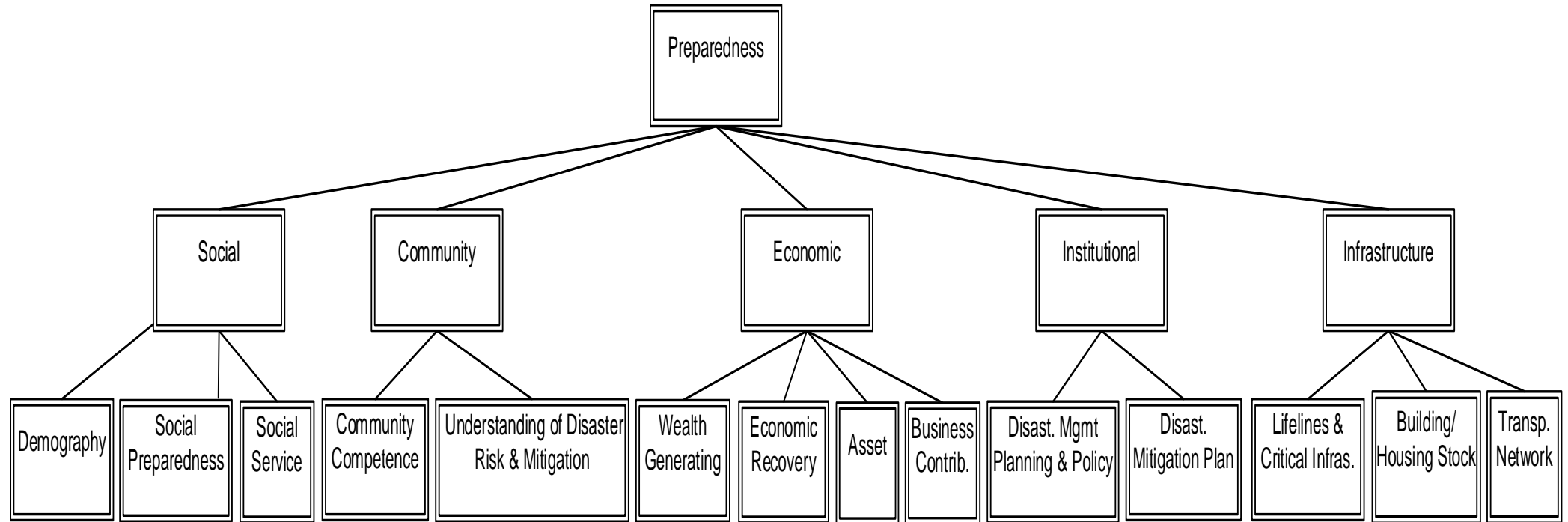
The Research Framework

- Resilience is the ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions (UNISDR, 2016)
- The resilience index is developed based on Simpson (2006): The resilience of the area will be determined by comparing the preparedness (representing the capacity to handle disaster) versus vulnerability.
- IDIs and FGDs with several parties that usually involved in disaster management were conducted to identify factors affecting the resilience towards natural disasters in Indonesia
- Based on the IDIs and FGDs results as well as the literature review, we conclude that resilience has several dimensions namely social, community, economics, institutional, infrastructure, and hazard.

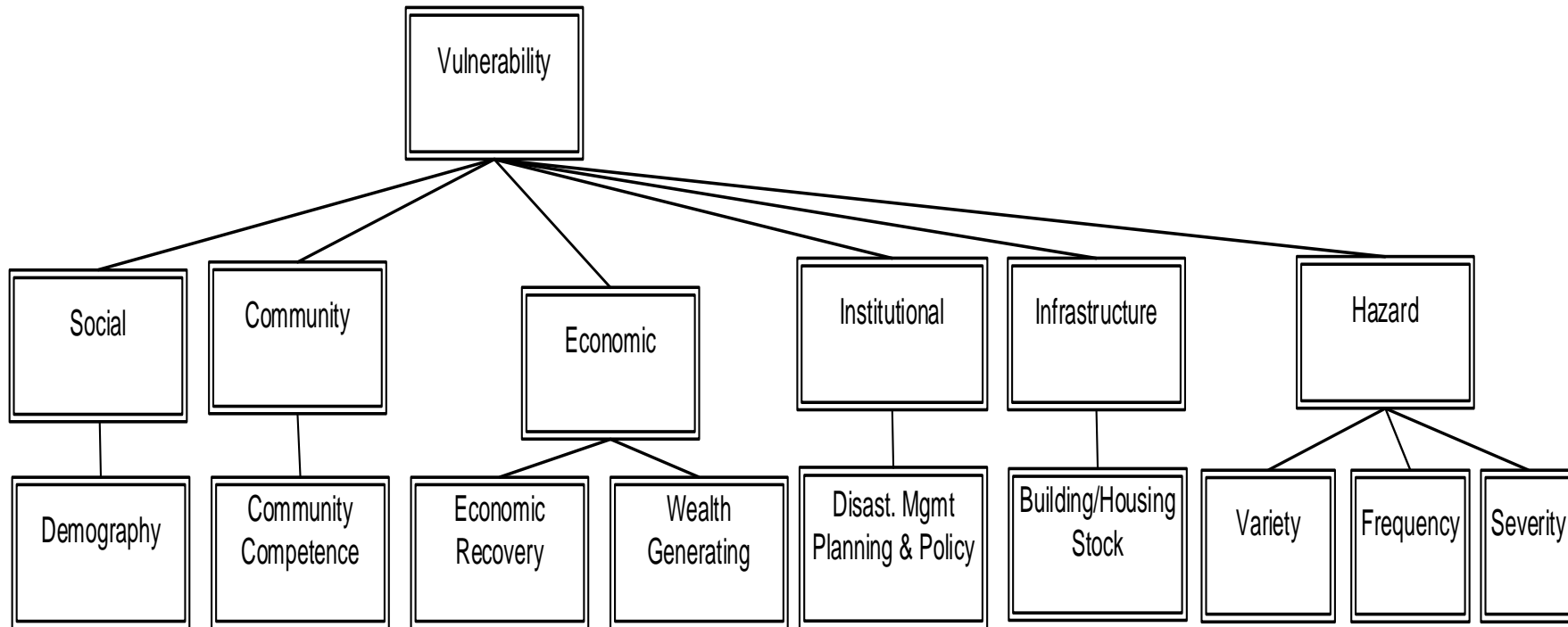
The Resilience Index



Dimensions of Preparedness



Dimensions of Vulnerability



Weighting and Scoring

- Preparedness and vulnerability scores are measured as composite of indicators
- The weights of each dimension and sub-dimension are determined using 9-scale pairwise comparison of AHP by 8 experts in disaster management in Jakarta, Cilacap and Padang
- Most indicators are measured using secondary data
- Certain indicators that cannot be measured using secondary data, are measured using survey questionnaire (distributed to 400 respondents in each area)

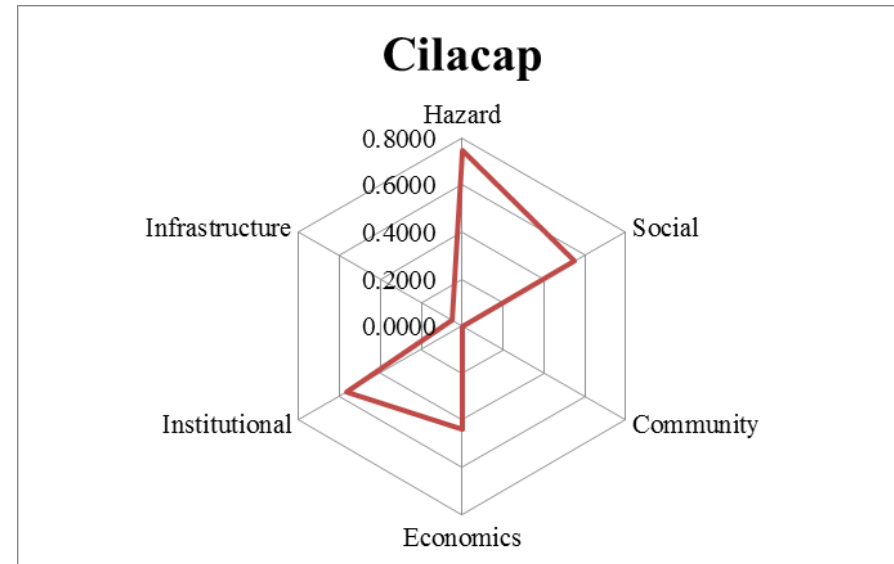
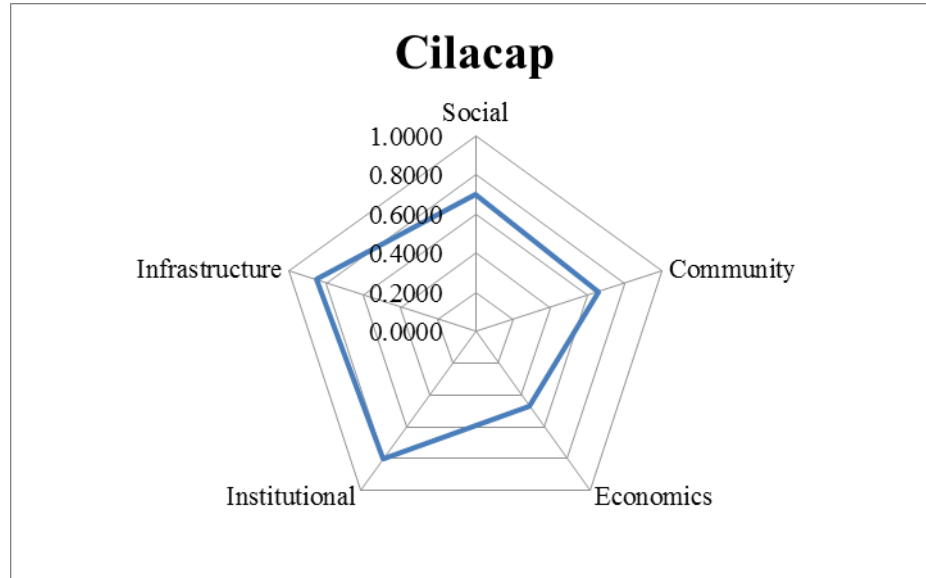
Findings: Weights of Preparedness

Dimension	Sub Dimension	Weight
Social		0.137
Community		0.291
Economic		0.161
Institutional		0.269
Infrastructure		0.143
Social	Demography	0.299
	Social Preparedness	0.421
	Social Services	0.280
Community	Community Competence	0.549
	Understanding Dist. Risk and Mitigation	0.451
Economic	Wealth Generating	0.208
	Economic Recovery	0.455
	Asset	0.202
	Business Contribution	0.135
Institutional	Disaster Mgmt. Plan and Policy	0.452
	Disaster Mitigation Plan	0.548
Infrastructure	Critical Infrastructure	0.534
	Building Stock and age	0.197
	Trans. Network	0.222

Findings: Weights of Vulnerability

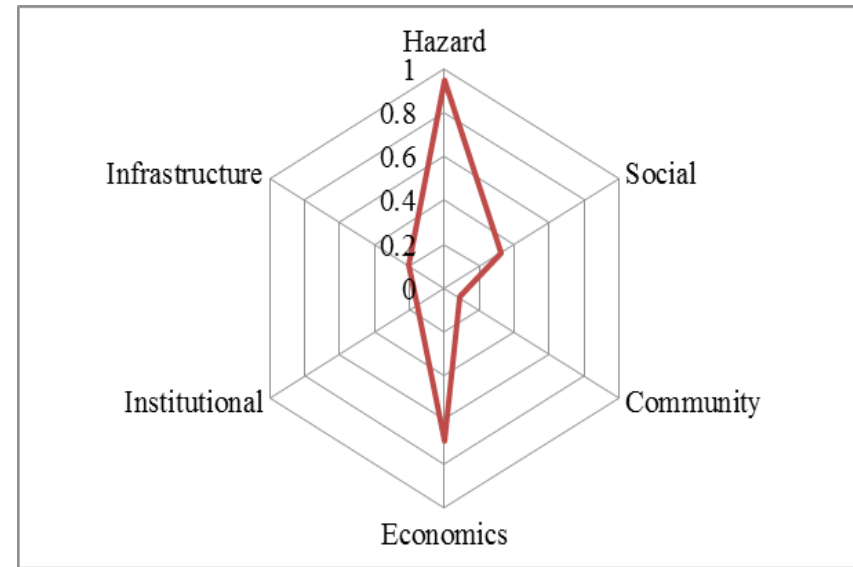
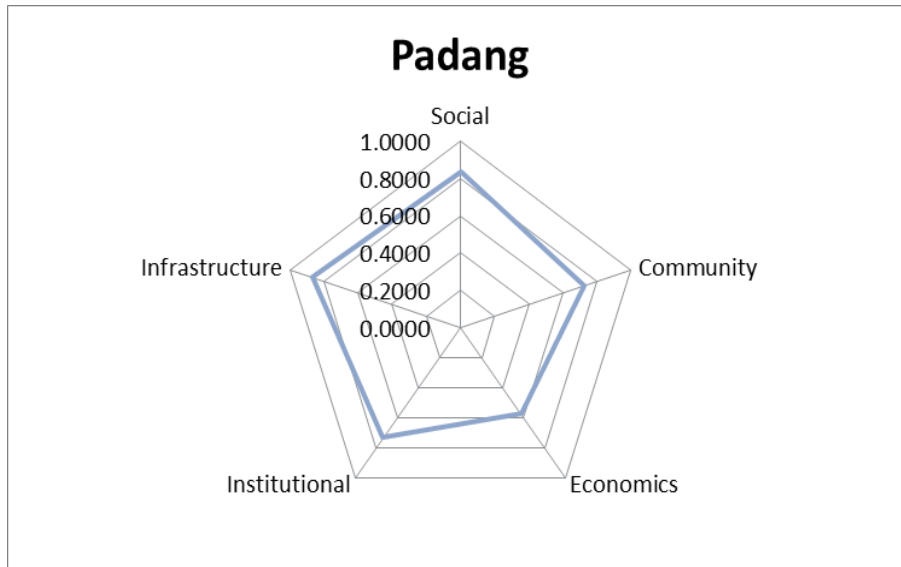
Dimension	Sub Dimension	Weight
Hazard		0.206
Social		0.216
Community		0.138
Economic		0.098
Institutional		0.156
Infrastructure		0.177
Hazard	Variety	0.204
	Frequency	0.322
	Severity	0.475
Economic	Wealth Generating	0.453
	Economic Recovery	0.547

Findings: Cilacap



- The resilience score of Cilacap regency toward natural disaster is 1.70 (preparedness score 0.7, vulnerability score 0.41)
- Indicating that currently, Cilacap regency has the capacity to overcome the vulnerability to disaster.
- The resilience can still further be enhanced by improving the preparedness and/or by reducing the vulnerability.

Findings: Padang



- The resilience score of Padang regency toward natural disaster is 1.83 (preparedness score 0.73, vulnerability score 0.40).
- Indicating that currently, the city of Padang has the capacity to overcome the vulnerability to disaster.

Findings: Cilacap and Padang preparedness scores

Dimension	Sub-dimension	Cilacap	Padang
Social	Demography	0.6473	0.7611
	Social preparedness	0.5850	0.7785
	Social services	0.9333	1.0000
	Social dimension score	0.7010	0.8351
Economic	Wealth generating	0.0944	0.1567
	Economic recovery	0.5903	0.8163
	Asset	0.7683	0.5825
	Business contribution	0.2149	0.3750
	Economic dimension score	0.4725	0.5724
Community capacity	Community competence	0.7395	0.7116
	Understanding dist. risk and mitigation	0.5708	0.7407
	Community dimension score	0.6633	0.7246
Institutional	Disaster mgmt. plan and policy	1.0000	1.0000
	Disaster mitigation plan	0.6325	0.5128
	Institutional dimension score	0.7987	0.7331
Infrastructure	Critical infrastructure	0.9753	0.8749
	Building stock and age	0.8280	0.9136
	Trans. network	0.7782	1.0000
	Infrastructure imension score	0.8563	0.8689
Preparedness score		0.7013	0.7378

Findings: Cilacap and Padang vulnerability scores

Dimension	Sub-dimension	Cilacap	Padang
Social	Demography	0.5482	0.3226
	Social dimension score	0.5482	0.3226
Community capacity	Community competence	0.0000	0.0848
	Community dimension score	0.0000	0.0848
Economic	Wealth generating	0.6876	0.8964
	Economic recovery	0.2337	0.5258
	Economic dimension score	0.4393	0.6937
Institutional	Disaster management planning and policy	0.5652	0.1533
	Institutional dimension score	0.5652	0.1533
Infrastructure	Residential housing stock	0.0500	0.2025
	Infrastructure dimension score	0.0500	0.2025
Hazard	Variety	0.7143	0.8571
	Frequency	1.0000	1.0000
	Severity	0.5885	0.9415
	Hazard dimension score	0.7473	0.9441
Vulnerability score		0.4124	0.4036

Conclusions

- On preparedness dimensions, Cilacap shows its strength on Infrastructure and Institutional while Padang has its strength on Infrastructure and Social.
- On the vulnerability dimension, Cilacap's highest vulnerabilities are in Hazard and Institutional while Padang is highest in Hazard and Economic.
- The individual survey shows that most of residences in Cilacap and Padang aware of the impact of natural disaster to their life, however, they do not prepare for recovery process after the natural disaster occurred.

Recommendations (1)

- The resilience of Cilacap and Padang can further be enhanced by improving the preparedness and/or reducing the vulnerability
- In the case of Cilacap:
 - The community and economic preparedness still need to be improved, for instance by recruiting community leaders as disaster mitigation spokesperson to ensure that the message is understood by the people, and encouraging the people to have savings, and encouraging the insurance companies to offer micro-insurance
 - The social and economic vulnerability still need to be reduced, by decreasing the percentage of residents living in poverty, for instance by encouraging the head of household to have more ways to earn a living and encouraging the housewives to engage in household-based industry. However it requires a long-term socialization and education program and cooperation between the local government, NGOs and the community leaders

Recommendations (2)

- In the case of Padang:
 - The community, and institutional dimensions of preparedness still need to be improved.
 - The community competence can be further enhanced by increasing the frequency of meeting between community leaders and their people.
 - The institutional preparedness can be increased by improving the disaster mitigation plan (improving the disaster management infrastructure and increasing the number of socialization/education to the people)
 - The economic dimension of vulnerability, especially the economics recovery sub-dimensions is relatively high, mainly due to high average expense per capita compared to other area in Indonesia. A campaign to live moderately and have reserve fund for emergency may need to be done.

Recommendations (3)

- Overall, we found that government has provided policy and action plan to mitigate natural disaster in Cilacap and Padang.
- Our findings suggest that the role of government needs to be extended to support the residences with adequate information about the impact of natural disaster and the mitigation plan.

Thank You



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