Disaster Recovery Guidance Series: Private Sector Participation in Disaster Recovery and Mitigation (DRAFT OUTLINE)

CONFERENCE VERSION

FOR CONSULTATION

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I. Introduction

A. Disasters, disaster recovery, mitigation and the role of private sector

In recent years, the severity and frequency of natural disasters has risen, resulting in increasing human and economic losses (Box 1). An alarming related trend are the losses imposed by smaller-scale and recurrent local disasters.[[1]](#footnote-1) Such disasters particularly affect households, communities and small and medium enterprises, who consequently bear a high proportion of the losses.[[2]](#footnote-2) It is estimated that in Latin America and the Caribbean between 1990 and 2014, small scale disasters accounted for over half of human losses caused by climate events.[[3]](#footnote-3) In addition, disasters also pose a risk to the viability and functioning of existing infrastructure and services. For example, after the Nepal earthquake in 2015, the damages to infrastructure, amounting to almost 472 million USD[[4]](#footnote-4), diminished a significant amount of the existing infrastructure.[[5]](#footnote-5) This exacerbated the logistical difficulties associated with the emergency response to the disaster and the recovery from it.

**Box 1: A rise in the number and severity of natural disasters**

*Figure 1: The number of affected individuals and the damages induced by natural disasters between 1950 to 2018.*

Source: Figure constructed based on data from EM-DAT: The Emergency Events Database[[6]](#footnote-6)

The frequency of natural disasters recorded in the Emergency Events Database (EM-DAT) has increased from 2776 reported natural disasters between 1950-1985 to 11556 reported natural disasters between 1985-2018, an over four-fold increase. The rise in the number of disasters accompanied by an increase in their severity has had a concomitant impact on human lives and economic damage.

Source: Figure constructed based on data from EM-DAT: The Emergency Events Database[[7]](#footnote-7)

Today's greater interconnectivity means that the impact of disasters is not restricted to an area, country or region alone, but it may in fact impact organizations and individuals in other parts of the world too.[[8]](#footnote-8) While natural disasters by themselves are beyond anyone's control, the preparation and response to them can be managed so that the economic and human losses can be minimized or eliminated altogether. [[9]](#footnote-9) Researchers estimate that on average $1 spent on preparedness is worth about $15 in terms of the future damage it mitigates.[[10]](#footnote-10) While states have the overall responsibility to drive disaster recovery and mitigation efforts, especially in the aftermath of a disaster, it is often a shared task between the government and relevant stakeholders.[[11]](#footnote-11) In practice, when a disaster strikes, besides the government response, we see non-profits, aid organizations, international organizations, local communities and individual agents also providing support (for an example see Box 2).

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| **Box 2: The response by non-governmental entities to the 2004 Indian Ocean Tsunami**Following the 2004 Indian Ocean Tsunami in Indonesia, Mercy Corps rushed emergency responders and relief supplies such as food, hygiene supplies and building materials to the affected area. [[12]](#footnote-12) The World Food Programme delivered food rations to about 0.8 million people. UNICEF provided clean water and sanitation as well as immunizations and supplementary feeding for children at risk of disease and malnutrition. Médecins Sans Frontières (MSF) sent volunteers to particularly hard-hit communities to provide medical and psychological support. The World Bank along with other global partners, contributed to recovery efforts by establishing the Multi-Donor Trust Fund for Aceh and Nias, which helped rebuild earthquake-resistant homes and key infrastructure like roads, irrigation canals, schools, clinics, clean water sources and sanitation units. [[13]](#footnote-13) [[14]](#footnote-14)  |

The private sector also provides post-disaster support although in a less systematic and ad-hoc manner. Strategic and planned partnerships between the government and the private sector for disaster recovery and mitigation is still an area for improvement.[[15]](#footnote-15) More importantly, government effectiveness in this matter can be strengthened by leveraging on existing private sector capacities and their core competencies. Effectively involving the private sector in disaster recovery can open opportunities to increase resilience and reduce pre-disaster inherent risks by building back better (BBB). Private participation in disaster recovery can also allow for faster and more efficient recovery efforts at a time when governments are already overstretched. Therefore, under the right enabling conditions, the private sector can make a very positive contribution towards disaster recovery and mitigation both in the short- and long-term.

B. About this Guidance Note: Aim, relevance and scope

This Guidance Note aims to provide action-oriented guidance to local and national government officials, key decision makers and other stakeholders on ways to encourage, enable and facilitate successful private sector participation in post-disaster recovery. In this note, the term 'disaster' is limited to natural hazards (excluding those caused by biological phenomena such as disease epidemics or insect plagues).[[16]](#footnote-16) It does not include man-made hazards, such as conflict and complex emergencies.[[17]](#footnote-17)

When it comes to private sector participation in disaster recovery and mitigation, there is a knowledge gap on the forms of engagement that could or may already exist and on why it should and how it can be better facilitated. Research in this regard is still in its infancy, which also leads to a lack of reliable data.[[18]](#footnote-18) While there are numerous examples of private-sector participation in the form of pro-bono, philanthropic and not-for-profit initiatives following a disaster, not much is known about alternate forms of private sector participation in disaster recovery. This Note takes a first step towards filling that gap by mapping the existing private sector participation in disaster recovery and mitigation. This exercise helps identify sectoral areas and forms of private sector participation where there is potential for greater private involvement.

The Guidance Note also lays out the case for private sector participation in disaster recovery and mitigation, showing by way of case studies and examples where this has been tried out. This Note is divided into four sections. The first section introduces the notion of private sector participation in disaster recovery and mitigation; the second section provides the rationale for private sector involvement in it; the third section discusses and maps the existing prevalence and forms of private sector participation in disaster recovery and mitigation; and the fourth section highlights some common challenges and provides some guidance for governments on the key elements for successful private sector participation in disaster recovery efforts. Appended to the end of this Guidance Note are more details on the examples cited in the tables.

This Note is based on research drawn from academic as well as practitioner sources. This includes but is not limited to journal articles, books, reports, news articles and briefs prepared by The World Bank, ILO, APEC, International Economic Council, IFC, OECD, UNISDR, UNESCAP, RAND, media agencies as well as CSR reports of various private companies and business organisations. Information has also been taken from the World Bank's PPI database. The Note uses a case study approach to draw out lessons and best practices. Therefore, many of the solutions identified are disaster- and country- specific, thereby, implying that generalizations to other contexts may not be appropriate. They would need to be tempered by the local context as every disaster scenario is unique in its cultural, socio-economic, governmental capacity, institutional and regulatory set-up. The solutions presented here should be taken as examples about what proved to be effective and has the potential to deliver similar results in other contexts under the right institutional arrangements. Similarly, what proved to be ineffective also offers lessons in what governments should be mindful of.

C. Key terms in this Guidance Note

1. Disaster Management Cycle and Disaster Recovery (DR)

A disaster management cycle illustrates the different phases by which governments and other entities plan for and reduce the impact of disasters, react during and immediately following a disaster, and take steps to recover after a disaster strikes.[[19]](#footnote-19) Typically, the disaster management cycle is thought to comprise of four equally important phases: mitigation, preparedness, response and recovery.[[20]](#footnote-20)

Mitigation comprises of actions taken to prevent, reduce the impact, consequences and causes of disasters. Preparedness includes planning, training and undertaking other activities for events that cannot be mitigated. Mitigation and preparedness are generally associated with the pre-disaster period. Disaster response unfolds in the immediate aftermath of a disaster and takes the form of disaster relief operations as well as other measures to curtail the damage imposed by a disaster. In the recovery phase, which occurs post-disaster, restoration and reconstruction efforts are undertaken concurrently with regular activities.[[21]](#footnote-21)

Figure 2 presents the phases described above. Note that the four phases are not mutually exclusive and can be thought of as a broad generalization rather than strictly defined categories. They also do not necessarily occur in isolation or unfold in a linear, cyclical or sequential manner. They often overlap, with the length of the phase dependent upon the severity of the disaster.[[22]](#footnote-22)



*Figure 2: The Disaster Management Cycle*

Source: Adapted from FEMA24 and Thomas1

Disaster recovery incorporates elements of disaster response as well as mitigation. For instance, the response to a disaster wherein critical infrastructure has been damaged will take the form of restoration efforts. Therefore, response and recovery will be two sides of the same coin in this instance. Similarly, when recovery takes the form of post-disaster reconstruction efforts that build back better by constructing disaster resilient structures, then this also helps mitigate the impact of future disasters.

2. Private Sector Participation (PSP)

Private sector activities, for the purposes of this note, is defined as *all economic activities that do not involve production by the public sector. This definition includes all for profit firms regardless of size, activity (goods, services, or financial), or location (urban or rural). It also includes institutions specifically established to serve the private sector such as industry associations*.[[23]](#footnote-23) While some authors include non-governmental organizations (NGOs) as part of the private sector, this guidance note restricts the term 'private sector' to mean entities that are typically driven by a commercial interest such as firms, businesses, corporations, companies and business/industry associations.

The extent of private sector participation in an economy can be described along a continuum ranging from low to high (Figure 3). Here 'low' refers to instances where the public-sector uses the private sector just as a contractor to build and/or design infrastructure or also to manage services in the short term or to supply goods. Such contracts apply when the government has the skills and knowledge to know the technical solution it requires (or has pre-determined design standards), prefers to retain maintenance responsibility over the long term and has the budget to pay for the works.

In contrast, at the other end of the spectrum the private participation is the highest. Here 'high' refers to instances where the private sector owns and operates an asset, for example, when the private sector operates as an independent, licensed and regulated company. Between these two extremes lies the case of Public-Private Partnerships (PPPs), which constitute a specific way of financing and procuring infrastructure assets and services.

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| *A picture containing object  Description automatically generated**Figure 3: Extent of Private Sector Participation* Source: Adapted from PPP-LRC[[24]](#footnote-24) and APMG PPP Certification Guide[[25]](#footnote-25) |

Therefore, it is important to note that private sector participation is not a synonym for public private partnerships (PPPs). Private participation includes other forms of private involvement in the delivery and/or management of public infrastructure that would not be considered a PPP because of a lack of risk transfer to the private sector.

3. Public-Private Partnerships (PPPs)

A Public-Private Partnership is defined as *a long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance.*[[26]](#footnote-26)

PPPs can be described in terms of the assets involved, the division of functions and the payment mechanism. PPPs may involve the creation of new assets or the upgradation of management of existing ones. [[27]](#footnote-27) The private sector may carry out multiple functions depending on the type of asset and service involved. Typical functions include but are not limited to – design, build (or rehabilitate), finance, maintain and operate. The payment mechanism is usually structured in such a way that the net renumeration of the private party is linked to performance. This is done by collecting fees from service users, the government, or a combination of the two.

In the broader literature on the role of the private sector and PPPs in disaster recovery and mitigation, the term is used very loosely and often to describe pro-bono, non-contractual and collaborative relationships between the government and the private party. Even when a contractual agreement exists between the government and private entity, there may be cases where such a partnership does not exhibit the defining feature of a PPP – the transference of significant risk and responsibilities to the private party under a long-term contract as well as performance-based remuneration. For instance, an agreement that does not incorporate a credible commitment on performance, but simply a commitment by the private sector to apply its best efforts towards a certain goal.[[28]](#footnote-28)

In addition, a PPP is also not equivalent to privatization. Privatization involves the permanent transfer of a previously publicly-owned asset to the private sector, an aspect that has currently not been seen in the research conducted for this guidance note.

4. Corporate Social Responsibility (CSR)

The World Bank defines Corporate Social Responsibility (CSR) as *the commitment of businesses to behave ethically and to contribute to sustainable economic development by working with all relevant stakeholders to improve their lives in ways that are good for business, the sustainable development agenda, and society at large.*[[29]](#footnote-29)

The World Bank's definition is one of many. However, two defining features of CSR tend to cut across different definitions for it. These are: first, CSR is manifested in observable and measurable output or behaviour. Second, this behaviour exceeds the standards enforced by law or exceeds levels set by obligatory regulation.[[30]](#footnote-30) [[31]](#footnote-31)

Private participation as a CSR activity is particularly prominent in disaster recovery and therefore, is included in this guidance note. Private firms, of all sizes, make a wide variety for financial and non-financial contributions in the aftermath of disasters. For instance, in the aftermath of Typhoon Haiyan in the Philippines in 2013, it has been estimated that the private sector contributed at least half of all humanitarian assistance.[[32]](#footnote-32) However, outside of financial contributions, the involvement by the private sector in post-disaster situations has highlighted the opportunities the government may have in leveraging the skills, resources and expertise of the private sector in a more formal manner to better plan for disaster recovery and mitigation. These include innovations in telecommunications, logistics and other new technologies.

5. Loss of Functionality (LoF), Time for Recovery (TfR) and Accumulated Loss of Functionality (ALF)

In the context of infrastructure, 'resilience' describes (i) an asset's ability to withstand shocks in such a way that minimizes losses in the levels of service provided by the asset (also known as asset functionality) and (ii) the asset's capacity to recover functionality across multiple dimensions following a disaster event.[[33]](#footnote-33)

*Loss of functionality* ($LoF$) accounts for reduced levels of service that the infrastructure in general produces due to disaster events. Since structural robustness helps an asset withstand shocks in the event of a disaster, $LoF$ is a function of both – (i) the impact of natural disasters, and (ii) the structural measures taken during the design and construction of the infrastructure to resist or absorb the external forces imposed by these disasters.[[34]](#footnote-34)

Recoverability refers to the ability of an asset to recover its functionality quickly. Recoverability is associated not only with physical factors, but also with social, organizational, resource-related, and managerial factors. Recoverability is dependent on the readiness of resources and preparedness of organizations to respond to disaster events. Recovery of functionality requires the availability of human and capital resources (e.g., machinery) as well as organizational plans and processes required to take necessary actions rapidly and effectively. Therefore, the *Time for Recovery* (TfR) is defined as the time that it takes an infrastructure asset that has been hit by a disaster, to return to a near-total or pre-disaster level of performance.[[35]](#footnote-35)

Putting these two aspects together, the *Accumulated Loss of Functionality* (ALF) measures the total functionality loss suffered by the asset until it is back to the pre-disaster levels of service (Box 3).

**Box 3: Concept of Loss of Functionality, Time for Recovery and Accumulated Loss of Functionality**

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| *Figure 4: Asset functionality and post-disaster recovery over time*Source: Marcelo, House and Raina36 The figure above illustrates the "recovering of functionality" process of an asset after a disruption, such as a natural disaster. An infrastructure asset (e.g., a road or bridge) is susceptible to losing its functionality after a natural disaster. This decrease in functionality is defined as 'loss of functionality' ($LoF$). Over time, functionality will typically recover, reaching a near-total or total pre-disaster level of performance. This is defined as the 'time for recovery' ($TfR$). The recovery time depends on the physical attributes of the asset, as well as the systems and processes in place. Therefore, the accumulated loss of functionality ($ALF$) will account for the aggregated functionality loss over the recovery time. 36 |

6. Build Back Better (BBB)

Build Back Better (BBB) is defined as the *use of the recovery, rehabilitation and reconstruction phase after a disaster to increase resilience and integrate disaster risk reduction measures into the restoration of physical infrastructure and societal systems, including livelihoods, economies and the environment*.[[36]](#footnote-36) If implemented properly, BBB has the potential to increase the asset functionality of a reconstructed work to a level which exceeds the pre-disaster level. Additionally, by building back better the time for recovery, in case of future disasters, can also be significantly reduced.

II. Rationale for private sector participation in disaster recovery: For emergency response and long-term recovery

In general, the private sector has been a supplier of goods and services for the government and aid agencies in the aftermath of a disaster. This has included construction companies who deployed assets and staff during and after disasters; consumer goods companies, that provided in-kind materials (e.g. hygiene products, soaps, water purification tablets, etc.); and even small firms and businesses that distributed food, water, clothing and other goods to affected people.[[37]](#footnote-37) Increasingly, the private sector is also being recognised as a driver of innovation and a strategic partner in disaster recovery. For instance, IKEA's solar-powered shelters, that have been deployed following disasters, last six times longer as compared to a typical emergency tent (Box 4).[[38]](#footnote-38) [[39]](#footnote-39)

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| **Box 4: IKEA's Solar-powered Better Shelter**Developed by the not-for-profit Ikea Foundation with UNHCR, IKEA's solar-powered Better Shelter lasts six times longer than a typical emergency tent. Not only is the 188 square foot emergency shelter easy to assemble, it can be built in just about four hours. It can sleep five people comfortably and is twice the size of a regulation refugee tent. The shelter also comes with solar-powered roofing. This eliminates the need for candles or kerosene lamps, which can pose a danger of fire. In addition, the interiors are kept cool during hot weather because the roof deflects solar heat gain by 70%.[[40]](#footnote-40) These shelters were used in Nepal following the 2015 earthquake[[41]](#footnote-41) and in Senegal in 2018 following severe coastal erosion[[42]](#footnote-42). Based on feedback Ikea is working on a re-design to make the shelters fire-resistant.[[43]](#footnote-43) |

The private sector has played a role as a strategic partner in telecommunications, insurance and logistics, where its resources and expertise has allowed the communities to recover faster than if they were solely dependent on public sector resources (Boxes 5 and 6).

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| **Box 5: Examples of private sector involvement in the emergency response to the disaster**UPS, Walmart and FedEx helped in coordinating humanitarian logistics (through the delivery and supply of aid and relief materials) in the aftermath of the earthquake in Haiti in 2010 and following Hurricane Katrina in 2005. Similarly, IBM and Microsoft contributed to recovery efforts through use of their ICT tools and data to manage and plan emergency operations better during the earthquake and Tsunami in Japan in 2011. Following the earthquake in Haiti in 2010, Google worked with an aerial surveillance company GeoEye to make damage assessments and help target aid to the most impacted areas. [[44]](#footnote-44) |

Compared to governments and multilateral aid agencies, the private sector often possesses capabilities that enable a faster and more effective emergency response to disasters. [[45]](#footnote-45) The private sector can also reduce the likelihood of disruption caused by disasters by using innovative technologies, research and data to build back better. Leveraging on private sector strengths, governments can increase asset functionality to higher levels than would be possible by government participation alone.

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| **Box 6: The Case of earthquake insurance in Turkey**In the aftermath of the 1999 Marmara earthquake, the Turkish Catastrophe Insurance Pool (TCIP) commenced operations in 2000. TCIP is a PPP insurance entity which provides catastrophe risk insurance for Turkish home-owners. TCIP has no public-employees and all its business operations are managed by the private insurance industry. The government’s role is restricted to providing contingent liquidity support in excess of the TCIP’s claims-paying capacity. The goal of TCIP is to provide earthquake insurance coverage at affordable but actuarially sound rates, limit the government’s financial exposure to natural disasters, build long-term reserves to finance future earthquake losses and encourage risk reduction and disaster mitigation practices in residential constructions. Since TCIP began insurance penetration for catastrophic coverage has increased by more than three times. [[46]](#footnote-46) |

Also, compared to governments and multilateral aid agencies, Private Sector Participation (PSP) functions under a different set of accountability, motivation and incentive structures that govern how it manages, designs, constructs, operates, maintains and delivers services. This under the right enabling conditions and a properly structured and procured contract, can lead to a better provision of assets and services (i.e. higher asset functionality) than if the same set of tasks was performed by the public-sector. For instance, a form of private participation, Public Private Partnerships (PPPs), can deliver quality, reliable, and cost-efficient infrastructure in post-disaster situations (See Box 23 on Haiti Telecom). By harnessing private sector expertise and efficiency as well as ability to mobilize capital faster, PPPs can improve the speed, quality and affordability of services as well as introduce innovations that respond better to the needs of the people.

While the private sector can assist in the immediate aftermath of a disaster, enabling the community to recover faster through a shortening of the time for recovery, even from an infrastructure resilience perspective[[47]](#footnote-47), the private sector can reduce the accumulated loss of functionality (described in the previous section) by BBB. By improving pre-disaster construction standards, reconstructed infrastructure assets may be able to resist better and/or recover more quickly from a future natural disaster.

In summary, there are two main reasons for private sector participation in disaster recovery and mitigation. These are (i) the 'immediacy' with which the private sector is able to undertake operations after a disaster (emergency response) and (ii) the resources at its disposal that enable it to successfully build greater resilience for the future ('long term recovery') (see Table 1).

From the private sector point of view, the rationale for involvement in disaster recovery may stem from multiple reasons. A firm may feel a moral-, religious- or country-related obligation; it may be in the interest of the firm to speed up recovery to secure back its supply chain; it may be to help build brand reputation or to induce brand loyalty by providing services to clients during crises;[[48]](#footnote-48) and it may even be to boost staff morale and retention and job satisfaction.[[49]](#footnote-49) The case for private sector participation is even stronger in countries where a significant proportion of the critical infrastructure is owned and operated by the private sector, such as in the United States where it is estimated to be at 85%, thereby, making it a critical stakeholder.[[50]](#footnote-50) In certain sectors such as insurance, the private sector may have a commercial interest in supporting investments in building long-term resilience so as to reduce losses over time.[[51]](#footnote-51)

Regardless of the motivation, this should not interfere with the potential positive impacts resulting from private sector engagement. Research, using data on every major natural disaster from 2003 to 2013, aid donations and their source, has found corporate disaster aid to not only be more socially beneficial but also more efficient and effective than aid from traditional providers.[[52]](#footnote-52)

Certain types of private sector participation, such as through PPPs, can be harder to undertake in the aftermath of a disaster when time is of the essence (see Box 7: *The general stages of the PPP process and the time it takes for a PPP contract to be signed*) and small projects may not possess the required economies of scale to be structured as PPPs. Therefore, involving the private sector in a systematic and effective way requires pre-planning and strategic thinking to lead to the highest social benefits.

**Table 1: The rationale for private sector participation in disaster recovery and mitigation**

| Emergency Response | Long-Term Recovery |
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| In the aftermath of a disaster the private sector can mobilize resources faster and quicker than the public-sector, especially at a time when government resources may already be stretched. For instance, the private sector can help transport and distribute goods and services faster than the government.[[53]](#footnote-53) | The private sector plays a key role in building back better, whether as a service contractor or by being instrumental in developing resilient systems by way of its expertise, financial resources and technological know-how. |
| The private sector can play a key role in filling the skills and financing gaps in the short and medium term. | In the medium and long term, engagement with the local private sector can also contribute to the development of capabilities of local contractors and construction workers. |
| The private sector can help in providing improved quality of services. [[54]](#footnote-54) | Certain types of private sector involvement can contribute towards generating commercial value from public-sector assets.[[55]](#footnote-55) |
| The private sector may possess greater competencies in the deployment of newer technologies and in the gathering of data that enable faster disaster recovery. | The private sector's competencies over ICT tools can aid in building disaster resilient systems for the future. |
| In the aftermath of a disaster, experts from the private sector can help undertake rapid assessments and provide guidance on how to do things right.[[56]](#footnote-56) | Private sector involvement in disaster recovery is also likely to nudge businesses to take measures to increase their own resilience and decrease the risks they face. This is especially relevant for small and medium enterprises that are often the most vulnerable in disasters.[[57]](#footnote-57) |
| Governments' access to private sector resources, capabilities and logistic networks, when organised properly, can allow governments to concentrate on their own priorities and avoid inefficiencies of duplication.[[58]](#footnote-58) | Successful PPPs between the public and the private sector in disaster recovery can help contribute to greater cooperation and collaboration between the two entities in the future in other spheres and sectors. |

III. Current trends in private sector participation in infrastructure for disaster recovery

As mentioned in the first section, private sector participation can take many forms. The formality of commitment with the government, accountability for results, responsibility for risk management, investment, financing and payment mechanism are the factors that define whether the extent of private sector participation is low or high in an intervention (see Figure 2, section 1).

Table 2 provides a mapping of private sector engagements in disaster recovery by the form of engagement as well as the goal (whether it fulfils immediate response needs or works towards long-term recovery).[[59]](#footnote-59) This mapping exercise reveals two key aspects:

**1**. **The primary mode of private participation in disaster recovery is through short-term service, management or supply contracts and Corporate Social Responsibility**

In the case of service/management contracts, the private sector is primarily engaged as a contractor for the construction, repair or management of services or infrastructure by the government or community, multilateral, aid or other organizations. Typically, service and management contracts are short term arrangements with a duration less than 5 years.[[60]](#footnote-60) Government retains ownership of and responsibility for service provision but finances private providers to give support services.[[61]](#footnote-61) The private sector may also act as a supplier providing material for reconstruction purposes to the government or other organizations.

Service contracts are one of the most expeditious ways of involving the private sector and use their expertise in recovery processes. This usually requires the government opening a competitive tendering process, through which it identifies the most appropriate private partner and works with it to deliver infrastructure and/or services in a post-disaster situation. Such an engagement requires much less government capacity to implement as opposed to a PPP, although the responsibility of financing, and the risks associated with it, remain with the public party.

The other dominant mode of participation by the private sector, in the post-disaster phase, is through its response and recovery actions undertaken under the aegis of Corporate Social Responsibility (CSR) or in the form of not-for profit or philanthropic initiatives. This may involve donating funds, goods or services, either directly or indirectly through the government or local civil society organisation or international aid agency. The key business sectors that engage directly are logistics, transport, consumer goods and services, water and sanitation, banking, agribusiness and engineering and construction.[[62]](#footnote-62)

Although pro-bono contributions by firms in the form of funds, aid materials and technical expertise to support post-disaster situations have been taking place for a long period of time, it is in the last few years that this really accelerated. [[63]](#footnote-63) In 2000, fewer than a third of the world's 3000 largest companies donated anything to disaster relief, but by 2015 the share had surpassed 90 percent with the average donation having increased ten-fold.[[64]](#footnote-64) Particularly since the 2004 Indian­ Ocean tsunami, many collaborations between international NGOs and private firms been developed.[[65]](#footnote-65)

However, such initiatives are often short-term, ad-hoc and independent assistance-based. Therefore, they are also characterised by a lack of impact assessment, which in the long-term, inhibits lesson learning and best practice adoption.[[66]](#footnote-66) Moreover there is limited integration of disaster focussed CSR activities in core planning and organizational structures of the public and private sector.[[67]](#footnote-67) For instance, the 2010-11 Queensland flood disaster in Australia, served as a catalyst for relatively ad-hoc public-private engagement during the response and recovery period.[[68]](#footnote-68) However, there were no state guidelines in place that offered specific guidance on the development of strategic or responsive public-private engagement arrangements in disaster recovery. [[69]](#footnote-69)  This suggests that there is room for private sector involvement in disaster recovery to be channelized into a more organized and effective form.

In addition to the two modes (service contracts and CSR), private sector participation in disaster recovery has some limited presence in the form of PPPs and independent business operations. In case of the latter, business firms may provide necessary or desired services with or without a formal arrangement with government agencies.

**2**. **CSR and service contracts are used for emergency disaster response whereas PPPs tend to help build resilience for disaster mitigation**

Given that post-disaster, the timeliness of response critically affects the well-being of people, it is often more efficient to use the private sector's existing skills and expertise to deploy immediate relief. The private sector can respond quickly and effectively since they are faster in mobilizing staff and resources which often makes them more efficient and effective. This is based on the fact that effectiveness of the emergency response is related to not just the quantum of the response but also the speed with which it arrives and the degree to which it can address areas of critical need.[[70]](#footnote-70) Moreover, disaster recovery is significantly affected by the restoration of critical infrastructure such as transport and communication, and by the speedy delivery of essential items like food, medicine and water.[[71]](#footnote-71) [[72]](#footnote-72) These are areas where the private sector may already possess a comparative advantage, which it can then rally in its response towards the disaster. Corporations that have an active economic presence in a disaster-affected nation are uniquely well-suited for this.[[73]](#footnote-73) Private sector participation tends to fulfil the emergency response motive predominantly when it takes the form of CSR initiatives or when it is engaged as a contractor by other public-sector and disaster management organizations. Since the private sector does not have to deal with the slow contractual processes that governments typically have, it is often able to mobilise resources faster.

To further improve the effectiveness of the emergency response provided by the private sector, governments should conduct the recovery operations through a coordinated system or through short-term performance-based service contracts that appropriately identify and target the beneficiaries who need relief the most. Not doing so contributes to the risk of coordination failures and can exacerbate accountability issues (see Boxes 8, 9 and 10). In the case of independent CSR programs, as they are operated under the discretion of the private firm, they often do not form part of a strategic response to a disaster. Even though these activities would be beneficial, they would not necessarily be efficient and effective in terms of the overall impact of the disaster. Therefore, given that it is now recognized that there is a role for the private sector to play in disaster recovery,[[74]](#footnote-74) [[75]](#footnote-75) [[76]](#footnote-76) [[77]](#footnote-77) it is vital for the government to build its own capacity as a facilitator and coordinator, to identify where the strength of the different actors lie in disaster response and how to deploy them in a more judicious manner.

PPPs are a special case of private participation that require detailed preparation, planning and complex negotiations. They may not be the most suitable for emergency response (see table 1) as they tend to correspond to long-term contracts and must be for a project or set of projects of a significant amount to justify the time and financial costs it takes to prepare it (Box 7).[[78]](#footnote-78)

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| **Box 7: The general stages of the PPP process and the time it takes for a PPP contract to be signed**A screenshot of a cell phone  Description automatically generated*Figure 4: General or Main Stages in the PPP Process*Source: APMG InternationalThe PPP cycle can be complex and time consuming. It includes three main phases – preparation, implementation and procurement, and managing/ operation. In the UK it can take between one to three years to reach contract signing before a project begins construction and operations.[[79]](#footnote-79) In Russia it is estimated it can take between nine months to 2.5 years.[[80]](#footnote-80) One of the more extreme cases is that of the Poland A1 Toll Motorway Project where the first tender was made public in 1995, but the PPP contract for the development of the motorway was signed nine years later in 2004.[[81]](#footnote-81) |

This may explain why PPPs are more common in the post-disaster reconstruction phase, where the government can capitalize on the efficiency and innovation of the private sector to support disaster mitigation by building back better. In the absence of the urgency to respond to the immediate needs of the people, the government can be in a better position to assess whether a PPP is the best form of procurement and provides value for money, and to dedicate the time required for preparing, bringing in all the actors (deal teams, sponsors, multilateral development banks, financiers, etc.) and negotiating the terms and conditions of the contract.

**Table 2: Selected examples and forms of existing private sector participation in disaster recovery**

| Initiative'sGoal | Short-Term Service Contracts | PPPs | Private Business Operations | CSR / Non-profit Initiatives |
| --- | --- | --- | --- | --- |
| Emergency Response | 1. Following Hurricane Harvey in 2017, AshBritt is engaged to collect and manage debris in 14 jurisdictions in Texas.[[82]](#footnote-82)
2. Following the earthquake in Haiti in 2010 Chemonics is awarded a contract for activities like rubble removal.[[83]](#footnote-83) [[84]](#endnote-1)
 |  | 1. Proteus On-Demand is a company that provides a range of emergency services, such as emergency kitchens, mobile facilities and camps.[[85]](#footnote-84) [[86]](#endnote-2)
 | 1. In the aftermath of the 2010 Haiti earthquake FedEx provides complimentary flights with medicines and aid materials.[[87]](#footnote-85) [[88]](#endnote-3)
2. Shell provides monetary support to the Texas Forest Service to support the local fire department following the wildfires in 2011.[[89]](#footnote-86) [[90]](#endnote-4)
3. Walmart and FedEx provide logistical support to affected areas following Hurricane Katrina.[[91]](#footnote-87) [[92]](#endnote-5)
4. Following the 2010 Queensland flood disaster in Australia, large retailers provide logistical support.[[93]](#footnote-88) [[94]](#endnote-6)
5. Tokyo Gas conducts disaster management camps and disaster drills for school children to teach them the relevant disaster related knowledge and skills.[[95]](#footnote-89) [[96]](#endnote-7)
6. Siemens donates potable water filtration units following Cyclone Nargis in Myanmar (2007), Cyclone Sidr in Bangladesh (2008) and the Sichuan earthquake in China (2008).[[97]](#footnote-90) [[98]](#endnote-8)
7. Safaricom, Yu and Airtel, provide their mobile banking platforms pro-bono for the emergency response to the 2011 drought in Kenya.[[99]](#footnote-91) [[100]](#endnote-9)
8. Kenya Commercial Bank and other audit companies offer pro-bono financial and auditing services following the 2011 drought in Kenya.[[101]](#footnote-92)
9. Office Depot retail stores in the US provides information on its website regarding disaster preparedness resources and contributes towards the sponsorship of the US Business Civic Leadership Centre’s national disaster help-desk for businesses.[[102]](#footnote-93) [[103]](#endnote-10)
10. UPS works with the Red Cross to train UPS logisticians as first responders to disasters in key locations in the US. UPS is funding a pilot with the Red Cross to develop a commodity tracking technology to aid disaster response.[[104]](#footnote-94) [[105]](#endnote-11)
11. Following the drought in Sub-Saharan Africa in 2011, Cargill donates 10,000 metric tons (~22 million pounds) of rice to support the World Food Program (WFP) USA’s efforts in Kenya.[[106]](#footnote-95) [[107]](#endnote-12)
12. IBM sponsors workshops for frontline health workers and air providers to provide psychological impact following the flash floods in Pakistan in 2010.[[108]](#footnote-96) [[109]](#endnote-13)
13. Google creates a ‘person-finder’ application following the 2010 earthquake in Haiti to help look for missing people.[[110]](#footnote-97) [[111]](#endnote-14)
14. Following the March 2011 earthquake in Japan, Google provides real-time information mapping the disaster. [[112]](#footnote-98) [[113]](#endnote-15)
15. Google’s public alerts on Google Maps provides emergency alerts. Their landing pages provide emergency numbers, and resources for first responders in the event of a disaster. [[114]](#footnote-99) [[115]](#endnote-16)
16. Microsoft provides 15 million worth of software to humanitarian aid organizations operating in the Horn of Africa following the 2011 drought.[[116]](#footnote-100) [[117]](#endnote-17)
17. Microsoft’s Disaster Response programme provides technological support and services to help restore citizens’ and partners’ operations. Based on needs this can take the form of cloud computing, low bandwidth applications, scaling communication between the government and citizens etc.[[118]](#footnote-101) [[119]](#endnote-18)
18. Following the 2010 earthquake in Haiti, Digicel makes communication data available to help track displaced population.[[120]](#footnote-102) [[121]](#endnote-19)
19. After the 2010 earthquake in Haiti, Google and aerial surveillance company GeoEye to assess damage and steer aid to the worst affected areas.[[122]](#footnote-103) [[123]](#endnote-20)
20. Following the 2010 earthquake in Haiti Teva pharmaceuticals donates medicines and makes a cash contribution towards relief efforts.[[124]](#footnote-104) [[125]](#endnote-21)
21. Following the 2015 earthquake in Nepal, IBM collaborates with the Nepalese government to improve and analyse missing persons data and track distribution of aid material.[[126]](#footnote-105) [[127]](#endnote-22)
22. Following the floods in India and Nepal following the breach of the river Kosi in 2008, BASF Stiftung extended support to provide water and sanitation services to affected communities.[[128]](#footnote-106) [[129]](#endnote-23)
 |
| Long Term Recovery | 1. After Christchurch earthquakes in 2011, New Zealand uses a SCIRT joint competitive model for reconstruction[[130]](#footnote-107)[[131]](#endnote-24)
2. Samoa's Government engages two New Zealand based consultancies to help develop a national disaster management plan and strategy.[[132]](#footnote-108) [[133]](#endnote-25)
3. Local builders are engaged for reconstruction efforts in Indonesia following the 2004 Indian Ocean Tsunami[[134]](#footnote-109) [[135]](#endnote-26)
4. Reconstruction of the Wolong Panda Base & Hubei following the Sichuan earthquake in 2008 involves local construction companies.[[136]](#footnote-110)
5. After Haiti's earthquake in 2010, John McAslan & Partners and local craftsmen are hired to reconstruct the iron market in Port-au-Prince.[[137]](#footnote-111) [[138]](#endnote-27)
 | 1. Citi Group’s PPP related to reconstruction in NYC following Hurricane Sandy.[[139]](#footnote-112)
2. Multiple PPPs in Japan related to Sendai city’s reconstruction activities.[[140]](#footnote-113) [[141]](#endnote-28)
3. Earthquake insurance in Turkey.[[142]](#footnote-114) [[143]](#endnote-29)
4. Following the 2010 earthquake in Haiti, Viettel signs a PPP with the Central Bank of Haiti to modernise Teleco, the SOE telecommunications enterprise.[[144]](#footnote-115) [[145]](#endnote-30)
 | 1. The Shiga Bank (Japan)’s disaster risk reduction related services to their corporate client.[[146]](#footnote-116)
2. Mission Risques Naturels (MRN) is an association created by French insurance companies following the 1999 floods and storms Lothar and Martin. MRN engages in risk knowledge management and disaster prevention.[[147]](#footnote-117) [[148]](#endnote-31)
3. Private flood insurance offered by companies in the US.[[149]](#footnote-118) [[150]](#endnote-32)
 | 1. Private investors from the local community enter into a contract with the City of New Orleans following Hurricane Katrina to build long term resilience and economic health.[[151]](#footnote-119) [[152]](#endnote-33)
2. Following the 2010 earthquake in Haiti, Google provides an ICT platform and cloud storage to the Haitian Ministry of Agriculture to safeguard official operations against future disasters.[[153]](#footnote-120) [[154]](#endnote-34)
3. After the 2004 Indian Ocean Tsunami in Indonesia, the Bali Hotels Association along with the Indonesian Ministry of Tourism develop and disseminate a ‘Tsunami Ready Toolkit’ for helping hotels prepare for future disasters.[[155]](#footnote-121) [[156]](#endnote-35)
4. The Corporate Network for Disaster Response (CNDR) engages in disaster risk reduction interventions (comprising hazard assessment, information dissemination and contingency planning at the community level) in Dingalan, Aurora in the Philippines following mudslides and typhoons of 2004.[[157]](#footnote-122) [[158]](#endnote-36)
5. The Asahi Glass Company in Japan undertakes information campaigns about global warming adaptation and disaster reduction countermeasures and donates disaster resistant glass to evacuation centres and schools.[[159]](#footnote-123) [[160]](#endnote-37)
6. TATA steel organises disaster management training programmes for their employees, contract workers and for masons in the community in India.[[161]](#footnote-124) [[162]](#footnote-125) [[163]](#endnote-38)
7. Following the 2010 earthquake in Haiti, Digicel telecommunications funds the reconstruction of the iron market in Haiti.[[164]](#footnote-126) [[165]](#endnote-39)
 |
| Both | 1. The Brisbane City Council in Australia contracts the post-flood clean up to the private sector after being hit by floods in 2010 and 2011.[[166]](#footnote-127) [[167]](#endnote-40)
2. Telstra is engaged by the Australian Government to develop a national emergency alert system.[[168]](#footnote-128)
 | 1. Astronomical Observatory Project in Sendai City, Japan following the 2011 Great East Japan Earthquake.[[169]](#footnote-129)
 | 1. Private builders engaged by citizens for housing reconstruction after the Victorian Bushfire (2009)[[170]](#footnote-130)
2. Ceres Environmental is a construction company that specialises in disaster recovery operations both for emergency response and long-term recovery.[[171]](#footnote-131) [[172]](#endnote-41)
3. PADCO (Planning and Development Collaborative International) is a development consulting firm which specialises in humanitarian response, recovery and mitigation to disasters.[[173]](#footnote-132) [[174]](#endnote-42)
4. Belfor is a disaster restoration company that provides disaster response as well as disaster mitigative construction services.[[175]](#footnote-133)
 | 1. IKEA’s campaign to bring sustainable lighting and energy to UNHCR Refugees Camps following the refugee crisis
2. Following the 2013 floods in Jakarta, Telkomsel restores disrupted telecommunication networks, supports evacuations and provides food & non-food items. It also provides free telecommunications services for several weeks after the disaster.[[176]](#footnote-134) [[177]](#endnote-43)
3. Following Hurricane Maria and Irma in 2017, IBM undertakes damage assessment in public schools in Puerto Rico and provides consulting services to the Puerto Rico Department of Education to develop a resiliency strategy.[[178]](#footnote-135) [[179]](#endnote-44)
4. Following hurricane Harvey in 2017, IBM provides response and recovery workshops for small businesses in Texas and offers cloud hosting to them. IBM is helping develop a power grid resilience monitoring system and a blockchain prototype to improve disbursement of recovery funds.[[180]](#footnote-136) [[181]](#endnote-45)
5. After the 2011 earthquake in Japan, IBM provides data and computing services to Hiroshima University and other non-governmental organisations to aid them in their emergency response; and provides expert advice and technical data to Sendai and Ishinomaki cities for long term recovery efforts.[[182]](#footnote-137) [[183]](#endnote-46)
6. After Haiti's earthquake in 2010, Degenkolb's team assists with post-earthquake building inspections and collaborates with Build Change (an NGO) to develop and implement a retrofit guideline and training programme.[[184]](#footnote-138) [[185]](#endnote-47)
7. Following the 2010 earthquake in Haiti, Caterpillar donates more than $800,000 to the Red Cross. It collaborates with the Pan American Development Foundation (PADF) on a drainage canal clean-up project and contributes one million dollars as part of a joint relief investment for recovery. Caterpillar provided their equipment such as excavators, tractors etc. and their operational expertise and engineers to assist in the debris clear up.[[186]](#footnote-139) [[187]](#endnote-48)
8. After Philippines' tropical storm Ketsana in 2009, BASF Stiftung helped in the construction of permanent shelters for families affected by it. [[188]](#footnote-140) [[189]](#endnote-49)
 |

# IV. Key lessons and guidelines for public sector participation in disaster recovery and mitigation

## A. Key Challenges

### 1. Coordinating among several players during a crisis

If the existing links and collaboration networks between technical experts, policy makers, various government offices and the private sector are already weak, in the event of a disaster these often break-down altogether. This frequently leads to a duplication of efforts and contributes to inefficiencies and delays in in post-disaster response and recovery operations (Boxes 8 and 9).

Even in case of disaster mitigation activities, the involvement of the private sector may be subject to obtaining clearances and permissions from various government agencies and offices. A lack of intra-governmental coordination may lead to delays in private sector participation, whether as a contractor, independent operator or as a (public-private) partner.

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| **Box 8: Widespread coordination challenges in response to the 2004 Indian Ocean Tsunami in Indonesia**According to a report by the International Federation of Red Cross and Red Crescent Societies (IFRC), a failure to coordinate between local, governmental, non-governmental, international and, private agencies, contributed to lack of information sharing, duplication of work and wasted resources. While some communities were overwhelmed with the emergency response, others were completely neglected. Competing rivalries within the government gave mixed signals to the private sector and non-governmental and international organisations. This hampered disaster response and recovery operations. A UN Officer summarised it as 'Depending on how you look at it, you can say this has been the best-funded emergency in the world - or the most expensive humanitarian response in history'. [[190]](#footnote-141) |

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| **Box 9: Procedural and institution complexity for private sector participation in Jordan refugee crisis**An ODI report notes some of the negative experiences faced by businesses in Jordan as they attempted to contribute to humanitarian work in the wake of the refugee crisis. One company representative spoke about being passed around several offices of the same organisation after offering a relatively straightforward in-kind contribution. Another firm spoke of being approached by three different international agencies in a short period of time to set up arrangements for strikingly similar but unrelated initiatives, which each agency was attempting to pursue. Another business spoke about the long delay in hearing back from an organisation after having offered technical support on a project.[[191]](#footnote-142) |

### 2. Lack of enabling legal and regulatory frameworks governing PSP in disaster recovery

One of the biggest challenges for private sector participation in disaster-recovery and mitigation is the lack of a clear legal and regulatory framework.[[192]](#footnote-143) Emergency management policies and guidelines in most countries, provide no specific direction on the involvement of the private sector. Where guidelines exist, the emphasis is on broad procurement related protocols (for example, on emergency supplies) or general community building.[[193]](#footnote-144) Not only does this lower private sector intent and actual participation in disaster recovery (Box 10), but it can further exacerbate the coordination failure.

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| **Box 10: Private sector opinion on government procedural challenges during post-disaster work**Following the 1989 Loma Prieta earthquake in San Francisco, US, a manager of the firm that was contracted by the Santa Cruz County to provide repair and reconstruction services summed up the challenge to government, in the following words: “*Governments should focus on and formalize the process they want to have in place when disaster strikes rather than trying to reinvent or tweak or get around or ignore normal procedures when you're trying to move as quickly as possible to help your community*.”[[194]](#footnote-145)In most parts of the world, the challenge of lacking a regulatory framework before a disaster, remains afterwards.  |

### 3. Accountability and institutional challenges

One of the factors that is critical in the post-disaster phase is the rapid assessment and implementation of response and recovery activities to minimize the time for recovery and the accumulated loss of functionality. Therefore, the time pressure in the post-disaster setup becomes especially high.[[195]](#footnote-146) This poses a constraint in the involvement of the private sector in forms that would entail more paperwork, for example PPPs (See Box 7 earlier). As a result, private sector engagement in disaster recovery often takes the form of short-term initiatives, which, in turn, does not encourage impact assessment of initiatives nor investment in building trust among the involved parties.[[196]](#footnote-147) This further hampers the future development of successful public–private partnerships.[[197]](#footnote-148) [[198]](#footnote-149)

The accountability issues that are endemic to any economic activity can be particularly salient in a post-disaster context when systems and processes are in disarray and, depending on the nature and scale of the disaster, the region may be in a crisis state.[[199]](#footnote-150) The lack of oversight of the private sector in such a situation can difficult tracking the amount of money flowing to contractors and sub-contractors.[[200]](#footnote-151)

Moreover, there is a lack of systematic research on the impact of PSP in disaster recovery (whether on a commercial or non-commercial basis) on accountability and transparency. There are no publicly-accessible reports on what the private sector is doing (especially in case of short-term service contracts) and whether their efforts have been successful. [[201]](#footnote-152) The difficulty of obtaining information from businesses with respect to financial flows under ordinary circumstances, raises concerns about transparency and accountability under extenuating circumstances such as when a disaster strikes (see Box 11). [[202]](#footnote-153) The lack of proper information channels sharing can contribute to transparency concerns. [[203]](#footnote-154) [[204]](#footnote-155) Closely connected to this is the institutional challenge that is posed by weak governmental bodies and corruption.

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| **Box 11: Accountability concerns regarding private contractors in Haiti**Following the 2010 earthquake in Haiti, numerous private contractors were engaged for different aspects of the recovery and humanitarian work. The top private contractor among these was Chemonics International, which received close to $150 million in funding between 2010-2012.[[205]](#footnote-156) However, there was little evaluation of the private contractors operating in Haiti. A 2011 audit by USAID’s Inspector General found inadequate results with Chemonics International’s cash-for-work projects, a lack of oversight and no financial review of their implementing partners.[[206]](#footnote-157) |

### 4. Limited role of PPPs

As identified in the mapping in the previous section, PPPs are challenging to execute for emergency response if that have not been established pre-disaster. This is primarily because setting up an appropriate PPP requires time for project preparation and complex negotiations among multiple parties. In addition, it might be challenging to build the economic case for a PPP in a context where people are already facing a loss of income and property and government resources are stretched thin. In such a scenario, neither a government-pay nor a user-pay PPP may be feasible.

However, there remains the scope of using PPPs in the long-term recovery process, wherein their expertise, innovative capacity and resource efficiency can be utilized to build back better, faster and more resilient infrastructure. Once the immediate response needs have been met, governments can work on assessing what interventions are needed for recovery, where is the private sector best placed to deliver them and what would be the appropriate mechanism to finance it. Not all projects are amenable to PPPs, therefore, careful selection and evaluation of value-for-money is required to determine whether the costs of a PPP procurement are worthwhile for the government.

## B. Guidelines for governments

The guidelines in this section have been categorised under three heads however, these classifications are not mutually exclusive and some of the recommendations could fall under one or more categories.

**Table 3: Summary of guidelines for governments**

| Guidelines |
| --- |
| 1. Policy, Planning and Implementation
 | 1. Set up processes and agreements prior to a disaster
2. Include the private sector formally in government disaster preparedness planning
3. Facilitate cooperation between the private sector and humanitarian/international aid agencies
4. Identify business cases for private sector involvement in disaster recovery and mitigation
5. Create incentives for private sector participation in disaster recovery, for BBB and increasing resilience
6. Build information systems to facilitate PSP engagement and multi-stakeholder coordination for the entire recovery process
7. Document disaster recovery learning
8. Ensure that reconstruction efforts involve building back better
 |
| 1. Institutional Recovery Arrangements
 | 1. Provide an enabling legal and regulatory environment for fast and efficient use of private sector resources and expertise
2. Appropriately assign responsibilities between the central and local governmental authorities given the context
3. Foster higher levels of trust with private sector by pre-establishing working relationships
 |
| 1. Financing Recovery Options
 | 1. Engage with international agencies to explore the use of credit enhancement instruments to encourage PSP
2. Identify financial transaction options most suited for the context
3. Structure PPPs to be mutually beneficial
 |

### 1. Policy, planning and implementation

#### Set up processes and agreements prior to a disaster

One of the most effective strategies for ensuring disaster recovery and mitigation, remains the investment in preparation—i.e. having the plans and tools in place to respond immediately and efficiently to get the recovery process started as quickly as possible.[[207]](#footnote-158) Therefore, rather than engaging in ad-hoc arrangements or signing contracts in a rush with the private sector when a disaster occurs, the government could set up processes and contracts prior to a disaster. This helps prevent bureaucratic delays and improves accountability when a disaster does strike. This can be done on a priority basis for different sectors and regions. The sectoral prioritization can be done after assessing the strengths and capabilities of the private sector in different sectors and identifying those sectors where the private sector possesses a distinct advantage as compared to the public sector, or where its presence can complement existing public sector activities.

Based on existing information on vulnerability and resilience, the most vulnerable and least resilient regions can be prioritized over others in setting up these pre-disaster contracts. Such contracts do not necessarily have to be in the domain of PPPs but can also be contracts signed between governmental bodies with each other and with the private sector for financing or service agreements (Boxes 12 and 13).

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| **Box 12: Setting up processes before a disaster strikes**In Japan if a disaster affects a public works facility which is owned by a local government, local governments can obtain public support and subsidies from the central government to raise money for recovery costs. Japanese regulations clearly set out defrayment rates for different facilities/infrastructure, such as roads, harbours, schools, and medical facilities. These policies positively impact financial viability and bankability and therefore result in greater private participation.[[208]](#footnote-159) |

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| **Box 13: Case Study of Kokusai Kogyo in Japan**Kokusai Kogyo is one of several Japanese companies bound to the government by a contract titled *saigai kyotei*, a service agreement that is activated by the government in the event of a disaster. The company collects and sells geo-spatial information including aerial imagery of Japan's terrain. Following the March 2011 Earthquake in Japan, Kokusai Kogyo surveyors undertook aerial imaging, which was then combined with property tax records, to determine the extent of damage to residential homes in the tsunami-affected areas. The company also helped issue disaster loss certificates in the wake of the disaster as the government offices had been washed away and were dysfunctional.[[209]](#footnote-160) |

#### Include the private sector formally in government disaster preparedness planning

Local governments can involve the private sector, including both large and small companies, in the design of their disaster preparedness and response plans. This would provide insights into private sector resources, capabilities, as well as needs and requirements in the event a disaster was to strike. This would also generate a sense of ownership among the private sector, contributing to building trust and paving the way for future collaboration in the most suitable form given the contextual factors. This would also allow the government to start discussing the impact of private initiatives, to harness on the lessons learnt and engage in better planning for disaster mitigation and recovery.

Often emergency plans set guidelines on a narrow range of processes, such as procurement of emergency supplies.[[210]](#footnote-161) Involving the private sector can help determine how to formalize guidelines on private participation in such emergency and recovery plans (See Box 14).

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| **Box 14: Steps for disaster preparedness planning with the private sectors and other stakeholders[[211]](#footnote-162)**1. Conduct a risk assessment to identify potential hazards and vulnerabilities to it.2. Determine the impact of these potential hazards.3. Create a plan for operating under duress.4. Practice implementing the plan through a system of testing and exercising.5. Conduct a post-exercise debrief to ascertain what has been learnt and how it can be improved. |

The private sector's expertise can also be harnessed upon by involving it in setting up standards related to disaster resilient construction (Box 15).

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| **Box 15: The Building Standards Committee in Fiji**In Fiji private firms oversee the preparation of the National Building Code, which establishes the minimum standards to reduce disaster related losses and hurricane insurance premiums. Homes that are upgraded are inspected by an engineer and issued a certificate. This certificate is necessary for obtaining cyclone insurance and undertaking mortgages. [[212]](#footnote-163) |

#### Facilitate cooperation between the private sector, especially humanitarian/international aid agencies

In the aftermath of a disaster, the capacity of smaller and local businesses to contribute to disaster recovery may not match the skillset and resources of bigger businesses and international organisations. By encouraging synergies between the local and smaller businesses with larger business and organisations, the capacity of the local private sector can also be developed. This is especially true of the construction sector, where small construction companies may often not be aware of disaster resilient construction strategies. Helping build their capabilities contributes to future resilience efforts when the big corporations and international organisations have moved away. It also contributes to the local economy.

The government can encourage bigger businesses and international organizations to collaborate with local and small businesses, in the form of trainings in processes and activities and through involvement in disaster recovery efforts. Large businesses can identify small businesses in their supply chains and include them in their disaster recovery plans. (Box 16)[[213]](#footnote-164).

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| **Box 16: Facilitating local procurement and participation by SMEs in Haiti**In the aftermath of the 2010 earthquake in Haiti, Building Markets (formerly the Peace Dividend Trust), a Canadian organization, established the Peace Dividend Marketplace-Haiti project (PDM-H) which facilitates local procurement and promotes access to procurement processes for a wider range of businesses. The goal of the project was to reduce barriers to local procurement and increase participation by local SMEs in recovery efforts. The project created a Tender Distribution Service which collected and shared tenders to registered local businesses and provided trainings on business standards, procurement and contracting requirements. It is estimated that these services enabled the local SMEs to win 1,332 contracts valued at $28.7 million.[[214]](#footnote-165) |

#### Identify the business case for private sector involvement in disaster recovery and mitigation

The private sector is more likely to be involved in disaster recovery and mitigation if they can perceive and receive tangible benefits from their involvement.[[215]](#footnote-166) Thus, building a business case for private firms to be engaged in the disaster recovery process is perhaps the most strategic way to build a sustainable partnership and leverage their strengths in a time of crisis (Box 17).

The government can do that on a selective basis by creating general dossiers regarding the kind of private sector participation it is interested in inviting and what forms this would take. These dossiers should highlight the advantages that would accrue to the private sector through their participation.

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| **Box 17: The case of Clean Team's Toilets in Ghana - commercially viable and cost-effective**Under the 'Clean Team' partnership comprising of the private company Unilever with design firm IDEO and WSUP, a commercially viable and cost-effective household toilet system was developed in Ghana.[[216]](#footnote-167) The service has been developed on a commercial basis wherein households pay a fixed amount per month – which is lesser than what they would pay for public lavatories – and in return receive a package of services that include twice-weekly emptying of the toilet, handling of the waste and over time replacement of the toilet. From a business point of view, the initiative is financially sustainable, potentially feasible (for all but the poorest of households) and helps Unilever expand its presence in Africa. It also provides technologies and a business model that could be replicable in refugee camps.[[217]](#footnote-168) |

#### Create economic incentives for private sector participation in disaster recovery for BBB and increasing resilience

The other way to incentivise private sector participation is by offering concrete monetary and other economic incentives (see Box 18). Example of monetary incentives include subsidies, concessions, loans and grants that can be granted to the private sector.[[218]](#footnote-169) When the private sector is involved as a service provider (whether as a service provider or partner) rewards/penalties system can incentivise to BBB and develop cost-effective solutions to strengthen disaster resilience.[[219]](#footnote-170)

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| **Box 18: Payment-for-ecosystem-services (PES) schemes to promote nature-based solutions for disaster resilience**In Brazil water users pay a fee to the local water company which is then used by local water-shed committees for water maintenance and reforestation.[[220]](#footnote-171) Such payment-for-ecosystem-services (PES) schemes can be implemented to incentivise the private sector to be involved in promoting nature-based solutions to strengthen resilience to disasters. |

#### Build information systems to facilitate PSP engagement and multi-stakeholder coordination for the entire recovery process

Information systems can contribute to disaster response and immediate recovery. For example, the disaster information system that followed Hurricane Stan in Guatemala in 2005 contributed to logistic support in immediate disaster response operations. Similarly, the information system in the wake of the earthquake in Pakistan (2005), helped to provide detailed information on basic needs in disaster hit areas and thereby, improved the response coverage.[[221]](#footnote-172)

Information systems can be the basis for platforms providing a detailed list of services from different private sector companies including the disaster recovery operations and capabilities they possess (Box 19). These can help in efficient matching of needs following a disaster. The information system can also incorporate a which helpdesk/matching service for private sector donations and goods in times of disaster.[[222]](#footnote-173)

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| **Box 19: Database built for post-disaster activity in Japan**Under the system of *saigai kyotei (*a service agreement that is activated by the government in the event of a disaster), the government of Japan appointed the Association of Precise Survey and Applied Technology, a national business association of survey companies, to keep a shortlist of companies that can conduct aerial post-disaster damage assessments in the immediate aftermath of a disaster. They have developed detailed guidelines that provide association members with information that enables them to know how to respond down to the smallest detail, including how single-page forms can be filled out by hand during emergencies, to delivering information between parties.[[223]](#footnote-174) |

During the disaster recovery and mitigation stage, the same information system could be utilized for hiring, bidding, contracting and tendering processes. This would help increase accountability and transparency, thereby, building trust. The information system could also be utilized for disseminating information customised for the private sector related to topics such as preparedness, disaster risk management, in a manner that is interactive, concise, attractive and accessible. [[224]](#footnote-175)

#### Document disaster recovery learning

To learn from the PSP lessons in previous disasters, the government could create a resource centre that pools together information regarding best practices, risk analysis and mapping of private sector initiatives in the country. Going forward, such a resource centre could help define a modality for accreditation and impact assessment of disaster recovery initiatives to help identify gaps and strategies for further improvements.[[225]](#footnote-176)

As part of this endeavour the government can encourage companies to consider including disaster-resiliency metrics in their CSR reporting or as part of their sustainability efforts. This would not only help pioneer best practices but also contribute to standard setting and accountability.[[226]](#footnote-177)

#### Ensure that reconstruction efforts involve building back better

Research on the voting behaviour of counties in the US, shows that voters tend to reward disaster relief spending but not disaster preparedness spending. This inconsistency can distort the government's incentives toward investing in disaster mitigation and preparedness even though spending on disaster preparedness can be more efficient than disaster relief.[[227]](#footnote-178) In this context, investing in maintenance of existing infrastructure is also important as it helps boost resilience, reduces losses from natural disasters and bolsters recovery. A World Bank report estimates that better road maintenance could reduce losses from floods and other natural disasters by as much as 18 percent in Tonga and 12 percent in Belize.[[228]](#footnote-179) Further, inadequate infrastructure and weak logistic chains can also contribute to the risk that a hazard turns into a disaster.[[229]](#footnote-180)

Against this backdrop, it has been suggested that disasters have the ability to realign citizen priorities in favour of disaster preparedness and mitigation. [[230]](#footnote-181) For example, in the aftermath of Hurricane Katrina in late 2006, 30 percent of New Orleans residents considered repair of the levees, pumps and floodwalls to be one of the top two priorities in reconstruction efforts.[[231]](#footnote-182) By mid-2008, only 2 percent of New Orleans residents ranked hurricane protection and rebuilding of levees and floodwalls as among their top reconstruction concerns.[[232]](#footnote-183)

This implies that when a disaster is still in the minds of citizens and legislators, the implementation of disaster mitigation measures that would otherwise have been considered unpopular can be ushered in. For instance, it may be easier to enforce stricter building codes for reconstruction and disaster mitigation efforts (Box 20).

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| **Box 20: Using disasters as a catalyst for change to bring in greater disaster resilience**Following the 2009 Victorian ‘Black Saturday’ bushfires in Australia, the Victorian Government introduced updated Building Standards AS3959- 2009 for bushfire-prone areas to facilitate the rebuilding process. The Standards increased the construction requirements on residential buildings for better fire protection. The new Australian Standard applies to the whole State. |

### 2. Institutional recovery arrangements

#### Provide an enabling legal and regulatory environment for fast and efficient use of private sector resources and expertise

Providing a legal and regulatory framework is essential to enable private participation, including accounting for disruptions that may ensue.

This would involve establishing a set of laws and regulations that would come into play in the event of a disaster to enable a quick response by the private sector. This measure would apply in the domain of operational, informational and financial regulations. For instance, regulations that allow the essential personnel to return to work when they are important to the initial stages of recovery, can enable the private sector to execute their recovery plans and restore business operations to serve the community. During Hurricane Irene in 2011 in the US, states either had no procedures or had different procedures and regulations regarding reopening business, which made it difficult for the private sector to plan and execute their recovery plans and resume business operations.[[233]](#footnote-184) Similarly, information-sharing law and regulation could allow businesses to share data with the government that would aid the emergency response. Following disasters, companies such as Google and IBM have shared data with the public and the government for immediate response and long-term recovery efforts as CSR or not-for-profit initiatives (see Table 2).

On a similar note, if the regulations for reconstruction work (in the form of building codes and safety requirements) are clearly articulated and freely available, then the quantity and quality of participation by the private sector (whether as a contractor or as an independent operator) may be boosted. In case of infrastructure projects, clear and accessible technical guidelines are imperative for building back better.[[234]](#footnote-185) It is important that such guidelines constitute the basic minimum standard that needs to be met. The government should, however, still encourage the private sector to perform above and beyond the minimum mandated standards (see Box 21). In addition to technical guidelines, the regulatory framework can also factor in the risks posed by natural disasters especially in vulnerable areas (Box 22).

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| **Box 21: The SCIRT collaborative-competitive model for reconstruction**Following the 2010-11 Christchurch earthquakes, the SCIRT Alliance model was developed in New Zealand including both competition and collaboration to drive performance. SCIRT was based on an alliance between national and local government and five private civil engineering contractors. The alliance was set up to manage the $2 billion reconstruction of Christchurch's badly damaged infrastructure which included roads, water and other facilities. Strong drivers were created for competition and collaboration in the reconstruction work. For each project the difference between the target cost (budget) and actual cost was added to a common "gain share/ pain share" pot, a share of which was paid to (or paid by) the contractor at the end of the programme according to the amount of work done by them. Therefore, encouraging collaboration among the contractors as they needed to perform well overall to ensure a "gain" rather than "pain" result. All contractors began with being allocated an equal amount of work, but over the course of the programme each contractor's share of future work altered based on their performance. Those companies that performed better were allocated more work, thereby, encouraging competition among them to perform better.[[235]](#footnote-186) |

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| **Box 22: An example of the government factoring in the risk of natural disasters**In Japan the Kansai International Airport, operates on the concession model of PPPs. The concession model sells management rights to a private entity whether new construction work is planned or not. In the Kansai International Airport project, the contract allows the concessionaire (the private party) to be exempt from contractual obligations to the extent and period necessary if obligations become difficult to perform due to Force Majeure.[[236]](#footnote-187) This is important given how prone to natural hazards Japan is and the general vulnerability of airports built offshore, such as the Kansai International Airport.A view of a snow covered road  Description automatically generatedAbove: The Kansai international airport (left) under normal operations[[237]](#footnote-188) and the airport after its' runways were submerged under seawater after Typhoon Jebi triggered high waves and storm surges on September 4, 2018 (right).[[238]](#footnote-189) |

#### Appropriately assign responsibilities between the central and local governmental authorities given the context

Following disasters, the balance between central and local governmental responses needs to be maintained. While a centralized response can help reduce coordination failure and reduce duplication of efforts, the risk is that it can also contribute to bottlenecks and delays. The latter is likely to happen if there is a lack of pre-event resource planning and preparedness and lack of ﬂexible and proactive engagement with the private sector.[[239]](#footnote-190) Thus it is especially important to coordinate and direct private sector involvement in the best possible manner, where the central government response can complement action by local authorities (Box 23).

Although, disasters cannot be perfectly predicted, geographical and climatic knowledge can help identify which regions are more vulnerable than others (Box 24).[[240]](#footnote-191) This knowledge can, in turn, help incorporate preparedness by involving local agencies in the planning and needs assessments stage, including but not limited to identifying potential private sector partners and especially vulnerable communities and areas.

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| **Box 23: Multi-government approach following earthquake Wenchuan in Sichuan, China**Following the the 2008 Wenchuan earthquake in the province of Sichuan in China, the national government took legislative action to establish a multi-governmental management framework for recovery. The national government, in conjunction with the county and local municipal authorities followed a common approach towards reducing the resources constraints posed by a shortage of building material and labour, by stimulating and promoting the use of resources nation-wide and locally. This took the form of providing legal support to various departments and government agencies to enable recovery and reconstruction. In addition to developing engagements with the private sector to capitalise on their strengths and encourage their participation. Overall the approach helped cater for reconstruction requirements, especially of the most vulnerable communities, in the short-term.[[241]](#footnote-192) |

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| **Box 24: Prioritising road networks in Mozambique** Given Mozambique’s finite budget and the need to prioritize interventions that would maintain the reliability of the network under extreme circumstances as well as reap the highest agricultural benefits, the government of Mozambique and the World Bank Africa Team helped create a tool to identify the districts where transport investments should yield the highest benefits in the central provinces of Zambezia and Nampula. The tool uses data related to current and future exposure to flood risk and combines this with criteria for agriculture, fishery, poverty and network criticality. [[242]](#footnote-193) |

#### Foster higher levels of trust with private sector by pre-establishing working relationships

For effective collaboration between the private and the public sector in the aftermath of a disaster, institutional trust must be established beforehand.[[243]](#footnote-194) It is essential that the private sector trusts government procedures and policies, and vice-versa. Economic studies have shown that low trust environments reduce the rate of investment.[[244]](#footnote-195) This is also borne out through qualitative accounts wherein low trust environments can have a detrimental impact on long term recovery and growth. Beyond being mutually beneficial, trust is an important element of long-term viability.[[245]](#footnote-196)

One way to build trust is through collaborative efforts between the public and private sector, well before a disaster, such as by involving the private sector in disaster preparedness planning (see the guideline from the previous sub-section: *Include the private sector formally in government disaster preparedness planning*). Collaborative planning between the government and private sector provides a strong foundation for working through the disaster management cycle moving from emergency response to long-term recovery following a disaster.[[246]](#footnote-197)

### 3. Financing recovery options

#### Engage with international agencies to explore the use of credit enhancement instruments to encourage PSP

There is lack of consistency in the financing of critical infrastructure.[[247]](#footnote-198) In cases when the government and the private sector are unwilling to bear the risk of a disaster recovery or disaster mitigation related project, the use of credit enhancement instruments can be explored. Credit enhancement instruments are financial instruments that transfer a certain type of project risk from the project to creditworthy third parties who are better placed to mitigate them. These third parties include development finance institutions, multilateral development banks, infrastructure banks, commercial banks, insurance companies and export credit agencies, i.e. institutions that have the capabilities to bear project risks. Examples of credit enhancement instruments include political risk guarantees, credit risk guarantees, viability gap funds, as well as construction and currency risk mitigation instruments. These not only help to secure revenue streams for the project, but also build confidence in a project's bankability in countries especially in contexts where there is not a strong existing legacy of PSP.[[248]](#footnote-199)

In this arena, multilateral development banks (MDBs) can support in improving the policy environment for private sector investments, help governments structure investments that may be attractive to the private sector and also provide data so that private players can better understand the risk profile of potential investments (Box 25).

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| **Box 25: The case of Haiti Telecom**Following the 2010 earthquake in Haiti, a Public-Private Partnership between Haitian fixed-line operator Teleco and Vietnamese telecom company Viettel was structured by IFC. This resulted in Viettel investing nearly $100 million in Teleco*.* The PPP is expected to catalyse future foreign direct investments as well as new PPPs in other critical sectors such as power, transportation, and water. [[249]](#footnote-200)IFC served as the advisor to the Central Bank of Haiti on structuring and implementing the international bidding process for the telecom PPP and worked closely with Haiti’s Council for the Modernization of State-Owned Enterprises, which acted as the project’s implementation agency to ensure the highest standards of transparency and fairness. IFC also coordinated with the World Bank, which was conducting a reform project to improve the regulatory environment for telecom operators in the country.[[250]](#footnote-201) |

#### Identify financial transaction options most suited for the context

During and after disasters if certain type of financial transaction options pose a binding constraint towards recovery operations then governments should be prepared to adopt alternative options. For instance, in Kenya following the 2011 drought, it was noted that lack of cash rather than operational or technical issues with the private sector hampered recovery efforts that were spearheaded by aid organisations. This was overcome by using mobile banking platforms provided by telecom operators such as M-PESA to undertake electronic cash transfers for disaster recovery.[[251]](#footnote-202) Similarly, following the earthquake in Haiti in 2010, to help the community recover from the disaster, aid agencies worked with mobile network operators to provide cash transfers via mobile money.[[252]](#footnote-203)

#### Structure PPPs to be mutually beneficial

While PPPs have many advantages offering specialized expertise and risk-transfer mechanisms for disaster recovery and mitigation, in order for them to succeed they need to be structured in a way that is mutually beneficial for both the public and the private sector.[[253]](#footnote-204) There are two critical aspects to consider. First, to ensure that the engagement with the private sector offers value for money to the government and the private sector, the PPP contract must be properly-prepared and well-structured. Second, the PPP must be implemented in line with the country's context.

Part of this process may involve making a convincing and credible case to the private sector to engage in the first place (see the guideline from the previous sub-section: *Identify the business case for private sector involvement in disaster recovery and mitigation*). In this context, it may also be necessary to work with a third party if key-personnel on both sides are not accustomed to such contracts (see the guideline: *Engage with international agencies to explore the use of credit enhancement instruments to encourage PSP*). It may also be useful to begin with a specific project rather than attempt broad cooperation across a range of sectors right away.[[254]](#footnote-205) This would allow for sufficient time to identify and learn from the process and incorporate this learning into future projects (see the guideline from the previous sub-section: *Document disaster recovery learning*).

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| **Box 26: Potential for further PSP in disaster recovery and mitigation**The sectors where there can be greater private sector participation, in forms other than that of CSR, are information, technology and data driven sectors. As much of this technology is in the hands of private sector, they are best-placed to be engaged in such services.[[255]](#footnote-206) For instance, in 2009, Telstra was engaged following a selective tender process to develop a national emergency alert system with $15.6 million funding from the Australian Government and under the lead of the Victorian Government through the Office of Emergency Services. The national emergency alert system would be available to all states and territories, excluding Western Australia (as Western Australia has its own system). The use of Telstra technology in developing it would allow emergency alerts to be broadcast via landlines and text messages. [[256]](#footnote-207)Private sector participation could be encouraged in food systems for storage and distribution, especially in case of low-income and lower-middle income countries recovering from a disaster. There is also room for increasing private sector participation in pharmaceuticals and health, given the strong link between natural disasters and epidemics. Early-warning diagnostic systems and medical preparedness could be provided by these sectors. [[257]](#footnote-208)Refugee camps present another avenue for greater involvement of the private sector (See Box 17 on Ghana’s Clean Team Toilets). According to the Danish International Development Assistance, in 2010 close to 5,000 businesses, ranging from small traders to large shops, were operating in the Dadaab camp in Kenya with a turnover of almost $25million annually.[[258]](#footnote-209)  |

## Glossary

**AF:** Asset Functionality

**ALF:** Accumulated Loss of Functionality

**BBB:** Build Back Better

**CSR:** Corporate Social Responsibility

**DR:** Disaster Resilience

**ICT:** Information Communication and Technology

**MDB:** Multilateral Development Bank

**PPP:** Public-Private partnership

**PSP:** Private Sector Participation

**TfR:** Time for Recovery

## Endnotes for Table 2

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72. Jamison M Day, Iris Junglas, and Leiser Silva, ‘Information Flow Impediments in Disaster Relief Supply Chains’, *Journal of the Association for Information Systems* 10, no. 8 (2009): 1. [↑](#footnote-ref-72)
73. Ballesteros, Useem, and Wry, ‘Masters of Disasters?’ [↑](#footnote-ref-73)
74. Nathan E. Busch and Austen D. Givens, ‘Achieving Resilience in Disaster Management: The Role of Public-Private Partnerships’, *Journal of Strategic Security* 6, no. 2 (2013): 1–19. [↑](#footnote-ref-74)
75. Burke and Fan, *Humanitarian Crises, Emergency Preparedness and Response: The Role of Business and the Private Sector - Indonesia Case Study*. [↑](#footnote-ref-75)
76. UNISDR, *Private Sector Activities in Disaster Risk Reduction: Good Practices and Lessons Learned* (Bonn: UN, 2008), <https://www.unisdr.org/files/7519_PPPgoodpractices.pdf>. [↑](#footnote-ref-76)
77. Anita Chandra, Shaela Moen, and Clarissa Sellers, *What Role Does the Private Sector Have in Supporting Disaster Recovery, and What Challenges Does It Face in Doing So?* (RAND Corporation, 2016), <https://doi.org/10.7249/PE187>. [↑](#footnote-ref-77)
78. APMG International, ‘Chapter 1: Public-Private Partnership - Introduction and Overview’. [↑](#footnote-ref-78)
79. Nathan Associates, *Public-Private Partnerships: A Basic Introduction for Non-Specialists: Topic Guide.* (UK: EPS PEAKS, 2017), <https://www.gov.uk/dfid-research-outputs/public-private-partnerships-a-basic-introduction-for-non-specialists-topic-guide>. [↑](#footnote-ref-79)
80. William Dachs, ‘PPP Policy Framework for St. Petersburg: PPP Project Cycle’ (22 May 2008), [http://siteresources.worldbank.org/INTECAREGTOPTRANSPORT/Resources/Session2&3PolicyFramework,ProjectCycleInception.ppt](http://siteresources.worldbank.org/INTECAREGTOPTRANSPORT/Resources/Session2%263PolicyFramework%2CProjectCycleInception.ppt). [↑](#footnote-ref-80)
81. Marian W Moszoro, ‘Public-Private Partnerships in Toll Motorways in Poland: A Comparison of Financing, Exploitation and Fiscal Risks’, *Nowy Sacz Academic Review*, no. 3 (2007), <http://jemi.edu.pl/uploadedFiles/file/all-issues/vol3/NSAR_Vol3_2007_Article3.pdf>. [↑](#footnote-ref-81)
82. AshBritt, ‘DEBRIS MANAGEMENT | AshBritt Environmental’, AshBritt Environnmental, accessed 24 April 2019, <http://www.ashbritt.com/services-capabilities/debris-management/>. [↑](#footnote-ref-82)
83. Vijaya Ramachandran and Julie Walz, ‘Haiti: Where Has All the Money Gone?’, *Journal of Haitian Studies* 21, no. 1 (2015): 26–65. [↑](#footnote-ref-83)
84. Following the 2010 earthquake in Haiti many American private companies were awarded US government contracts to assist in recovery and humanitarian operations. Chemonics and DAI received a total of $125 million from USAID for activities like rubble removal and cash for work. [↑](#endnote-ref-1)
85. Proteous, ‘Proteous On-Demand Facilities’, 24 April 2019, <https://www.proteusondemand.com/emergency_about_over.php>. [↑](#footnote-ref-84)
86. Proteus is an emergency services company that provides remoting operating camps and a range of other services that can aid emergency response. The services provided by Proteus include emergency mobile kitchens, shelters, as well as satellite and software packages. [↑](#endnote-ref-2)
87. Business Civic Leadership Centre, *The Role of Business in Disaster Response* (U.S. Chamber of Commerce, 2012), <https://www.uschamberfoundation.org/sites/default/files/publication/ccc/Role%20of%20Business%20in%20Disaster%20Response.pdf>. [↑](#footnote-ref-85)
88. Following the 2010 earthquake in Haiti, FedEx provided 13 complimentary charter flights full of medicines and aid supplies, including one for the International Federation of Red Cross and Red Crescent Societies (IFRC) to the affected areas in Haiti. FedEx also worked with other organisations like Heart to Heart International (HHI) to help deliver medicine and equipment to the disaster hit areas of Haiti. [↑](#endnote-ref-3)
89. Business Civic Leadership Centre. [↑](#footnote-ref-86)
90. In 2011 following the wildfires in Texas, Shell donated $160,000 to the Texas Forest Service to support local fire departments, while at the same time also encouraging their wholesalers to provide support to the emergency crews and local residents. [↑](#endnote-ref-4)
91. Abou-bakr, *Managing Disasters Through Public-Private Partnerships (Public Management and Change Series)*. [↑](#footnote-ref-87)
92. After Hurricane Katrina in 2005, FedEx contributed to disaster recovery by helping the first responders in New Orleans establish a communication channel. In the aftermath of Hurricane Katrina in 2005, Walmart was among the first responders on the scene and helped provide critical supplies to evacuees. [↑](#endnote-ref-5)
93. Bajracharya and Hastings, ‘Public-Private Partnership in Emergency and Disaster Management: Examples from the Queensland Floods 2010-2011’. [↑](#footnote-ref-88)
94. After the floods in 2010-11 in Queensland and Brisbane, Australia, large retailers provided and modified logistical support in the form of warehouse services, freight and distribution, so as to ensure supply of essential items in the disaster area. [↑](#endnote-ref-6)
95. UNISDR, *Private Sector Activities in Disaster Risk Reduction: Good Practices and Lessons Learned*. [↑](#footnote-ref-89)
96. Tokyo Gas Company has developed its physical and organisational infrastructure to prepare for earthquakes. In addition, it has worked with other government and non-government agencies to conduct disaster camps and workshops for school children and families, so as to equip them with the necessary skill-set and knowledge in the event of a natural disaster. [↑](#endnote-ref-7)
97. UNISDR. [↑](#footnote-ref-90)
98. In the wake of natural disasters, Siemens in collaboration with Sky Juice Foundation has supplied multiple potable water filtration units called ‘Sky Hydrant’ to several disaster impacted areas, including but not limited to countries affected by the Indian Ocean Tsunami in 2004, Myanmar (following cyclone Nargis in 2007), Bangladesh (following Cyclone Sidr in 2008) and China (following the Sichuan earthquake in 2008). [↑](#endnote-ref-8)
99. Jim Drummond and Nicholas Crawford, *Humanitarian Crises, Emergency Preparedness and Response: The Role of Business and the Private Sector - Kenya Case Study* (Humanitarian Policy Group, Overseas Development Institute, 2014), <https://www.odi.org/publications/8169-business-private-sector-humanitarian-crisis-kenya>. [↑](#footnote-ref-91)
100. Following the 2011 drought in Kenya, donors and international organisations used private sector platforms for cash transfers for drought response. These included Safaricom (M-PESA), Orange (Orange Money), other mobile network operators in Kenya (Yu and Airtel), who offered their platforms pro-bono. [↑](#endnote-ref-9)
101. Drummond and Crawford. [↑](#footnote-ref-92)
102. Business Civic Leadership Centre, *The Role of Business in Disaster Response*. [↑](#footnote-ref-93)
103. Office Depot retail stores in the United States reaches out to small businesses, through the Foundation’s continuing sponsorship of BCLC’s National Disaster Help Desk for Business. Office depot helps spread information on disaster preparedness, adapted particularly to the requirements of small businesses, by hosting relevant information and resources on its website. [↑](#endnote-ref-10)
104. Business Civic Leadership Centre. [↑](#footnote-ref-94)
105. UPS is working with the Red Cross to train its logisticians as first responders to disasters and place them in locations like New Orleans, Texas and Florida, as part of a Logistics Actions Team (LATs). UPS is also funding a pilot in collaboration with the Red Cross to help develop a commodity tracking (technological) system, that can help in the logistics of warehousing, inventory management and prepositioning of supplies in advance of the hurricane season. [↑](#endnote-ref-11)
106. Business Civic Leadership Centre. [↑](#footnote-ref-95)
107. Cargill donated 10,000 metric tons (more than 22 million pounds) of rice to the World Food Program (WFP) USA to support their work in Kenya, following the 2011 drought. Cargill sourced the rice, managed the ocean transportation and logistics to deliver and donate the grain in Mombasa. [↑](#endnote-ref-12)
108. Business Civic Leadership Centre. [↑](#footnote-ref-96)
109. Following the 2010 flash floods in Pakistan, in 2011 IBM sponsored intensive workshops for aid providers and frontline workers to provide them psychological support for their own healing and recovery. [↑](#endnote-ref-13)
110. Business Civic Leadership Centre. [↑](#footnote-ref-97)
111. Following the 2010 earthquake in Haiti Google’s crisis response team formally organised to put together information about the disaster using geographic, satellite and aerial imagery. The Person Finder application to help individuals’ search for missing friends and family was also developed. This application is now an open-source project with an open application programming interface. [↑](#endnote-ref-14)
112. Business Civic Leadership Centre. [↑](#footnote-ref-98)
113. Following the 2011 earthquake and Tsunami in Japan, the Google office worked around the clock to provide real-time information on road-closings, power outages and on the disaster in general. [↑](#endnote-ref-15)
114. Business Civic Leadership Centre. [↑](#footnote-ref-99)
115. Google has launched a Google Public Alert on google maps that provides emergency alerts as and when relevant. Other Google tools like their landing pages provide important information relevant to a disaster such as the emergency numbers, resources for first responders and crisis maps. [↑](#endnote-ref-16)
116. Business Civic Leadership Centre. [↑](#footnote-ref-100)
117. Following the drought in the Horn of Africa in 2011, Microsoft worked with NetHope (a non-profit) to provide more than 15 million dollars’ worth of software to aid and other organisations on the ground, in order to improve coordination and disaster relief operations. [↑](#endnote-ref-17)
118. Microsoft, ‘Microsoft Disaster Response Pamphlet’ (Microsoft), accessed 12 April 2019,

<http://download.microsoft.com/download/B/1/A/B1A28534-B933-419D-A344-EB2E91800228/Microsoft%20Disaster%20Response%20Brochure%20Pamphlet.pdf>. [↑](#footnote-ref-101)
119. Microsoft’s disaster response programme involves engagement with technology and response partners and government agencies to deploy targeted technologies, following a disaster. It helps coordinate the delivery of expert IT services to support consumers and partners restore business operations. Its targeted offerings include cloud computing, provision of data to enhance response planning and mobilization, low band-width applications and technologies to strengthen governmental and community communication. [↑](#endnote-ref-18)
120. Sarah Bailey, *Humanitarian Crises, Emergency Preparedness and Response: The Role of Business and the Private Sector - a Strategy and Options Analysis of Haiti*, Research Reports and Studies (Humanitarian Policy Group, Overseas Development Institute, 2014), <https://www.odi.org/publications/8149-humanitarian-crises-emergency-preparedness-response-analysis-haiti>. [↑](#footnote-ref-102)
121. Following the 2010 earthquake in Haiti, data from Digicel’s mobile phone towers was made available to a non-profit initiative in order to track the displaced population. This helped identify where displaced people were congregating and improved coverage of the emergency response. [↑](#endnote-ref-19)
122. Jemima Kiss, ‘Haiti Earthquake: How Google Helped Save Lives’, *The Guardian*, 12 January 2011, <https://www.theguardian.com/technology/pda/2011/jan/12/haiti-earthquake-google-maps>. [↑](#footnote-ref-103)
123. Following the 2010 earthquake in Haiti, Google worked with GeoEye, an aerial surveillance company, to take aerial pictures of the affected areas so as to assess the damage and direct aid to the most severely impacted areas. [↑](#endnote-ref-20)
124. Bailey, *Humanitarian Crises, Emergency Preparedness and Response: The Role of Business and the Private Sector - a Strategy and Options Analysis of Haiti*. [↑](#footnote-ref-104)
125. Following the 2010 earthquake in Haiti Teva pharmaceuticals donated medicines worth $7 million and $200,000 to relief efforts. [↑](#endnote-ref-21)
126. IBM, *Corporate Responsibility Report 2015* (IBM, 2015), <https://www.ibm.com/ibm/responsibility/2015/assets/downloads/IBM_2015_CR_report.pdf>. [↑](#footnote-ref-105)
127. Following the 2015 earthquake in Nepal, IBM collaborated with the Nepalese government to help track missing people, track the distribution of relief material and establish an integrated response and relief reporting process. IBM’s CSR report notes that 13,000 Nepalese families were supported with emergency food, hygiene, healthcare and housing by IBM. [↑](#endnote-ref-22)
128. UN-Habitat, *Evaluation of BASF Stiftung UN-Habitat Programme Contribution Towards Sustainable Development, December 2014* (United Nations Human Settlements Programme, 2014), <https://unhabitat.org/books/evaluation-of-basf-stiftung-un-habitat-programme-contribution-towards-sustainable-development-december-2014/>. [↑](#footnote-ref-106)
129. Following the floods in India and Nepal in 2008 because of the breach of the river Kosi, UN-Habitat received financial support from BASF Stiftung to extend support to provide sustainable and safe access to water and sanitation services to the affected communities in the two countries. [↑](#endnote-ref-23)
130. SCIRT, ‘SCIRT: Rebuilding Infrastructure’, [https://scirtlearninglegacy.org.nz/, n.d., accessed 22 April 2019](https://scirtlearninglegacy.org.nz/%2C%20n.d.%2C%20accessed%2022%20April%202019). [↑](#footnote-ref-107)
131. See Box 22. [↑](#endnote-ref-24)
132. UNISDR, *Private Sector Activities in Disaster Risk Reduction: Good Practices and Lessons Learned*. [↑](#footnote-ref-108)
133. Under a World Bank-funded initiative, the Government of Samoa commissioned New Zealand based consultancies - BECA International Consultants (BECA) and Kestrel Group, to help in the development of a national level framework (legislation and national plan) for disaster management for institutional strengthening of the National Disaster Management Office and engagement of private sector agencies in disaster risk management. [↑](#endnote-ref-25)
134. Alice Yan Chang, ‘Resourcing for Post-Disaster Housing Reconstruction’ (Thesis submitted for the degree of Doctor of Philosophy in Civil Engineering, The University of Auckland, 2012), [https://researchspace.auckland.ac.nz/bitstream/handle/2292/18891/whole.pdf?sequence=2; Tony Lloyd-Jones, *Mind the Gap! Post-Disaster Reconstruction and the Transition from Humanitarian Relief* (RICS, 2006)](https://researchspace.auckland.ac.nz/bitstream/handle/2292/18891/whole.pdf?sequence=2;%20Tony%20Lloyd-Jones,%20Mind%20the%20Gap!%20Post-Disaster%20Reconstruction%20and%20the%20Transition%20from%20Humanitarian%20Relief%20(RICS,%202006)), <https://www.preventionweb.net/files/9080_MindtheGapFullreport1.pdf>. [↑](#footnote-ref-109)
135. In Indonesia, following the 2004 Indian Ocean Tsunami, the main builder for tsunami housing reconstruction was contracted out to local construction contractors. However, masonry requirements without adequate technical training could not be fulfilled by the local construction contractors. As a result, many houses had to be demolished and rebuilt or retrofit strengthened. [↑](#endnote-ref-26)
136. Chang, ‘Resourcing for Post-Disaster Housing Reconstruction’. [↑](#footnote-ref-110)
137. Max Miller, ‘PRIORITIES IN PORT-AU-PRINCE: IRON MARKET SPARKS REGENERATION’, Project for Public Spaces, 3 November 2014, http://www.mcaslan.co.uk/projects/iron-market; John McAslan & Partners, ‘Projects | Iron Market’, accessed 22 April 2019, <http://www.mcaslan.co.uk/projects/iron-market>. [↑](#footnote-ref-111)
138. Following the 2010 earthquake in Haiti, the restoration of Port-au-Prince's historic Iron Market was financed by the telecommunications company Digicel. The services of the UK firm, John McAslan + Partners were engaged for the reconstruction work, in addition to local artisans. In addition to restoring historic details, as and when possible, the building was also engineered to meet current seismic requirements. [↑](#endnote-ref-27)
139. Emmanuela Gakidou et al., ‘Global, Regional, and National Comparative Risk Assessment of 84 Behavioural, Environmental and Occupational, and Metabolic Risks or Clusters of Risks, 1990–2016: A Systematic Analysis for the Global Burden of Disease Study 2016’, *The Lancet* 390, no. 10100 (September 2017): 1345–1422, [https://doi.org/10.1016/S0140-6736(17)32366-8](https://doi.org/10.1016/S0140-6736%2817%2932366-8). [↑](#footnote-ref-112)
140. World Bank, ‘Resilient Infrastructure Public-Private Partnerships (PPPs): Contracts and Procurement-The Case of Japan’ (Washington, D.C.: World Bank, 2017), <https://www.globalinfrafacility.org/sites/gif/files/Resilient%20Infrastrcuture%20PPP%20Japan%20Case%20Study%20FINAL_web.pdf>. [↑](#footnote-ref-113)
141. Sendai City PPPs were mostly projects of the build-operate-transfer (BOT) form. These transferred ownership of the assets to the private sector with an elaboration of the definition of force majeure definition (to agree upon risk sharing). Other examples of PPPs in Japan include the Aichi toll road, Sendai airport and Minamisoma park. [↑](#endnote-ref-28)
142. Gurenko et al., *Earthquake Insurance in Turkey*. [↑](#footnote-ref-114)
143. See Box 6. [↑](#endnote-ref-29)
144. IFC, *Haiti: Haiti Teleco*, Public-Private Partnership Stories (IFC Advisory Services in Public-Private Partnerships, 2010),

<https://www.ifc.org/wps/wcm/connect/99f2914d-d646-48ff-82fb-912d8783950d/PPPStories_Haiti_HaitiTeleco.pdf?MOD=AJPERES>. [↑](#footnote-ref-115)
145. Following the earthquake in Haiti, the Central Bank of Haiti (Banque de la République d’Haïti or BRH) signed an agreement with Viettel, Vietnam’s largest mobile telephone operator. The PPP is expected to modernize Teleco (the state-owned fixed telephony enterprise) to help modernize its infrastructure, increase the company’s financial and technical capacities and provide new services to its customers. Viettel was awarded the international tender out of three bidders. Viettel will initially invest $59 million, and over the next four years an additional $40 million. IFC served as advisor to BRH, providing advice on structuring and implementing the bidding process, working closely with the implementing agency (Haiti’s Council for the Modernization of State-Owned Enterprises), so as to ensure transparency and fairness. [↑](#endnote-ref-30)
146. UNISDR, *Private Sector Strengths Applied: Good Practices in Disaster Risk Reduction from Japan* (UN, 2013), <https://www.unisdr.org/we/inform/publications/33594>. [↑](#footnote-ref-116)
147. UNISDR, *Private Sector Activities in Disaster Risk Reduction: Good Practices and Lessons Learned*. [↑](#footnote-ref-117)
148. Mission Risques Naturels (MRN) was created in 2000 by French insurance companies, in the aftermath of losses caused by storms Lothar and Martin, as well as large floods during the preceding decade. MRN develops general interest services for the market as a whole and generates disaster management and prevention knowledge for insurance companies. [↑](#endnote-ref-31)
149. Carolyn Kousky et al., *The Emerging Private Residential Flood Insurance Market in the United States* (Wharton Risk Management and Decision Processes Center, Knowledge@Wharton, 2018), <https://d1c25a6gwz7q5e.cloudfront.net/reports/07-13-18-Emerging%20Flood%20Insurance%20Market%20Report.pdf>. [↑](#footnote-ref-118)
150. According to estimates, 20 groups and unaffiliated organizations in the US offered private flood insurance in 2016 and 30 offered it in 2017. In 2017 the total premium that was written in this regard was approximately $623.5 million. [↑](#endnote-ref-32)
151. IEDC, *The Role of Public-Private Partnerships in Economic Disaster Recovery and Economic Resilience*, Case Studies (International Economic Development Council, 2017),

<http://restoreyoureconomy.org/wp-content/uploads/2017/09/Public_Private_Partnership_Paper.pdf>. [↑](#footnote-ref-119)
152. In the aftermath of the 2005 Hurricane Katrina, New Orleans experienced a deep decline in employment and population. With a view to reviving the local economy, the New Orleans Business Alliance (NOLABA) was created as an agreement between the city of New Orleans and private investors from the local community. NOLABA functions as a non-profit with a focus on supporting the city’s economic strategy through workforce development, equity, branding, international investment etc. [↑](#endnote-ref-33)
153. Diego Arias and Nicolas Weber, ‘Taking Haitian Agriculture to the Clouds: Implementing Google Apps for Government at the Ministry of Agriculture’, *Smart Lessons*, November 2011, <http://smartlessons.ifc.org/smartlessons/lesson.html?id=1514>. [↑](#footnote-ref-120)
154. After the earthquake in 2010 in Haiti, the World Bank and the Ministry of Agriculture, Natural Resources and Rural Development (Ministère de l’Agriculture des Ressources Naturelles et du Développement Rural, or MARNDR) redesigned the ICT system of MARNDR based on Google’s cloud technology and making use of Google Apps, which was provided by Google free of cost. The system allows agricultural knowledge to be protected, shared and used even in the event of a disaster. Thus, making the agricultural innovation and extension system more effective and resilient. [↑](#endnote-ref-34)
155. UNISDR, *Private Sector Activities in Disaster Risk Reduction: Good Practices and Lessons Learned*. [↑](#footnote-ref-121)
156. After the 2004 Indian Ocean Tsunami, the Indonesian Ministry of Culture and Tourism (BUDPAR) and the Bali Hotels Association (BHA), together developed a ‘Tsunami Ready Toolkit’ to help hotels prepare for future disasters. The toolkit comprises of a collection of fact sheets and background information papers on subjects such as evacuation, information sources, department close-down procedures, best practice examples, warning signs and so on. [↑](#endnote-ref-35)
157. UNISDR. [↑](#footnote-ref-122)
158. The Corporate Network for Disaster Response (CNDR), is a network of business groups, associations, corporations and corporate foundations in the Philippines whose aim is to institutionalise disaster management efforts of the business community. Following mudslides and typhoons in 2004, in order to build disaster resilience and preparedness, CNDR in conjunction with CARE and the European Commission, undertook a hazard assessment, contingency planning and information dissemination campaign in the Municipality of Dingalan, Aurora Province. [↑](#endnote-ref-36)
159. UNISDR. [↑](#footnote-ref-123)
160. Following the earthquake in Niigata Prefecture, Japan in 2004, the ‘Glass Power Campaign’ was initiated by Asahi Glass Company. The campaign raised public awareness about the properties of laminated glass and its role in creating disaster resilience. The campaign also involved the donation of such glass by the company to preferred donation sites as voted for by the public on their website. [↑](#endnote-ref-37)
161. TATA Steel, ‘Tata Steel Organizes Master Trainers’ Training Program on Disaster Management 27 Nov – 08 Dec 2017’, *TATA Steel Press Releases* (blog), 8 December 2017, <https://www.tatasteel.com/media/newsroom/press-releases/india/2017/tata-steel-organizes-master-trainers-training-program-on-disaster-management-27-nov-08-dec-2017/>. [↑](#footnote-ref-124)
162. UNISDR, *Private Sector Activities in Disaster Risk Reduction: Good Practices and Lessons Learned*. [↑](#footnote-ref-125)
163. Undertaken under the aegis of CSR, Tata Steel in collaboration with the National Disaster Management Authority of India has organised trainings in disaster management and response for its staff. They have also trained masons in the community and their own contractors in the construction of disaster resilient structures. [↑](#endnote-ref-38)
164. David Smith, ‘Chapter 10: Petty Trade and the Private Sector in Urban Reconstruction: Learning from Haiti’s Post-Earthquake Iron Market’, in *Urban Disaster Resilience: New Dimensions from International Practice in the Built Environment*, ed. David Sanderson, Jerold S. Kayden, and Julia Leis (Routledge, 2016). [↑](#footnote-ref-126)
165. Following the 2010 earthquake in Haiti, the restoration of Port-au-Prince's historic Iron Market was financed by the telecommunications company Digicel. The services of the UK firm, John McAslan & Partners were engaged for the reconstruction work, in addition to local artisans. In addition to restoring historic details, as and when possible, the building was also engineered to meet current seismic requirements. [↑](#endnote-ref-39)
166. Brisbane City Council, *Queensland Floods Commission of Inquiry (Initial Submission)*, 2011, http://www.floodcommission.qld.gov.au/data/assets/file/0020/8363/BCC\_Brisbane\_City\_Council\_11.03.11.pdf. [↑](#footnote-ref-127)
167. Following the 2010-11 floods in Brisbane and Queensland, Australia, the Brisbane City Council used social media to actively solicit contract plant and machine operators for the post-disaster clean-up. [↑](#endnote-ref-40)
168. APEC, *Public-Private Partnerships and Disaster Resilience*, Report from APEC Workshop on Public Private Partnerships and Disaster Resilience Bangkok 24-29 August, 2010 (APEC, 2010), <https://apec.org/Publications/2011/01/Public-Private-Partnerships-and-Disaster-Resilience>. [↑](#footnote-ref-128)
169. World Bank, ‘Resilient Infrastructure Public-Private Partnerships (PPPs): Contracts and Procurement-The Case of Japan’. [↑](#footnote-ref-129)
170. Yan Chang et al., ‘Resourcing Challenges for Post-Disaster Housing Reconstruction: A Comparative Analysis’, *Building Research & Information* 38, no. 3 (June 2010): 247–64, <https://doi.org/10.1080/09613211003693945>. [↑](#footnote-ref-130)
171. CERES, ‘Ceres Environmental’, accessed 20 April 2019, <http://www.ceresenvironmental.com/about-us/>. [↑](#footnote-ref-131)
172. The services Ceres Environmental offers include among others, debris removal, deconstruction, seismic Stabilization, construction of levees and flood control systems. [↑](#endnote-ref-41)
173. Binder and Witte, *Business Engagement in Humanitarian Relief: Key Trends and Policy Implications*. [↑](#footnote-ref-132)
174. PADCO is a development consulting firm and an operating company of AECOM which is a consortium of major engineering and architectural companies. In addition to disaster recovery and mitigation, PADCO works on issues related to conflict resolution, urban services, sustainable development and governance. PADCO’s specialisation in disasters includes natural, man-made and complex disasters. [↑](#endnote-ref-42)
175. Belfor, ‘Our Company’, Belfor Global, accessed 16 April 2019, <https://global.belfor.com/en/about-belfor/our-company>. [↑](#footnote-ref-133)
176. Burke and Fan, *Humanitarian Crises, Emergency Preparedness and Response: The Role of Business and the Private Sector - Indonesia Case Study*. [↑](#footnote-ref-134)
177. Telkomsel’s disaster preparedness unit called Telkomsel Recovery Emergency Response Activity (TERRA) was formulated as a CSR initiative. Following the 2013 floods in Jakarta, TERRA restored disrupted telecommunication networks, provided food and non-food items to affected communities supported evacuations and provided free telecommunications services for several weeks in the aftermath of the disaster. [↑](#endnote-ref-43)
178. IBM, *The IBM Response to Hurricanes Harvey, Irma, and Maria*, IBM Corporate Citizenship - Executive Brief (IBM, 2018), <https://www.ibm.com/ibm/responsibility/downloads/initiatives/IBMResponseto2017Hurricanes-ExecutiveBrief-080218.pdf>. [↑](#footnote-ref-135)
179. In the aftermath of Hurricane Maria and Irma in 2017, IBM undertook a damage assessment of IT and communications capabilities in Puerto Rico’s 1,130 public schools for the Puerto Rico Department of Education (PRDE). IBM also partnered with the Bechtel Corporation to provide PRDE with resiliency consulting, in order to mitigate the impact of future disasters. [↑](#endnote-ref-44)
180. IBM. [↑](#footnote-ref-136)
181. In partnership with the U.S. Chamber of Commerce Foundation, IBM organised recovery and resiliency planning workshops for small businesses impacted by Hurricane Harvey in Texas. This involved subject-matter-expert reviews of disaster plans developed by workshop attendees, as well as the offer of cloud hosting to them. Following a design thinking session, IBM developed a blockchain prototype illustrating innovative best practices for resource tracking to demonstrate how recovery payments can be efficiently and securely tracked. In collaboration with Texas A&M University, IBM is also developing a power grid resilience monitoring system that would help demonstrate and assess the health of and threats to a utility in the event of a disaster. [↑](#endnote-ref-45)
182. Business Civic Leadership Centre, *The Role of Business in Disaster Response*. [↑](#footnote-ref-137)
183. In the aftermath of the 2011 earthquake in Japan, IBM opened its computer servers and data centres to Hiroshima University to allow it to fortify its website in order to provide important information on radiation exposure. IBM used its data centre to host IBM smart cloud for social business software in order to facilitate better communication and coordination between non-governmental organisations. IBM hosted the Sahana software on its cloud for Yamagata and Iwate prefectures to help track refugees, supported by another application created by IBM that captures data on shelters. In Sendai and Ishinomaki cities, through the Smarter Cities Challenge grants, IBM provided access to top experts, surveyed stakeholders and combined this with technical data to help build up disaster resilience in these cities. [↑](#endnote-ref-46)
184. Business Civic Leadership Centre. [↑](#footnote-ref-138)
185. Following the 2010 earthquake in Haiti, Degenkolb’s team assisted with post-disaster building inspections and helped develop appropriate seismic standards. Degenkolb collaborated with a non-profit, Build Change, to act as peer reviewer, and to develop and implement a comprehensive retrofit guideline and training programme. [↑](#endnote-ref-47)
186. Business Civic Leadership Centre. [↑](#footnote-ref-139)
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