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Developing an innovative disaster resilience framework with universities as key agents – the value of consolidating international expertise

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Abstract. Since the Covid-19 pandemic, the higher education sector has seen an expansion of universities' expertise from being providers of education, research and knowledge transfer to providers of crisis response capacity for partners and stakeholders. Prior to that, nascent approaches towards delivering disaster mitigation and response capability through community training and volunteering were seen across universities located in areas prone to natural disasters. This leads to the purpose of the paper, which is to address initiatives required to enhance the role of the higher education sector in disaster resilience. Specifically, in relation to driving national policy-making and disaster management activities at the local level, high levels of decentralisation prevent effective interventions by central government bodies. Based on an inductive approach, the methods used were informed by an initial fact-finding exercise and a series of roundtable discussions involving senior higher education and disaster resilience experts from across Indonesia and Europe. Building on the four theoretical perspectives, expert opinions then informed the conceptual development of an innovative and scalable disaster resilience framework. Within the higher education sector, this integrates conventional streams of university activity, such as curriculum development, research, innovation, knowledge transfer and networking, with a contextually adapted and appropriate disaster mitigation and response capability.

Keyword: Community training, bottom-up approach, disaster management

1. Introduction

Since the outbreak of Covid-19, crisis and disaster management has been at the forefront of everyone's thinking. Disaster mitigation and response initiatives used to be seen largely as the responsibility of a defined group of agencies, including, for example, governments, emergency services, disaster aid organisations and specialist organisations. However, responding to the current pandemic has demonstrated that crisis response and resilience are the responsibility of us all. Individuals, families, businesses and communities around the globe have had to make substantial adjustments to their daily lives in a joint effort to combat the virus. For many, the implications are existential and may range from redundancy, bankruptcy, and physical and psychological illness to unsafe domestic situations. Assisting those who are affected now and in the future is an astronomical task that will challenge policymakers, the public and private sectors, charitable organisations, lawmakers and law enforcement for some time to come.

Unfortunately, the challenges in keeping society resilient do not stop there. Destinations prone to natural disasters are having to face up to the inconvenient truth that, without much advance warning, they may need to respond to a local disaster amidst the pandemic. This raises serious questions about the feasibility of maintaining social distancing measures whilst implementing disaster response strategies and the possibility of receiving disaster aid from elsewhere whilst the Covid-19 crisis is ongoing.

Universities have strong networks within the public and private sectors and with local, regional and international communities. This places them in a unique position to not only act as catalysts for research and educational initiatives but also to mobilise networks, resources and specialist expertise in the event of emergencies and during recovery phases. This position is strengthened through their capacity to contribute to knowledge transfer, scenario planning, post-assessments and impact studies, curriculum development and innovative research initiatives to improve the diverse aspects of disaster resilience as prioritised in local, regional and national disaster management plans.

Advocating a bottom-up approach, the paper commences with a review of four theoretical perspectives on resilience planning, including systems thinking, multi-stakeholder integration, adaptive governance and scalability. Based on an inductive approach, the methods used were informed by an initial fact-finding exercise and a series of roundtable discussions involving senior higher education and disaster resilience experts from across Indonesia and Europe. The insights derived from those helped to establish the need for integrating universities into wider disaster resilience strategies and policy-making by reflecting on the educational, innovation, business, community and policy-related activities that higher education institutions are typically involved in and by identifying some of the weaknesses in current disaster management approaches.

Building on the four theoretical perspectives, expert opinions then informed the conceptual development of an innovative and scalable disaster resilience framework. Within the higher education sector, this integrates conventional streams of university activity, such as curriculum development, research, innovation, knowledge transfer and networking, with a contextually adapted and appropriate disaster mitigation and response capability.

2. Theoretical perspectives on resilience planning

Enhancing resilience is recognised as one of the most important tasks of policy institutions. Governments and supranatural institutions play a crucial role in fostering policies towards the cohesion and prosperity of society and environmental sustainability [7]. Playing a leading role in emergency response internationally, the European Union, in particular, is committed to promoting and facilitating the embedding of the United Nations (UN) Sustainable Development Goals (SDG) around the globe and was a key player in building the Sendai Framework for Disaster Risk Reduction that has now been adopted by 187 UN Member States. Moreover, the Emergency Response Coordination Centre (ERCC) oversees disaster response coordination within and outside of the European Union, which remains committed to extending international humanitarian and disaster aid programmes further [10]This is, amongst other initiatives, reflected in the funding of hundreds of international collaboration projects in the broad fields of disaster risk reduction, disaster management and resilience through the European Commission's several funds. These projects typically bring together educational institutions and the public, private and third sectors and can act as powerful catalysts for scaling up relevant outputs nationally as well as internationally.

However, what remains clear is that more needs to be done to increase designated funds and to improve collaboration, coordination and innovation capability [3,4,11] The questions that follow are how and where relevant knowledge and technical solutions can be created and how these can be scaled up for the maximum benefit. The same applies to the role of communities and notions of citizenship in building disaster resilience.

3. Systems thinking, multi-stakeholder integration, adaptive governance and scalability

Principles of resilience are best understood within the context of a conducive and multi-layered eco-system, where, through its design and the conscious actions of individual agents, resilience becomes self-perpetuating. Designing a powerful disaster resilience framework requires a systems approach. To explain this further, four resilience frameworks will be introduced. These are systems thinking, multi-stakeholder integration, adaptive governance and scalability.

Social resilience is widely understood as the adaptive and learning capacity of individuals, groups and institutions to self-organise in a way that maintains system function in response to incremental

change or acute disturbance. Understanding how individuals, organisations and communities can successfully adapt to oftentimes crisis-driven change is therefore increasingly regarded as fundamental to government policy and management practice [6]).

Resilience thinking is inevitably systems thinking, at least as much as sustainable development is. When considering systems of humans and nature (social-ecological systems), it is important to consider the system as a whole, whereby three concepts are crucial to grasp. Firstly, humans live and operate in social systems that are inextricably linked with the ecological systems in which they are embedded. Secondly, social-ecological systems are complex adaptive systems that do not change in a predictable, linear, incremental fashion. Thirdly, resilience thinking provides a framework for viewing a social-ecological system as one system operating over many linked scales of time and space. Its focus is on how the system changes and copes with disturbance [8]).

According to [7]), a system is deemed resilient if the combination of riskiness and vulnerability, measured in expected losses, is low or if expected losses are high, but the system can recover with limited loss. As resilience is highly context-driven, existing degrees of resilience and interventions must be analysed within the wider ecological, socio-economic and political system and consider all entities that play a role in the system. They, therefore, propose that a Policy Framework aimed at building resilience must be (1) individual-centric, (2) dynamic, (3) built around interactions, feedback and possible non-linearities amongst various entities and layers of the system, (4) propose and implement interventions to enhance resilience and (5) focus on the ability to bounce forward.

Similarly, the Social Resilience Framework proposed by [6] identifies the adaptive and learning capacity of individuals, groups and institutions to self-organize effectively when faced with disturbance as an enabler of resilience. The capacity to adapt is thought to be driven by six main attributes: (1) knowledge, skills and learning; (2) community networks; (3) people-place connections; (4) community infrastructure; (5) diversity and innovation and (6) engaged governance. The importance of the latter is particularly emphasized, whereby it is explained that engaged governance requires genuine participation from the relevant public, private and third-sector organizations, the development of inter- and intra-sector partnerships, science and government collaborations, as well as leadership, vision, communication, systems thinking and institutional capacity building. Multi-stakeholder integration is, therefore, fundamental to resilience planning [1]

[9] Resilience Planning Framework is built around similar principles in that it emphasizes the need for contextualization, the systematic connection of key individuals and entities, continuous learning and the development of reflective strategies for managing complexity and uncertainty. Here, resilience planning is seen to go hand in hand with adaptive governance, defined as "flexible and learning collaborations and decision-making processes at multiple levels, with the aim to adaptively negotiate and coordinate management". The term "learning collaborations" is particularly interesting as it points to opportunities for the scaling up of resilience initiatives through the structured dissemination and wider implementation of outputs. [9] describe these as "waves of resilience planning" and propose a methodology that is based on the implementation of common principles within different local contexts whilst allowing for necessary adaptation.

4. Methodology

The disaster resilience framework proposed in this paper is being developed as part of the Erasmus+ funded Capacity Building in Higher Education project "Building Universities in Leading Disaster Resilience" (BUiLD). Whilst numerous organisations, projects and good practice models already exist dedicated to improving various aspects of disaster resilience, the Erasmus+ CBHE BUiLD project has been designed around the proposition that universities can serve as key players in their consolidation, innovation, dissemination and future implementation. Funded by the European Commission, the project, therefore, fits well with the Commission's aspiration to increase disaster prevention and response capability in multiple ways and at multiple levels.

The launch of the Erasmus+ CBHE BUiLD project is the result of working in partnership with universities, public sector organisations and private companies across Indonesia, Europe and the UK for

half a decade. It commenced in December 2019 and will run until at least November 2022. It has been inspired by a joint vision and desire to develop disaster resilience within Indonesia and worldwide and, through this, safeguard economic prosperity and societal well-being.

Expert opinions were sought to conceptualise a comprehensive disaster resilience framework with universities as key agents. The development of this framework was iterative, involving the same group of experts interacting at regular intervals between December 2018 and July 2021. Twenty-four experts were drawn from eight universities from across Indonesia; three higher education institutions from the United Kingdom (UK), Denmark and Portugal and three independent consulting firms from the UK, Austria and Germany with professional expertise in resilience planning, crisis management and higher education management. The composition of the team was mixed and included Rectors, Vice-Rectors, Heads of International Partnerships, Heads of Centres with a focus on disaster resilience and academics with expertise in disaster resilience.

Topics for discussion included the rationale for creating a disaster resilience framework with universities as key agents in Indonesia, strategies for development, possible challenges in the implementation of the framework and implications of the Covid-19 pandemic. Discussions were recorded, and summaries of outcomes were disseminated to participants as evidence trails.

5. Discussion of Findings

Several universities across Indonesia are currently involved in wider disaster resilience initiatives. Examples of disaster management initiatives across Indonesia's university sector include the Disaster Risk Reduction Centre (DiRReC) at Universitas Islam Indonesia (Central Java), incorporating a disaster-responsive medical team, which was deployed to provide early medical support during past and recent earthquake disasters in Indonesia, including those in Lombok, Palu, and Donggala. Universitas Ahmad Dahlan (Central Java) has established a Center for Environmental Studies and Disaster Management, which has been involved in numerous disaster recovery initiatives, for example, during the Merapi volcanic eruption in Yogyakarta in 2005 and the earthquakes in Lombok and Palu in 2018. The centre conducts training on mitigation and disaster management and collaborates with the Muhammadiyah Disaster Management Centre in various areas of disaster recovery, including volunteering for psychosocial, logistical and health assistance, and fundraising. Universitas Andalas (West Sumatera) and Universitas Lambung Mangkurat (Kalimantan) are involved in disaster research and provide consulting services to the Indonesian government, whilst Universitas Khairun (North Maluku) deliver frequent disaster awareness courses to local communities. Other universities, such as Universitas Muhammadiyah Palu (Sulawesi) and President University (West Java), are pursuing the establishment of a disaster resilience centre after having been directly affected by the triple disaster in Sulawesi in September 2018 respectively, the tsunami following the eruption of Mount Krakatau later that year.

During the current pandemic, many universities have either extended their range of activities or redeployed resources to support healthcare providers or businesses, communities and individuals affected by the crisis. The manufacturing and donation of medical and personal protective equipment, Covid-19 related research, and the repurposing of university facilities to provide accommodation for key workers or to accommodate testing facilities are some examples of current initiatives, as are efforts to support local businesses with assistance in maintaining business continuity, volunteering and fundraising. Covid-19 has given universities an opportunity as well as a duty to fundamentally rethink their role in society and to embrace their responsibility to act as organisational role models in developing educational, business and partnership models that promote and facilitate socio-economic growth, well-being and resilience.

Cumulatively, Indonesian partner universities have a diverse set of expertise that can be consolidated into a comprehensive disaster resilience framework as well as a diverse network and close working relationships with key organizations. These include the National Ministry of Education and Higher Education, the National Disaster Mitigation Agency (BNPB), non-governmental disaster aid organization ACT Alliance, the Muhammadiyah Disaster Management Centre (MDMC) and funding

platforms kitabisa and Lazismu. At the local level, partner universities have good working relationships with emergency services, including the police, hospitals, the military and with local businesses and communities.

Whilst collaboration between universities and public, private and non-governmental sector organisations has been a growing trend in the international higher education sector for some time, strategic approaches towards comprehensively embedding such partnerships into teaching, research, business support and community service are still rare. There is a consensus within the expert team that as socially responsible organisations, universities have a duty to reflect on how their educational strategies, research and business development activities, engagement with stakeholders and institutional governance relate to the Sustainable Development Goals (SDG) Disaster Risk Reduction targets. Moreover, universities are understood to have a duty of care towards their students, staff and associated communities and a responsibility to contribute to local and regional socioeconomic development.

Much of the team's development work was informed by the Indonesian National Disaster Management Plan 2010-2014 [2] Recognizing the unique role of universities, one of the eight key priorities identified in the plan centred around the capacity building in the higher education sector, specifically in the areas of disaster management and disaster science and technology. The rationale for enhancing the role of universities was driven by decentralisation and the inability of the central government to effectively implement disaster management capacity-building programmes across all of Indonesia's diverse regions. Owing to the local expertise and network, the plan identifies them as better placed to devise and deliver disaster resilience initiatives that are suitably adapted to the local context. As an example of a policy document designed to inform disaster management that is effectively planned, well-directed and integrated, the National Disaster Management Plan for Indonesia 2010-2014 [2] addresses many of the design criteria underpinning the development of a comprehensive disaster resilience framework. This includes an identification of relevant government agencies and their roles, a consideration of regulatory frameworks, the integration of disaster risk reduction programmes into development agendas and support initiatives for specific groups, community-based disaster management, the enhancement of the roles of the third sector and government partner organization, as well as capacity building. As such, the plan reflects an acknowledgement of the multi-layered nature of disaster management, the need for a systems approach, for integrating a wide range of relevant entities, for engaged governance and for capacity building and innovation. With an emphasis on mitigation, preparedness and response capability, the plan also addresses the different stages of the disaster management cycle.

Developing policy recommendations on disaster resilience into a robust disaster resilience framework is, however, a complex and challenging task. The Erasmus+ CBHE BUiLD project seeks to contribute to the development of such a framework by significantly enhancing the role of the higher education sector in this endeavor. In the initial phase, eight Centers of Excellence in Disaster Resilience across all major regions in Indonesia will act as local enablers in the implementation of a comprehensive Disaster Resilience Framework. Based on the penta helix model, the vision behind the centers and the Disaster Resilience Framework is to facilitate collaboration between universities and the public, private and third sectors through all stages of the disaster management cycle.

The Disaster Resilience Framework integrates resilience capacity building at multiple levels, including the individual, programme, institutional, regional and national levels. It addresses several aspects of resilience capacity-building, including university governance, disaster response and recovery capability, disaster awareness training, curriculum development, fundraising, networking, knowledge transfer, and research and innovation. Concrete outputs include physical spaces for the coordination of disaster resilience activities with a defined institutional governance structure, an Information Exchange and Management Model and Target Operating Model for disaster recovery involving internal and external stakeholders, needs based training solutions, curriculum benchmarks, and a National Disaster Resilience Network designed to drive knowledge transfer, innovation and policy-making. The proposed framework, therefore, meets several of the aforementioned design criteria and, by being based on a set of common principles and standards, is scalable nationally as well as internationally.

Key challenges to the successful development and implementation of the disaster resilience framework relate to differences in local disaster risks, variations in institutional structures and networks, the need for a change in organizational culture, the identification of ongoing funding streams, stakeholder involvement and the attractiveness of disaster management education as a chosen career path. The expert team is involved in ongoing internal and external consultation with key stakeholders to find solutions to those challenges and to ensure that the needs of end-users are being met.

6. Conclusion

This practice-informed paper has explored how universities can be positioned as key change agents within a comprehensive disaster resilience framework. It has explained the need for integrating universities into wider disaster resilience activities by reflecting on the educational, innovation, business, community and policy-related activities that higher education institutions are typically involved in. In this regard, the paper concludes that further initiatives are required to enhance the role of the higher education sector in disaster resilience, specifically in relation to driving national policy making and disaster management activities at the local level where high levels of decentralisation prevent effective interventions by central government bodies.

Referring to the theoretical frameworks of systems thinking, multi-stakeholder integration, adaptive governance and scalability, the paper has defined the structure and underlying principles of a comprehensive disaster reliance framework.

Using the current Erasmus+ CBHE BUiLD project in Indonesia as an example, the paper has then illustrated how international collaborations within the higher education sector can facilitate the development of a comprehensive disaster resilience framework. It is concluded that through the sharing of expertise, as well as access to funding and channels for dissemination and exploitation, international collaborations can act as powerful catalysts for the design, implementation and upscaling of comprehensive disaster resilience frameworks.

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