Building Better amidst the Coronavirus Disease (COVID-19) Pandemic: An Analysis of Critical Success Factors within Resilience to Natural Hazards and COVID-19

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Abstract— *A disaster can be viewed, from the project perspective, as a unique public problem to be addressed by stakeholders, including the government, through appropriate response, recovery, reduction, and readiness measures. In view of successful disaster management practices, this research explores relevant literature on countries' post-disaster reconstruction and recovery along with countries' resilience in curbing the coronavirus disease (COVID-19). The research aims to enhance understanding on the successes of past and ongoing events with a disaster resilience lens. It examines the reported critical success factors (CSFs) within resilience to natural hazards and COVID-19, and analyzes them using the Build Back Better (BBB) Framework, a framework intended to evaluate recovery efforts. The analysis results reveal that the CSFs could be linked to the framework's three categories: disaster risk reduction, community recovery, and effective implementation. However, the emerging environment sees political influences and public policy driving community resilience, which are currently not highlighted in the framework. The research findings are not meant to be exhaustive, since mostly Asia-Pacific case studies were integrated into the literature, and the solution to COVID-19 has yet to be significantly realized. Further systematic review considering the recent developments may corroborate the findings on success and direct future research.*

Index Terms— *build back better, COVID-19 pandemic, critical success factors, community resilience*

I. INTRODUCTION

The Project Management Institute (2017, p. 4) defines a project as "a temporary endeavor undertaken to create a unique product, service or result" [1]. For instance, the construction of a building is a project wherein the building is a deliverable to be produced within a timeframe to meet the project's objective. The impact delivered by a project can be appreciated as substantial evidence of success depending on the critical success criteria (CSC), including but not limited to the value that has been generated. The same impact can be attributed to critical success factors (CSFs). CSC and CSFs basically vary per project. For purposes of this research, both are treated as components of project success, criteria entail an output-oriented perspective, and factors are an input contributory to success. This research will focus on CSFs.

Various authorities have described a disaster as an event, natural or man-made, causing disruption to the functioning of a community and often leading to multifaceted losses. A natural hazard is differentiated from a disaster in that the former does not require damages caused by such a disaster event, albeit acts as a threat that may adversely affect society, environment, and economy. A natural hazard − such as a flood, earthquake, or volcano − thus turns into a disaster depending on the human experience of losses.

By analogy, a disaster can be viewed as a unique public problem to be addressed by stakeholders. An integrated approach to disaster management encompasses response, recovery, reduction, and readiness [2],[3]. In disaster recovery, the resilience actors include the government and those funding and implementing the recovery activities, like the private sector, civil society organizations, and international community. The government may lead disaster management with assistance from relevant actors, owing to the complexity of the management process and a disaster's large-scale impacts. An ongoing example is the government's primary role in addressing the crisis introduced by the coronavirus disease (COVID-19), a biological hazard.

The United Nations Sendai Framework for Disaster Risk Reduction (SFDRR) 2015-2030 emphasizes the *build back better* (BBB) concept in recovery, rehabilitation, and reconstruction. The SFDRR also includes disaster resilience investments among the countries' priorities for action. Arising from the Hyogo Framework for Action 2005-2015, the resilience concept expanded to cover not only the social, environmental, and economic assets but also the livelihoods and health, physical and cultural assets, as well as businesses.

The BBB Framework intends to effectively and efficiently improve a community's physical, social, environmental, and economic conditions towards greater resilience [4]. Initially developed by Wilson and Mannakkara, the BBB Framework offers resilience indicators to disaster management practitioners for evaluating recovery efforts. The framework for BBB during post-disaster reconstruction and recovery

(Fig. 1) is the product of a four-year extensive international literature review combined with in-depth case studies [4]. Building on the earlier work, the modified BBB Framework (Fig. 2) was recently formulated to serve as a tool for planning and implementing post-pandemic recovery [4]. The two framework versions are similar, except for the risk reduction category (e.g., the scope of resilience and zoning).

Fig. **1.** BBB Framework for post-disaster recovery [4]

Fig. **2.** BBB Framework customized for pandemic recovery [4]

II. MOTIVATION

Since the alert by the World Health Organization (WHO) of a novel coronavirus on 31 December 2019, the virus has evolved, and most countries worldwide have suffered from COVID-19 cases and socioeconomic impacts. On 11 March 2020, WHO declared the COVID-19 outbreak a global pandemic. The unknowns and uncertainties in dealing with COVID-19 ushered in lockdowns, physical distancing measures, digital transactions, and other online activities to prevent human exposure to the virus. As of 19 July 2021, five countries (North Korea, Turkmenistan, Tonga, Tuvalu, and Nauru) plus some island territories in the Pacific and Atlantic are without reported cases of COVID-19 [5]-[6]. As of 25 July 2021, statistics show that around 27% of the world's population received at least one dose of a COVID-19 vaccine

and almost 14% are fully vaccinated against the virus [7].

These gains, however, have been met with the spread of variants more contagious than earlier strains of the virus. Driven by the desire for progress, if not back to the pre-pandemic status quo, this research explores CSFs in the context of countries' post-disaster reconstruction and recovery and countries' relative successes in curbing the disease. The countries mainly refer to the ones that at least managed to cope significantly, thereby performing resilience.

III. AIM AND OBJECTIVES

This research aims to enhance understanding on the successes of past and ongoing events from a disaster resilience lens, using the BBB Framework. The objectives to accomplish the aim are as follows: a) identify the elements of disaster and pandemic management, particularly the reported CSFs culled from relevant literature on natural hazards and COVID-19; and b) analyze the reported CSFs using the BBB Framework and validate, with a disaster resilience lens, the framework's applicability and relevance in view of successful resilience practices based on relevant literature.

IV. METHODOLOGY

This research involves a combination of desktop research via the Scopus database and a study on disaster cases using the BBB Framework. A systematic literature review was conducted to identify and examine reported CSFs having a context of resilience to a natural hazard or COVID-19. The collated CSFs for previous post-disaster reconstruction and recovery and the ongoing COVID-19 pandemic performances were cross-referenced with the BBB Framework indicators to check the observance of BBB Framework principles. CSFs that match a BBB Framework indicator were considered to validate the framework's applicability and determine which framework indicators are most likely critical to success from a disaster resilience lens.

V. RESULTS AND ANALYSIS

Post-disaster and pandemic CSFs as of July 2021 were collated for analysis. A total of 84 factors based on 13 works of literature from the Scopus database was analyzed. Of the 84, 55 CSFs from eight works of literature are specific to post-disaster reconstruction and recovery efforts (about earthquake and tsunami), humanitarian aid supply chain (about tsunami), as well as cases of Indonesia (earthquake), Malaysia (landslide), New Zealand (earthquake), South India (tsunami and flooding), Taiwan (earthquake and typhoon), and Thailand (tsunami). The remaining 29 CSFs from five works of literature are regarding the COVID-19 pandemic, i.e., countries' coping levels, their preventive strategies with an economy-centric approach, Asia-Pacific countries' success level from the social-ecological standpoint, public policy responses of the Russian Federation and two Central European countries, and individual and community resilience

in terms of risk and crisis communication. The collated success factors were cross-referenced with eight BBB Framework principles and the principles' respective indicators. The analysis reveals that the reported CSFs can be linked to the three categories of the BBB Framework (disaster risk reduction, community recovery, and effective implementation). Table I affirms the framework's applicability and relevance by summarizing the reported CSFs, from various works of literature, in terms of the framework's terminologies.

Table **I.** BBB Framework indicators most likely critical to success from a disaster resilience lens

BBB Framework Principle	BBB Framework Indicator (Summarized)	
	Natural Hazard Resilience CSF	**COVID-19 Resilience CSF**
Risk Reduction[a]		
Structural resilience or health sector resilience	• Communication with stakeholder • Professional supervision	
	• Funding to improve structures • Redundancy and transitional arrangements • Quality assurance	--
Multi-hazard based land-use planning / risk-based zoning	--	• Temporary isolation plans
Early warning and risk reduction education	• Education on disaster risk reduction	--
Community Recovery[b]		
Psychological and social recovery	• Specialized assistance to vulnerable groups • Alternative activities to create community togetherness • Transparency in recovery decisions	
Economic recovery	• Government support	• Supporting economic restoration
Effective Implementation[c]		
Institutional mechanism	• Recovery authority • Level of centralization/decentralization • Supporting impacted organizations • Monitoring and evaluation	
	• Roles and responsibilities for stakeholders • Recovery fund • Information database • Multi-stakeholder meetings • Partnership	--
Legislation and regulation	• BBB-based recovery decisions • Efficiency for recovery	
	• Legislative provisions	--
Monitoring and evaluation	• Learning/obtaining lessons	
	• Comprehensive data collection	--

Notes:
- A blank means no reported CSF from the literature review associated with a BBB Framework indicator.
- The framework has a number of close to 60 indicators.
- The framework's three categories are defined below (excerpts from the international research of Mannakkara and Wilkinson) [4].

[a] *Risk Reduction* – Putting measures in place to improve resilience; land-use planning based on multi-hazard analysis or risk-based zoning; and disaster risk reduction and early warning education for communities

[b] *Community Recovery* – Supporting the psycho-social recovery and economic recovery of affected communities as a priority during the rebuild

[c] *Effective Implementation* – Implementing appropriate institutional mechanisms; legislation and regulation; and monitoring and evaluation to improve the effectiveness and efficiency of recovery

Almost half of the BBB Framework indicators (26 out of 59 indicators pertaining to post-disaster reconstruction and recovery or 56 indicators pertaining to pandemic recovery) are substantiated by reported CSFs from the literature review. In the meanwhile, this result invites the interpretation that indicators excluded from Table I are not considered critical in

achieving success from a disaster resilience lens or have not been reported as such. Otherwise, the excluded indicators have not been implemented remarkably and may be contemplated as CSF in a particular setting in the future. For disaster management practitioners evaluating recovery efforts with a considerable number of indicators, it would be helpful to know which indicators are most critical and thus preferably backed up with a high standard of evidence.

Most of the reported CSFs match the BBB Framework indicators under effective implementation, one of the framework's three categories. Of the three categories, community recovery is least represented by the reported CSFs. This observation is a superficial contradiction to the BBB Framework's intent to improve a community's conditions. Understandably, the community recovery category is underpinned by two principles, whereas the risk reduction and effective implementation categories are underpinned by three principles each.

The results from Table I acknowledge that the BBB Framework thrives on a holistic strategy to create a more resilient community. The categories, including their principles and indicators, manifest the importance of post-disaster recovery and pre-disaster planning for greater resilience outcomes. Nevertheless, the rapid response or early recovery aspect is vague. Cross-cutting factors − political influences and public policy, which are perceived to be among the prevailing drivers of community resilience, especially during the COVID-19 pandemic − are currently not highlighted. The framework provides related principles, for instance, structural/health sector resilience (communicating with stakeholders, recovery advisory services), psychological and social recovery (community advisory service, informing the community), institutional mechanism (recovery authority, multi-stakeholder meetings), and legislation and regulation (BBB-based recovery decisions, efficiency for recovery). Nonetheless, these do not steadily reflect the criticality of adaptive and transformative changes for communities to recover as one.

VI. DISCUSSION

Table II presents the specific factors culled from the literature review [8]-[20]. The factors were classified according to the BBB Framework indicator, given the most obvious context from the corresponding author.

Table **II.** BBB Framework indicators vis-à-vis reported CSFs

BBB Framework Indicator	Literature Review Reported CSF	Literature Review Author Example
Communication with stakeholder	effective communication mechanism, good coordination and communication, stakeholder management	Anilkumar & Banerji (2021), Kashyap & Raghuvanshi (2020), Lin Moe & Pathranarakul (2006), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)
Professional supervision	input of expert teams, mismanagement in the medical sector	Baniamin, Rahman & Hasan (2020), Chou & Wu (2014)
Funding to improve structures	formulation of a flexible funding plan	Liu, Scheepbouwer & Giovinazzi (2016)
Redundancy and transitional arrangements	strategic, transport & capacity planning, supply chain strategy, resource/ inventory, human resource & information management, supplier relations, technology utilization	Hidayat & Egbu (2011), Pettit & Beresford (2009)
Quality assurance	continuous improvement	
Temporary isolation plans	social distancing, sealing the borders of the territory	Kashyap & Raghuvanshi (2020)
Education on risk reduction measures	resident disaster prevention awareness, community education & awareness, an understanding of the community-based method	Chou & Wu (2014), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013), Ridzuan, Kadir, Yaacob, Zainol, Abdullah et al. (2020)
Specialized assistance to vulnerable groups	successful beneficiary identification, presence of vulnerable population, sensitivity towards particular terminologies	Baniamin, Rahman & Hasan (2020), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)

BBB Framework Indicator	Literature Review Reported CSF	Literature Review Author Example
Alternative activities to create community togetherness	community engagement, having a significant level of community participation/ control, involvement of all community members, demographic attributes, family structure, cultural practices and close proximity, religious and social sentiments, attitude towards personal safety measures	Baniamin, Rahman & Hasan (2020), Liu, Scheepbouwer & Giovinazzi (2016), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013), Ridzuan, Kadir, Yaacob, Zainol, Abdullah et al. (2020)
Transparency in recovery decisions	transparency and accountability, gathering trust from the community, institutional trust and civil disobedience, high trust level of citizens towards government	Baniamin, Rahman & Hasan (2020), Ling, Suhud, Leng, Yeo, Cheng et al. (2021), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)
Government support	government support	Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)
Supporting economic restoration	concern for the economy and hesitation to take draconian policy for the state, adopting new technology	Baniamin, Rahman and Hasan (2020), Kashyap & Raghuvanshi (2020)
Recovery authority	effective institutional arrangement, institutional mechanism, policy frameworks, strong leadership and government control	Anilkumar & Banerji (2021), Chou & Wu (2014), Kashyap & Raghuvanshi (2020), Lin Moe & Pathranarakul (2006)
Level of centralization/ decentralization	facilitator and implementer capacities	Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)
Supporting impacted organizations	general coordination of organizations, human resources, capacity and preparedness to test and trace, quite limited capacity of the health system	Baniamin, Rahman & Hasan (2020), Hidayat & Egbu (2011), Katsikopoulos (2021)
Monitoring and evaluation	effective logistics management, sufficient mobilization and disbursement of resources, project implementation, timing of public policy responses, strict implementation of lockdown, penalties	Anilkumar & Banerji (2021), Chubarova, Maly & Nemec (2020), Ling, Suhud, Leng, Yeo, Cheng et al. (2021), Lin Moe & Pathranarakul (2006)
Roles and responsibilities for stakeholders	competencies of managers and team members, defined authority and responsibilities for the various stakeholders, clearly defined goals and commitments by key stakeholders	Chou & Wu (2014), Lin Moe & Pathranarakul (2006)
Recovery fund	availability of government funding, sufficient funding availability	Chou & Wu (2014), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)
Information database	effective information management system	Lin Moe & Pathranarakul (2006)
Multi-stakeholder meetings	effective consultation with key stakeholders and target beneficiaries	Lin Moe & Pathranarakul (2006)
Partnership	coordination and collaboration	Lin Moe & Pathranarakul (2006)
BBB-based recovery decisions	appropriate reconstruction policy/strategy, establishment of a recovery vehicle, modifying rules and regulations at the workplace, comprehensive COVID-19 testing policy	Anilkumar & Banerji (2021), Kashyap & Raghuvanshi (2020), Ling, Suhud, Leng, Yeo, Cheng et al. (2021), Liu, Scheepbouwer & Giovinazzi (2016), Ophiyandri, Amaratunga, Pathirage & Keraminiyage (2013)

BBB Framework Indicator	Literature Review Reported CSF	Literature Review Author Example
Efficiency for recovery	selection of a rebuild driver, determination of rebuild project prioritization methodology, policy implementation structure, ability to be innovative and to use technology, highly adequate and efficient mobilized facilities	Baniamin, Rahman & Hasan (2020), Ling, Suhud, Leng, Yeo, Cheng et al. (2021), Liu, Scheepbouwer & Giovinazzi (2016)
Legislative provisions	supportive laws and regulations	Lin Moe & Pathranarakul (2006)
Learning/ obtaining lessons	community learning mechanisms, policy learning from previous experiences	Baniamin, Rahman & Hasan (2020), Chou & Wu (2014)
Comprehensive data collection	standardization of data management mechanism	Liu, Scheepbouwer & Giovinazzi (2016)

The CSFs were formulated by authors for different purposes, with different methods, and in different circumstances. It would be prudent not to generalize them. The resilience context of these cases, including the actors, events, assets, and resources, could affect the criticality of disaster or pandemic management elements. On the one hand, a CSF will not necessarily apply to or be as crucial in any disaster or pandemic setting. On the other hand, these CSFs are not mutually exclusive and can affect other CSFs in certain situations. At the same time, these CSFs can be viewed as part of broader structures and relationships that make and shape systemic change.

The momentum for change has persisted since the declaration of the COVID-19 pandemic, yet resilience capacities are still in demand. In this COVID-19 era, countries have varying approaches, strategies, and tactics in controlling the spread of COVID-19 as well as enabling social change for sustainability. Right now, a single public policy has not been pervasive, nor have non-coercive sanctions from government leaders been consistent. This chaotic setup is replicated to some extent on the local scales. Existing political regimes and instrumental resources have established risk reduction measures for the majority and the vulnerable (e.g., vaccination), yet the communities' ideals (e.g., isolation) are not aligned. Consequently, the world society is not in unison in recovering from the pandemic and addressing sustainability outcomes. Better discursive means seem required for more effective recovery implementation and are ideal for political influence and public policy to galvanize prevailing attempts to end the pandemic.

Table III enumerates the rest of the CSFs attributed to community resilience − a relatively wider dimension, thus seen to be interconnected with all categories of the BBB Framework.

Table **III.** Reported CSFs associated with community resilience

Literature Review Reported CSF	Literature Review Author Example	BBB Framework Category
Community leadership*	Ridzuan, Kadir, Yaacob, Zainol, Abdullah et al. (2020)	• Risk reduction (structural resilience / health sector resilience)
Influence of community leaders*	Chou & Wu (2014)	
Nature of governance**	Baniamin, Rahman & Hasan (2020)	• Community recovery
Success in motivating compliance**	Chubarova, Maly & Nemec (2020)	• Effective implementation

* Natural hazard resilience context
** COVID-19 resilience context

Disaster management studies have witnessed the multifaceted nature of resilience. For instance, resilience themes may refer to infrastructure, economy and business, climate, and community. Community disaster resilience can be summarized as the ability of communities to rise from or withstand disasters through coping, adaptive, and transformative capacities. Fig. 3 illustrates the intersection of community capitals and disaster management activities [21]. The intersection places resilience at a systemic gap and opportunity to safeguard a community's capitals for continued development amidst disasters.
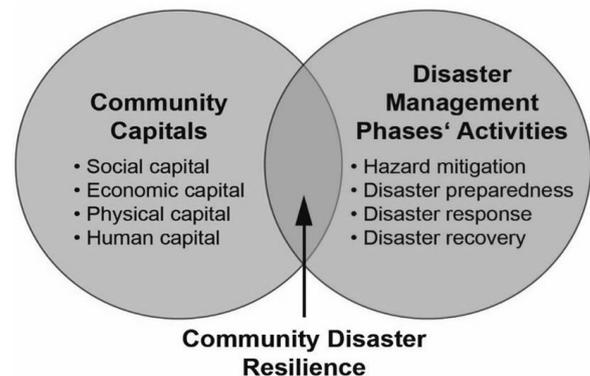
Fig. **3.** Community disaster resilience framework [21]

It is argued that political influence driving community resilience is present in the last four CSFs of Table III. Lin Moe and Pathranarakul (2006) opined that the political leaders' willingness to adopt certain approaches is crucial in responding to disasters and promoting sustainability [8]. Along this vein, Pettit and Beresford (2009) intimated that political constraints brought about by cultural elements can determine supply chain decisions during crisis response [9]. In enhancing urban communities' disaster resilience, the community leader's role of ensuring interventions consistent with community needs was underscored by Chou and Wu (2014) [12]. The role makes sense with the position of Ridzuan, Kadir, Yaacob, Zainol, Abdullah et al. (2020, p.7) that in a disaster, a leader's good personal coping capacity can generate attitudinal and behavioral outcomes among the community members, such as "readiness, compliance with law, cooperation, commitment and ethics" [14]. Whereas the stakeholders' attitude impacts post-disaster recovery projects' objectives [22], the criticality of a leader's political influence on successful uptake by stakeholders is magnified. Given these works of literature, political influence can be understood vis-à-vis a community leader's influence and governance that ideally stimulates compliance.

Reflecting on COVID-19, researchers have recognized the dimensions of power, politics, health, and development as an opportunity for collaboration between governments and communities [23]-[24]. Amidst these opportunities, the looming threats catapulted by COVID-19 cannot be unforeseen. Specifically, the integration of gender lens in policy response [25], equal application of public policy to faith groups [26], as well as enhanced coordination, data management, and decentralized planning [27] − still among the ways forward − were proposed together with facilitating health interventions in order to build a better world. According to a behavioral perspective reviewing Brazil's pandemic situation, successful emergent practices can emanate at the policy level. This perspective rejects returning to the preceding sense of normality in exchange for the community's opportunity to learn, innovate, and prepare for the following disturbances [28]. It is submitted that public policy is central to community resilience for success, globally recovering from COVID-19. Without a coherent public policy, communities are at a loss, contending with local vulnerabilities, including chronic and ensuing challenges.

As political influences can shape public policy then and now, resulting policies and actions must lead to recovery at the earliest opportunity. Studies have recommended support by the government and other actors in initiating horizontal networks during the pandemic [29], and advancing public health awareness to improve human behavior in the long term [30]. A recovery-oriented study envisioned partnership agreements among local authorities and the community or voluntary sector for quick response to community needs [31]. Another study projected a broadened crisis planning by local governments and private businesses to allow for buffer capacity in future emergencies [32]. Optimistically, governments will intensify engagement with stakeholders in pursuit of greater resilience and sustainability outcomes.

Social cohesion and community resilience are key to recovery from the COVID-19 pandemic [33]. Further, utilizing "pre-existing collective understanding of the system situation" as per Katsikopoulos (2021, p.117) can contribute to adaptive resilience even without risk communication campaigns [20]. How the healthy system's weakness transformed into a call to the public for preventive measures during the pandemic elucidates the adaptation. Furthermore, upgrading community resilience capabilities could assist grassroots decision-makers in adopting appropriate response strategies to reduce the risk [34]. In such a resilience landscape, it is hoped that the governments and communities shall progressively plan and implement resilient governance, ultimately reaching a successful post- COVID-19 recovery.

VII. CONCLUSION

Reported CSFs from various works of literature, whether on previous disasters or the COVID-19 pandemic, validate the applicability and relevance of the BBB Framework in evaluating recovery efforts. Moreover, this research established that the reported CSFs could be traced to the framework's categories: risk reduction, community recovery, and effective implementation. In addition, this research suggests that political influences and public policy, driving community resilience yet not currently highlighted in the framework, may be treated as an indication of building better (rapid response or early recovery) and successful resilience performance. Timely studies support the suggestion, putting forward the needed collaboration between the governments and communities as well as their roles in promoting resilient governance and social cohesion for recovery.

The research findings are not meant to be exhaustive, since mostly Asia-Pacific case studies were integrated into the literature, and the solution to COVID-19 has yet to be significantly realized. Further systematic review considering the recent developments may corroborate the findings on success and direct future research. At any rate, the research has found that a recovery framework may be perceived as wanting when something as practicably invisible as a virus puts people's liberty at stake for over a year (and counting)

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