



## **Climate change adaptation and smaller businesses in the Global South: defining roles, limitations, and touch points for positive interventions for MSMEs situated in developing countries**

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**CLIMATE CHANGE ADAPTATION AND SMALLER  
BUSINESSES IN THE GLOBAL SOUTH:**

**DEFINING ROLES, LIMITATIONS, AND**

**TOUCH POINTS FOR POSITIVE**

**INTERVENTIONS FOR MSMEs SITUATED**

**IN DEVELOPING COUNTRIES**



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## ABSTRACT

How the private sector engages in adaptation represents a significant research gap in the climate change adaptation field, with focus traditionally falling upon adaptation at a household-, community- and national-level. In the last decade however, the private sector has begun to receive greater attention, particularly with regards to how it can contribute to achieving global adaptation goals. In this shift however, emphasis has mainly been upon the role that large, commonly multi-national enterprises are able to play and as such, the Micro, Small, and Medium sized Enterprises (MSMEs) segment of the private sector have largely been neglected; particularly those situated in developing countries.

This working paper represents an initial attempt to outline how MSMEs situated in developing countries fit into the present discourse surrounding private sector adaptation, as well as highlighting potential touch points that can allow practitioners to make positive interventions in this field. The paper analyses the present discourse on two-levels, namely: (1) how private sector adaptation is represented in international frameworks and agreements, and how such instruments consider MSME actors; and (2) how MSMEs in developing countries have been defined as adaptation actors thus far. In determining potential touch points, the paper draws upon the preliminary learnings of UNEP DTU Partnership's 'Building Businesses' Climate Resilience' (BBCR) project to identify the more tangible aspects of engaging MSMEs located in developing countries, in adaptation enhancing interventions and capacity building initiatives.

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# 1. INTRODUCTION

Discussions on the prospects and role for the private sector to contribute to climate change adaptation is gaining momentum on the global climate agenda. In the topic of climate change, businesses have traditionally been more engaged in mitigation activities, as they are often able to offer more tangible and immediate returns on investments and are found to attract the large majority of public-private climate finance (Gardiner *et al.*, 2015). In contrast, the robustness of the business case for adaptation investments may at first glance seem limited, as the profitability of climate risk management is often vague, based on chance and as a result more abstract. Following the global agenda, to date scholarly literature has also mainly focused on businesses in the context of climate mitigation, with limited attention given to their adaptation prospects. This lack of attention represents a policy gap, for businesses to fully integrate the value associated with managing climate risks (Biagini and Miller, 2013). This is no less true when it comes to Micro, Small and Medium Size Enterprises (MSMEs) situated in developing countries, which despite being the backbone of their respective economies – estimated by the International Finance Corporation (2017) to generate 66% of full employment – have so far been largely overlooked when it comes to issues of adaptation.

## 1.1 RATIONALE FOR STUDY

Until recently, guiding and financing climate adaptation in developing countries was mainly considered to be the responsibility of the public sector. In the past, a focus on private action was even seen as politically controversial insofar as being perceived as a way to transfer responsibility that otherwise should be borne by governments (Biagini and Miller, 2013). It is now increasingly recognized that (a) the future costs of adaptation will largely exceed the public sector's financial resources in developing countries, and (b) that the private sector has the potential to play a critical role in contributing to- and scaling up of adaptation. With its ability to innovate and produce new technologies, its unique expertise and fundamental role in communities, harnessing the private sector's potential is thus considered essential to achieve global adaptation goals (Frey *et al.*, 2015).

On a practical level, the vague business case for adaptation means that the question of how to increase private sector engagement in climate adaptation through targeted interventions in practice remains uncertain. This being said, it is increasingly clear that in order to accelerate the adaptation dynamic, an in-depth understanding of the specific vulnerabilities and the risks and opportunities that result from climate change for the MSME segment in developing countries is required. This working paper discusses these issues in detail, by examining the nuances between the discourse surrounding private sector engagement in adaptation and the realities of MSME adaptation in developing countries, and by providing initial learning points from flood prone SME's<sup>1</sup> experience in dealing with risks in Sri Lanka.

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<sup>1</sup> Although MSME is the term used in the paper, Small and Medium size Enterprises (SMEs) are also referred to in certain cases (sometimes interchangeably with 'MSME') when specific programmes, projects or authors have used this term to target or define specific enterprises.

Whereas the private sector has traditionally received very little attention in climate adaptation policies, current international frameworks and agreements, such as the Paris agreement and the Sendai Framework on Disaster Risk Reduction, now clearly emphasize the necessity to engage the private sector, in the strive towards climate resilient societies. Meanwhile, resilient and productive businesses are recognised to have a key role in contributing to the realization of many of the UN Sustainable Development Goals.

Some, typically bigger, businesses are starting to develop strategies for reducing and managing climate risks, for example, by climate-proofing their supply chains and developing goods and services of use in climate adaptation or disaster response (e.g. water-efficient technologies, drought-resistant seeds, insurance products). Meanwhile, studies of corporate adaptation have

also started to emerge in the last ten years,<sup>2</sup> in which larger businesses and multinational corporations are typically the object of study (e.g. Averchenkova *et al.*, 2016). Thus far, the focus has predominantly been on the insurance, agriculture, and water sectors (Agrawala *et al.*, 2011; Averchenkova *et al.*, 2016) and mainly from a developed country perspective (e.g. Berkhout, Hertin and Gann, 2006; Wedawatta, Ingirige and Amaratunga, 2010)

Across adaptation literature and relevant public databases – i.e. NAZCA, the Climate Initiatives Platform (CIP), and the Private Sector Initiative (PSI) – little documented evidence exists on the potential of smaller enterprises to contribute to the realisation of global adaptation goals, something that is particularly pertinent regarding MSMEs situated in developing countries (Pauw and Pegels, 2013). Considering that MSMEs often represent more than ninety percent of all businesses in developing countries (Hussain, 2012), present informative resources that focus on private sector engagement in climate adaptation only covers a fraction of the global private sector (Okereke, Wittneben and Bowen, 2012).

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<sup>2</sup> See for example Agrawala *et al.* (2011), Haigh and Griffiths (2012), Linnenluecke, Griffiths and Winn (2012), Pinkse and Kolk (2012), Dougherty-Choux *et al.* (2015), and Crick *et al.* (2018)

In lieu with this, a consensus regarding how to conceptualize what private sector engagement in adaptation actually is continues to be work in progress. One emerging understanding of this concept that is gaining increasing amounts of traction is that of financing adaptation – *i.e. how businesses can help close the gap in adaptation finance*. However, this interpretation fails to consider the private sector’s potential capacity to drive, guide and implement adaptation efforts.

Likewise, thus far little consideration seems to have been given to the positive subsidiary implications that private sector adaptation can have on the community resilience. The impacts of climate shocks upon local enterprises are seen to exacerbate and create socioeconomic problems in the surrounding community. Thus, by understanding the risks that climate change presents and protecting their business interests through investing in adaptation, private sector actors can indirectly mitigate decreases in both employment and wealth in the local economy that would otherwise result from extreme weather events and long-term climate trends. Furthermore, typically embedded in the local context in which climate action must be taken, MSMEs possess knowledge of the local specificities, a form of ‘social license’ to operate, and are also able to disseminate vital climate information to the community and other businesses in the locale (Terpstra and Ofstedah, 2013).

## 1.2 STRUCTURE OF THE PAPER

The paper starts by presenting the evolution of the role of the private sector in international frameworks and agreements associated with the global climate and development agenda (section 2). Section 3 then provides a perspective on what is meant in practice when MSMEs are categorised as adaptation actors. It starts by exploring a working definition for the term MSME (3.1), followed by an overview of how private sector adaptation is presently understood (3.2). The paper then explores the vulnerability of MSMEs to climate change that underpins the need for greater MSME engagement in adaptation (3.3). Presenting first how MSMEs based in developing countries, as a group, are disproportionately exposed to the impacts of climate change and second their inherent ability to manage this vulnerability. Finally, the paper concludes this section by

connecting the four previous sections to outline how MSMEs, particularly those in developing countries, are able to perform as adaptation actors (3.4). Following this, section 4 takes a step back from the literature to present initial findings from the Building Businesses Climate Resilient (BBCR) project, based in Sri Lanka, providing an increased understanding of how SMEs are affected by disasters, how they respond to recurring floods, and what may stimulate them to initiate risk management and adaptation initiatives. Finally, section 5 concludes by looking into areas for further research.

## 2. THE PRIVATE SECTOR IN INTERNATIONAL FRAMEWORKS AND AGREEMENTS

The role of the private sector in general – and MSMEs in particular – in global climate and development related frameworks and agreements has significantly evolved over the years, from a relatively limited scope of action to a cornerstone position in global action for sustainable development.

In the United Nations Framework Convention on Climate Change (UNFCCC) adopted in Rio in 1992, the private sector is referred to as “business and industry” and appears as a passive actor with governments being the main catalysers of action (Art. 30). According to Shishlov, Bellassen and Leguet (2012), the role of businesses is relatively limited and mainly revolves around co-operation and implementation of sustainability in business practice (e.g. environmentally sound technologies, environmental management systems). Likewise, in the Kyoto Protocol of 1997 that focuses on emissions reduction, the “private sector” only appears twice in the treaty: in relation to environmentally sound technologies and participation under the Clean Development Mechanism (CDM). In practice however, as large emitters, business and industry held a central role in the context of the Kyoto Protocol mechanisms (i.e. International Emissions Trading, CDM, Joint Implementation Mechanism). But while the role of private sector in relation to mitigation has featured in international agreements for many years, it is only about ten years ago that it gained prominence in the context of adaptation to climate change and climate finance.

In 2009, as part of the Copenhagen Accord, Annex I (industrialized) countries pledged USD 100 billion per year by 2020 to address the needs of developing countries stating that the funding would come from “a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance” (United Nations Framework Convention on Climate Change, 2010 pg.7). Stemming from this commitment, mobilizing private sector finance for the purposes of climate change mitigation and adaptation became a priority on the international scene.

A number of multilateral funds started to integrate or strengthen private sector engagement as part of their work programmes and project portfolio. Such is the case of the Green Climate Fund (GCF), which was established with the objective of channelling funding to countries for the implementation of both mitigation and adaptation projects. The fund channels private sector finance via its dedicated Private Sector Facility (PSF) and recently established a pilot program specifically for MSMEs with an initial allocation of USD 200 millions diversified across three regions (Africa, Asia, Latin America) with a USD 65 million cap for each (Green Climate Fund, 2016). The Adaptation Fund, created under the Kyoto Protocol, the Special Climate Change Fund (SCCF) and the Least Developed Country Fund (LDCF) are other multilateral funds that provide support to developing countries in their efforts to adapt to the effect of climate change but do not have private sector as part of their priorities (Watson and Patel, 2018).

Contrastingly, the Global Environmental Facility (GEF) Secretariat has been instrumental in leveraging finance and providing funding to community-based projects focusing on climate change and featured MSMEs as key target in its programmes since the 1990s (GEF Independent Evaluation Office, 2013). In 2017, its portfolio included 383 projects that engaged with private sector, of which 89 used non-grant instruments (GEF Independent Evaluation Office, 2017). As part of an evaluation of its private sector engagement programme, the GEF conducted a survey among private sector actors that showed that one of the fund’s advantages was its wide range of flexible financing instruments and appetite for high risk with smaller or early stage projects (*ibid*). Characteristics that are particularly relevant for the case of projects involving MSMEs. Nonetheless, determining the extent of financing that goes to MSMEs remains generally challenging due to a lack of “explicit markers” indicating their participation in projects (Watson and Patel, 2018).



Beyond programmes of multilateral climate funds, private sector involvement and the promotion of financially viable business models also occupy a central place in other global frameworks such as the Paris Agreement, the Agenda 2030 on sustainable development (including the SDGs), and the Sendai Framework for Disaster Risk Reduction. In relation to the climate agenda, participation of non-party stakeholders also referred to as non-state actors, a term that includes private sector, was a central element of the negotiations leading up to the COP 21 and the Paris Agreement (Hale, 2016). The private sector is identified as a potential and even indispensable partner for governments to achieve the commitments they presented in their Nationally Determined Contributions (NDCs) both via specific climate actions and investments (International Finance Corporation, 2017).

Again under the banner of “Business and Industry”, the private sector participated in the formulation of Agenda 2030 and the development of the SDGs, as one of the nine sectors of society that represent the main channels of broad participation under UN activities (United Nations Department of Economic and Social Affairs, no date). Private actors are referenced to prominently in the SDGs and their related indicators, mostly as critical partners for attracting investments, constituting public-private partnerships and delivering innovative solutions. The target that is most directly relatable to private sector action is Target 12.6, which “encourages companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle” (United Nations, 2015). While this target is mainly aimed at large companies, achieving the SDGs will require the involvement of the whole private sector including MSMEs. In 2017, the Global Reporting Initiative analysed 43 voluntary national reviews submitted by countries to the United Nations High Level Political Forum. These reports are the result of voluntary country-level analyses of actions taken to achieve the SDGs. The findings show that 93% of countries had consulted the private sector in reviewing their national strategy and progress on SDGs, and it is recognized as a key financier for the implementation of the SDGs in 68% of the reports (Global Reporting Initiative, 2017).

In the Sendai Framework however, the role of the private sector is more targeted. It revolves around the incorporation of disaster risk management policies in business models through disaster risk informed investments, engaging in private-public partnerships, and cooperating with international organizations to support research and innovation for more resilient societies (UNISDR, 2015). Created in 2015, the Private Sector Alliance for Disaster Resilient Societies also known as ARISE, is a network that focuses on engaging private sector in supporting the implementation of the Sendai Framework. It relies on voluntary commitments from members (currently 140 private sector entities) to align with the framework’s objectives and engage in experience and knowledge sharing to support effective project implementation (UNISDR, no date). This bears particular relevance for MSMEs, since they are likely to be disproportionately affected by climate change impacts due to an existing deficit in their capacity and resources to respond to climate impacts (Halkos *et al.*, 2018). Yet to date, no MSME-specific platform for engagement is provided under ARISE.

The increase in financing needs for climate action represents a need for private sector involvement. Moreover, as technological solutions and the incorporation of sustainability measures in business practice advanced, requirements and expectations placed on the private sector also evolved. However, it is found that private sector partnerships have mostly taken place in high-level and global political contexts, whereas vulnerability is experienced locally and adaptation needs to be implemented at the local level (Pauw and Chan, 2018).

# 3. DEFINING MSMES AS ADAPTATION ACTORS

Looking at section 2, it seems clear that private sector adaptation is gaining traction on the global climate policy stage. However, research concerning how MSME specifically are able to contribute to global adaptation requirements is still in its infancy, with much existing literature looking at the adaptation potential from the private sector more generally. This section presents what can be derived about MSME adaptation from available literature. Starting by providing a working

definition for the term MSME, the section then moves on to present how the term ‘private sector adaptation’ is understood in practice. Following this, we look more closely at what climate change means for MSMEs situated in developing countries in terms of impacts and how MSMEs are able to adapt. The section concludes by highlighting the potential and limitations of the MSME segment’s role in ‘private sector adaptation’ as understood on the global climate agenda and in literature.

## 3.1 DEFINING MSMES – WHO ARE WE REFERRING TO?

There is no unilaterally accepted definition for a MSME, with applied definitions varying between countries and even between institutions active within the same country (Gonzales, Hommes and Mirmulstein, 2014). Definitions for the term MSME have been created and applied by a wide variety of organisations, including: National and local governments, government agencies, multi-lateral development banks, and inter-governmental organisations. These definitions are used to enable these actors to more effectively assist the MSME segment through more targeted policies, whilst simultaneously limiting access to support mechanisms such as financial and technical support schemes, funding opportunities, and tax exemptions.

Institutional definitions are predominantly composed of quantitative metrics, the most frequently used is employee headcount, for which the most commonly applied delimitations are: 1–9 employees for micro-enterprises, 10–49 employees small-enterprises, and 50–249 employees for medium-enterprises; notably used by the OECD and the European Commission (Gonzales, Hommes and Mirmulstein, 2014; European Commission, 2016; OECD, 2017). Whilst employee headcount is by far the most common metric used globally, it is commonly used in tandem with other quantitative metrics such as turnover and assets (Gonzales, Hommes and Mirmulstein, 2014). The European Commission for example, defines a MSME based on an enterprise meeting two criteria: employee headcount and either, annual turnover or balance sheet total (European Commission, 2016). Meanwhile, at the time of

writing,<sup>3</sup> the definition applied by the Government of India does not use either employee headcount or turnover, instead allocating Micro, Small, and Medium status based on capital investment made in plant and machinery, excluding investments in land and building (Government of India, 2015; Bhardwaj, 2018).

Despite their continued application, such simple quantitative definitions are criticised by some as too broad and all encompassing to be meaningful in a pragmatic sense. For example, using the OECD definition, which only uses employee headcount, would classify 99.8% of firms in the EU as MSMEs (Papadopoulos *et al.*, 2018). Meanwhile, Gibson and van der Vaart (2008) exemplify this notion further by highlighting that applying the “official” SME definitions used by UNDP and World Bank, <200 and <300 employees respectively, would mean that the majority of Ghana’s top 100 manufacturers would be classified as (M)SME’s, including the manufacturing subsidiaries of both Nestle and Unilever. Meanwhile, whilst complementary quantitative indicators such as annual turnover, balance sheet total, or capital investments made address this issue somewhat, they commonly fail to consider the inherent differences in profit margin and capital investment that exist between sectors (i.e. services and manufacturing), are vulnerable to currency volatility, and are totally inappropriate for facilitating comparisons between different national contexts (Gibson and van der Vaart, 2008; Bhardwaj, 2018).

Instead it has been suggested by some (i.e. Gibson and van der Vaart, 2008; Ebitu, 2016; Ebitu, Ufot

<sup>3</sup> Bhardwaj (2018) states that changes in this definition have been approved by the Government of India in favour of a turnover-based definition, although changes have yet to take effect in legislation.

and Glory, 2018) that a firm's status as an Micro, Small, Medium or Large enterprise should be based on the functional and behavioural attributes it has and how they relate to the national and sectoral context it is embedded in. In this sense, Gibson and van der Vaart (2008) suggest that SMEs can be distinguished from large enterprises by the fact that they are likely to have the following attributes, whilst acknowledging that not all might necessarily apply to each case:

- Are less likely to have significant personal connections to influential individuals within government and the financial sector, and thus less able to negotiate special fiscal incentives or influence government benefits (“corporate welfare” or “sweetheart deals”);
- In turn, this means that they are less likely to be engaged in corruption that results in the securing of advantageous positions;
- Are more likely to be managed by their owners, possess a more centralized management structure, and thus typically possess substantially weaker abilities to delegate and departmentalize;
- Have a greater focus on the firm's short-term needs and medium-term survival than on its long-term profitability or market share;
- Are less adept at, and less motivated to, preparing and following formal business plans;
- Are typically less technologically advanced and slower to integrate available and affordable technology that provides them with a market advantage;
- Are more flexible and able to adjust quickly to shifts in the economic and regulatory environment;
- Are less able to hire skilled workers that would meet the hiring criteria of larger firms, and thus are more likely to be compelled to train their workforce;
- Are more likely to be embedded and active within a single community; and,
- Are more dependent upon the personal management-worker and management-client relationships

Regardless of using a more qualitative and functional definition such as that suggested by Gibson and van der Vaart (2008) above, MSMEs remain a very heterogeneous group. They continue to comprise businesses from distinct sectors, of various sizes, with different resource endowment and managerial and technical capacities, which operate in diverse policy and regulatory environments (Frei-Oldenburg et al. 2018; Pierre and Fernandez, 2018). However, whilst it may still seem artificial or even counterproductive to class a group a highly heterogeneous firms using such a broad definition,<sup>4</sup> MSMEs – as defined under a more nuanced understanding – share many similar vulnerabilities and needs that make their amalgamation arguably worthwhile, including to existential threats such as the impacts climate change.

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<sup>4</sup> *The usefulness of the term MSME is in fact questioned by Gibson and van der Vaart (2008)*

### 3.2 HOW IS ‘PRIVATE SECTOR ADAPTATION’ PRESENTLY UNDERSTOOD?

The term ‘private sector adaptation’ is generally used in reference to adaptation actions performed by a private sector actor. It is defined broadly by Averchenkova *et al.* (2016 pg.5) as “the process of adjustment by companies to actual or expected climate and its effects through changes in business strategies, operations, practices and/or investment decisions”. Linnenluecke, Griffiths and Winn (2013) highlights that private sector adaptation responses do not just occur at the individual firm level, but in practice do so across four different levels: (i) the institutional level, (ii) the industry level, (iii) the firm level, and (iv) the individual decision-maker level; depending on where adaptation decisions are made and implemented. For private sector actors at all levels, investment in adaptation represents a business decision, and as such is driven by the expected reduction of risk and costs, and the creation of new opportunities and the anticipation of

future revenues (Druce *et al.*, 2016). This adjustment is generally recognised to manifest itself in two different forms relating to the nature and beneficiary of the action (Schaer, 2018):

- (a) Ensure their own business continuity by climate-proofing their operations;
- (b) Innovate and develop new products and services in response to market needs.

Whilst bearing in mind Linnenluecke, Griffiths and Winn’s (2013) above observation, private sector adaptation is most commonly described at the individual firm level. At this level, different forms of adaptation are often identified within the different categories of action, such as: relocation, altering technologies and processes, monitoring climate data, awareness raising for employees, and building physical structures (*i.e.* Berkhout *et al.*, 2006; Nardia Haigh and Griffiths, 2012). In some

cases, private sector adaptation can be conducted in collaboration with the public sector, in the form of Public Private Partnerships, where by private sector actors contribute to public sector initiatives as a stakeholder, by building infrastructure or providing advisory services. Likewise, private sector actors can climate proof their own operations and infrastructure, whilst at the same time provide direct benefits for communities and other, often smaller, private sector actors. This is exemplified by the contributions of Brazilian mining conglomerate Vale to the port of Tubarão, Brazil, in which the company invested over USD \$18 million in a hydrometeorological monitoring centre in partnership with the local state government in order to provide Vale, other commercial users of the port,

and the local community with a warning system for extreme weather events (Frey *et al.*, 2015).

When one considers private sector adaptation as laid out above, it becomes clear that private sector adaptation does not fundamentally differ from other adaptation contexts and, as such, private sector adaptation actions are often applicable into classifications originally applied in adaptation research conducted at household-, community-, and national-levels. Such transferability is exemplified by (Goldstein *et al.*, 2019), who applies Jones, Hole and Zavaleta’s (2012) overarching categorisation system (originally applied to general adaptation approaches) to their analysis of corporate adaptation strategies, as seen below:

**FIGURE 1. CATEGORISATIONS OF PRIVATE SECTOR-LED ADAPTATION ACTIONS, ADAPTED FROM GOLDSTEIN ET AL. (2019)**

Category	Description of action in the context of private sector adaptation
Soft adaptation	Actions are composed of physically intangible responses to climate impacts, e.g. supply chain measures, knowledge management, and crisis planning
Hard adaptation	Actions are composed of tangible and physical responses to climate impacts, e.g. capital investment in technology or engineered infrastructure, including built structures.
Ecosystem-based adaptation	Actions facilitate the sustainable management, conservation, and restoration of ecosystems in a manner that reduces the exposure of a given area to climate impacts, e.g. grassland restoration and coastal ecosystem management.

As such, lessons learnt in the better-established tracts of adaptation research can thus be applied to the private sector context.

### 3.3 MSMEs AND VULNERABILITY TO CLIMATE CHANGE

MSMEs situated in developing countries are considered to be highly vulnerable to climate change due to their propensity to be highly exposed and sensitive to its impacts, whilst possessing limited capacity to cope and adapt to the changing climatic conditions. The following section outlines the inherent factors associated with such MSMEs that contribute to their vulnerability to the impacts of climate change.

#### MSME EXPOSURE

As a group, MSMEs situated in developing countries are considered to be highly exposed to the impacts of climate change. While the nature and magnitude of their exposure varies on a case by case basis, they are commonly observed to be located in areas that are disaster prone and

typically unprotected by publicly funded hard adaptation measures (Asgary *et al.*, 2012; Pathak and Ahmad, 2016; Auzzir, Haigh and Amaratunga, 2018). Moreover, their high exposure to the impacts of climate change is reinforced by the very local scales at which they operate, often having their fixed assets in a single location and thus rendering them to more easily spread their risks in a similar fashion to their commonly multi-local Large Enterprises (LEs) and Multi-National Corporations (MNCs) counterparts.

For enterprises in general, the implications of climate change are both short- and long-term in nature. Short-term implications typically refer to the impacts associated with extreme weather events – i.e. various forms of flooding, drought, heatwaves, tropical storms etc. Studies focussing on the developing context, such as Asgary, Anjum and Azimi (2012) and Pathak and Ahmad (2016), have demonstrated that such events can be catastrophic, with it being common for MSMEs in afflicted areas to face lengthy recovery periods or permanent closure. Furthermore, whilst the direct impacts of hazards are of obvious concern, their position in various value chains that increasingly span across regional and national borders means that MSMEs in developing countries are also reported to be highly vulnerable to the indirect impacts of climate hazards (Asgary *et al.*, 2012; Baba *et al.*, 2014; Neise and Revilla Diez, 2019); with the findings of Asgary and Naini (2011) suggesting that in some cases, the indirect implications of a disaster (*i.e. disruption to supply chains*) can be severe enough to cause business closure in of itself.

The more long-term implications refer to various trends associated with changing climatic conditions on a global and local scale. A survey by AXA and United Nations Environment Programme (2015) indicates that the rising costs of inputs and insurance and negative health impacts of employees are the most important climate change impacts felt by MSMEs in both developed and emerging markets. Other negative impacts are reported on production processes, the demand for businesses' products and services, transport, access to markets and the fabric of buildings (*ibid*). Climate change is also found to affect employee absenteeism, business competitiveness and productivity, production and supply chain movements, and access to raw materials. Moreover, climate change also presents risks to MSMEs from employee migration and knock-on effects such as damage to infrastructure, civil unrest and conflict over increasingly scarce resources such as water. Other indirect impacts include rising insurance premiums and tighter regulation (Berkhout, Hertin and Arnell, 2004).

## MSME CAPACITY TO ADAPT

An enterprise's capacity to adapt is to a large extent intertwined with its' internal capacities and characteristics. MSMEs situated in developing countries are commonly characterised as possessing a low capacity to adapt due to: (a) their lack of knowledge concerning climate risk; (b) possessing low ability to adequately conduct cost benefit analysis of adaptive measures; (c) lacking in financial resources; and (d) possessing low technical capacity to implement adaptation options (see Asgary *et al.*, 2012; Terpstra and Ofstedah, 2013; Pathak and Ahmad, 2016; Auzzir, Haigh and Amaratunga, 2018; Chaudhury, 2018; Kato and Charoenrat, 2018).

Further to these factors, the capacity of these MSMEs to adapt is inhibited by the operational realities of being a MSME. In practice, building resilience requires high upfront investment costs and long-term planning, which will often compete with the more short-term business priorities and needs. As a result, existing responses are often reactive and executed without formal planning, as MSMEs often fail to see the incentives they have to become involved in early adaptation planning and to invest in building resilience. At the same time, general awareness of climate change risks alone does not necessarily translate into adaptation action and investments either. MSMEs in general operate with much shorter business planning cycles than larger companies and have limited access to funding for adaptation. This means that they typically prioritize more pressing and immediate short-term issues and profit-maximization goals and objectives in their business operations (Linnenluecke, Griffiths and Winn, 2013).

Whilst the above state of affairs is neither strictly an inherent condition of being a MSME nor exclusive to this enterprise classification, many studies find that this applies well as a rule of thumb. For example, in Thailand a survey conducted by iPrepare (2017) found that the size of firm correlated strongly with whether or not it had any disaster preparedness plans, with the proportion of those surveyed indicating that they had no plans regarding disaster preparedness being 70% for small enterprises, 41% for medium enterprises and only 7% for large enterprises. Meanwhile, in their study of the response of Malaysian manufacturing firms to flooding, Neise and Revilla Diez (2019) find that smaller firms have a greater propensity to possess reactive

and passive<sup>5</sup> adaptation strategies. Both studies however, highlight that the correlation between size and adaptive strategy is not clear-cut, with factors surrounding the firm's sector, its end-market, and the nature of its ownership, also found to be important determinants in a firm's capacity to adapt. In this vein, Neise and Revilla Diez (2019) find that some large firms found to partake in the same passive adaptation strategies executed by their medium and particularly smaller-sized counterparts, whilst the results of the iPrepare (2017) survey indicate that in terms of formal planning 30% of small enterprises are, *on paper*, more prepared than 7% of large firms.

Likewise, whilst the internal attributes of a MSME represent a major determinant to its adaptive capacity, the nature of the enabling environment in which a MSME is situated in also has a key role to play. Yohe and Tol (2002) for example, highlight that the extent to which firms have access to credit, well-functioning institutions and public services, and a robust skill-base, will have a strong bearing on their adaptation capacity. However, in the developing country context, such resources and services generally appear to be lacking – particularly towards the MSME segment. O'Brien and Brandes-van Dorresteyn's (2018) analysis of the different instruments that governments have at their disposal to support private sector adaptation actions and investments (e.g. tax relief mechanisms, inclusion of resilience focus in building codes etc.), shows that there is a significant gap in policies targeting MSMEs directly. The problems presented by a poor enabling environment can be particularly pertinent for the MSMEs that face additional barriers, including those operating in the informal sector, which are female-owned or located in rural areas (Pathak and Emah, 2017; Crick *et al.*, 2018). A large percentage of MSMEs in the Global South operate in the informal sector, with very limited access to finance, new market opportunities or public-sector services (Terpstra and Ofstedah, 2013; Crick *et al.*, 2016). However, even those that operate more formally without needing to negate additional structural or societal barriers can find themselves excluded from these services and opportunities due to the

underdeveloped national financial infrastructure, uncondusive legislation, and poorly developed public services respectively (see Gamage, 2015; Wijesinha and Perera, 2015; Niranjala and Jianguo, 2017; Mendoza, Lau and Castillejos, 2018). Such barriers are compounded by the fact that, *as a general rule*, smaller firms are more constrained in their access to finance, support and other services than larger firms, regardless of the qualities of the enabling environment they are situated in (Beck and Demirguc-Kunt, 2006; Hutchinson and Xavier, 2006; Luo, Wang and Yang, 2016; Niranjala and Jianguo, 2017).

Under the right conditions and supporting environment however, various studies have demonstrated that MSMEs can possess an inherent agency to take action and change their practices. For example, scholars from the discipline of innovation economics consider MSMEs to be capable of compensating for their relative lack of resources through their ability to be flexible and operate more informally than their larger counterparts (see Qian and Li, 2003; Wolff and Pett, 2006), although in the same regard it can also be a limitation (Pierre and Fernandez, 2018). Meanwhile, several studies highlight that enterprises that have prior experience of extreme weather events are more open to engaging in adaptation (*i.e.* Herbane, 2010, 2015; Wedawatta, Ingirige and Amaratunga, 2010; Neise and Revilla Diez, 2019). In the same vein, MSMEs who have adapted after experiencing an extreme weather event, were found to possess key characteristics that were supportive of adaptive behaviour, including self-organisation capacity, strong social networks and self-efficacy beliefs (Kuruppu, Mukheibir and Murta, 2014).

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5 *Passive strategies are considered to be those for which the strategy is inaction. In their paper, Neise and Revilla Diez (2019) disaggregate these strategies further into “depending” and “surrendering”. The former of which is centred around a firm relying on the state authorities to implement adaptation measures on their behalf, whilst the latter is underlined by either the inability to implement measures with firms simply tolerating losses and disruptions, or a willing adoption of a ‘wait and see’ strategy.*

### 3.4 WHAT DO WE KNOW ABOUT ADAPTATION IN MSMEs?

The ability of a private sector actor to engage in the various forms of adaptation is dependent on the characteristics and capabilities of the implementing actor. As such, the contrasting financial, technical and innovation capacities that exist between different business segments, sectors, and national and sub-national contexts mean that the various forms and nuances of private sector adaptation presented in section 3.2 are not equally relevant or viable across individual businesses or business classifications. Whilst this is not to exclude off-hand that businesses from certain segments, sectors, or economies are unable to participate in all forms of adaptation, it is however to say that for certain segments – taken as a whole – some forms are more applicable than others.

Regarding the MSME-segments of developing and emerging economies, evidence strongly suggests that the climate proofing an enterprise's own operations is the most common form of engagement in adaptation. In part, this is because for a majority of firms, the precise nature of their operations and core competencies do not provide the scope to adequately or directly incorporate adaptation principles into their products or services. However, it is also because MSMEs in these economies are typically lacking in the various dimensions of innovation capacity that are required to drive innovation processes towards new climate-orientated products and services. There are of course, exceptions to this generalisation. Terpstra and Ofstedah (2013) point to specialist manufacturers and consultancies, such as Karmsolar, *Egypt*, and Waterlife, *India*, and Green Future Solutions, *Singapore*, as examples of MSMEs in developing and emerging economies that specialise in products and services that formally address demand driven by climate change. Similarly, in Ghana VOTO Mobile Technologies Limited have developed a mobile phone based agricultural extension service, providing reliable weather information and guidance on improved agricultural practices to farmers, enabling them to increase their yields (Kuruppu, Bee and Schaer, 2018). Furthermore, some small informal enterprises are capable of undertaking what could be described as providing an innovative climate-resilience enhancing product to meet demand driven by climate change. For example, Nossiter (2009) reports that entrepreneurs in Dakar, Senegal, sell garbage to slum-dwellers as a means of raising up their houses and streets from the regular flooding that afflicts the area. However,

without being deemed as negligible, the capacity to address climate adaptation in the market-based manner demonstrated by the aforementioned MSMEs is not reflected in the majority of MSMEs.

Further, despite having the potential to possess the requisite capabilities to contribute to public-funded initiatives, available evidence suggests that MSMEs are seldom involved in strategic Public Private Partnerships with adaptation objectives. This is apparent in the absence of local MSMEs in the databases documenting climate action by non-state actors (*i.e. the NAZCA, CIP, and PSI*), despite the fact that cases of private sector actors contribution to public sector initiatives and meeting climate-related market demand through new innovative services and products are prominent. This state of affairs was first highlighted by Pauw and Chan (2018) who, in their analysis of the PSI database, found that out of 85 business cases of adaptation, only 13 included MSMEs as partners in the projects. This finding has led Pauw and Chan (2018) speculate that this may be due to a preference for working with larger companies that have international networks and experience. Something that would present MSMEs with a further barrier towards involvement in public initiatives, in addition to the fact that they – going by our working definition – are less likely to have access to key government departments and individual decision-makers.

Having outlined nuances between the discourse surrounding private sector engagement in adaptation and the realities of MSME adaptation, the following section presents initial findings from fieldwork conducted in Sri Lanka, where we explore how MSMEs engage in flood risk management and adaptation in practice in flood prone areas. The work conducted is part of the 'building businesses' climate resilience' (BBCR) project, which aims to propose sustainable solutions to reduce SMEs' recurring flood impacts. In the following section, we present some preliminary learnings from interviews conducted in Sri Lanka, as part of the baseline survey for the project.

# 4. INITIAL LEARNINGS FROM FLOOD AFFECTED SMES IN SRI LANKA

## 4.1 BACKGROUND

SMEs, which constitute the backbone of Sri Lankan economy accounting for 52% of GDP and 45% of total employment (Kulasinghe *et al.*, 2018), are among the most adversely affected by recurrent flooding in the country. In 2010, heavy rainfall and flooding affected about 50% of the private sector and during floods in 2017, 80% of those businesses affected fell into the MSME segment (Government of Sri Lanka *et al.*, 2017). Climate change is expected to exacerbate the risk of flash floods and landslides in the country.

Against this backdrop, the BBCR project – implemented by UNEP DTU Partnership (UDP) in collaboration with Asian Disaster Preparedness Centre, the Ceylon Chamber of Commerce and MPEnsystems – aims to enhance SMEs’ adaptation capacity in Sri Lanka. Through the development of innovative tools that give knowledge and confidence to SMEs to accelerate investment in flood risk management and adaptation, the objective is to propose sustainable solutions that reduce SME vulnerability to the impacts of recurring disasters. As part of the project UDP and project partners are currently undertaking a baseline study to examine the vulnerability context and adaptive capacity of SMEs in three target areas in Sri Lanka (Gampaha, Kalutara and Ratnapura). The aim is to gain an improved understanding of their adaptive capacity and decision-making behaviour, as well as the broader governance context in which they operate.

In February 2019, members of the project team conducted thirty-two semi-structured qualitative interviews with SMEs<sup>6</sup> and key national and local stakeholders involved in disaster relief, adaptation and SME development in Sri Lanka. In the following, we present some initial findings from the interviews, to provide an increased understanding of how SMEs are affected by disasters, how they respond to recurring floods, and what may stimulate them to initiate flood risk management and adaptation initiatives. In addition, as part of the study, questionnaires have been administered to 116 SMEs operating in diverse industries;<sup>7</sup> a detailed analysis of the data obtained from the full survey (questionnaires and interviews) will be presented in a forthcoming baseline survey report.<sup>8</sup>

*6 Micro businesses with less than 10 employees are not considered in the survey, as they are often operate from their homes in Sri Lanka and have limited willingness, as well as technical and financial capacity to engage in flood risk management and adaptation*

*7 Such as garments, fast-moving consumer goods, light engineering, printing and packaging, food processing, electrical and electronics, etc.*

*8 The baseline survey report will be published in August 2019*

## 4.2 FLOOD IMPACTS FOR SMES IN SRI LANKA

Interviewees reported that floods have had serious impacts on individual SMEs, with the most serious recent flood event reported in May 2017. 69% of the SMEs included in the study sample reported having floodwaters entering their premises; out of these, 56% suffered from damages to business premises and infrastructure, while 74% reported damage to equipment and products in the past five years. Interviewees reported impacts such as damages to machines and destruction of stock and buildings, delays in orders, loss of customers, relocation of factories, employee absenteeism, adverse impacts on supply chain movements because of blocked transportation routes etc. Floods were not a major problem in industrial zones (known as free trade zones), where the infrastructure is more developed and there is appropriate drainage systems installed. However,

despite not experiencing direct impacts, some SMEs in these zones reported indirect impacts such as when their employees cannot come to work due to blocked roads, or when they are unable to sell their goods because their customers are affected. Afflicted companies were found to have an approximate idea of the costs incurred as a result of flooding, however these estimates typically only take into consideration direct damages. They expect the total costs to be much higher when taking into account indirect costs (such as loss of business, moving factories, employee absenteeism etc.).<sup>9</sup>

*9 Forthcoming results from the questionnaires will provide exact numbers for direct and indirect costs*



## 4.3 FLOOD RISK MANAGEMENT AND ADAPTATION STRATEGIES ADOPTED BY TARGET SMES

Municipal services to help SMEs prevent, recover from, and adapt to floods in the target areas are limited or non-existent. SME actors found early warnings to often be either absent, late or inadequate (for example, loudspeakers were able to warn local inhabitants, but often proved inadequate to business owners who typically live in other locations), and therefore they often communicated through informal channels initiated by the SMEs themselves. Some SMEs have received a government-supported compensation for their losses through the National Insurance Trust Fund, however they consider the amounts granted to be inadequate.<sup>10</sup> SMEs typically have no other risk-transfer options, as they are often not covered by a private insurance company<sup>11</sup> and no access to funding or government support specifically for disaster risk prevention had been provided. As a result, SMEs are covering most of their losses themselves and are only initiating limited strategies to cope with – and adapt to – recurrent flooding. Our findings here correlate with Pauw and Chan (2018), who found that SMEs often have limited access to market-based finance, and that publicly financed adaptation projects typically prefer working with larger companies.

Nonetheless, most of the interviewed SMEs had initiated certain actions to respond to recurrent floods. Many of these were short-term and/or reactive measures, such as moving machines and/or inventory to higher grounds, providing transportation for employees and building small walls outside premises to keep the water out. In addition, some SMEs provided post disaster relief to employees, such as clothing, rice rations and cement to rebuild their houses. A few interviewees reported adopting longer-term strategies, such as constructing drainage around factory premises, elevating ground floors, providing emergency training for staff, and diversifying their end-markets to minimize the risk of losing their entire market

share due to disruption caused by floods.<sup>12</sup> Further, some SME's have taken more extreme option and relocated to multi-storey buildings outside of their present locality, although most respondents explained that moving their businesses is not a feasible option, as their customer base is in the area. In some areas, neighbourhood committees and informal business networks have been reported to warn each other of impending flood risk.

Most identified actions initiated by SMEs are short-term and/or reactive because although SME actors expressed a willingness to act, they typically have limited awareness of the specific types of measures and actions they can adopt. They also lack knowledge of the long-term implications of climate change for their geographical location. Interviewees explain that they typically act based on past experience and express the need for more information on the future plans and anticipated changes for their area, as well as expert support to evaluate and initiate appropriate risk management and adaptation actions. Furthermore, flooding is not the only recurring challenge facing SMEs in the target areas which are typically confronted by a number of other issues that threaten their continued viability, including: market fluctuations, manpower shortages, and difficulty accessing loans, together with other day-to-day challenges of keeping up with bills and paying staff wages. In managing these conflicting demands SMEs were forced to make trade-offs, in which they were typically found to prioritize short-term issues and profit-maximization over long-term risk mitigating actions. These findings confirm the often-observed phenomena that long-term planning together with the high upfront investment costs that resilience building usually requires, loses out to the more short-term business priorities and needs that it competes with (Becker-Birck *et al.*, 2013).

Decisions regarding which measures to adopt were typically taken by the director/owner of the SME and none of the interviewed SMEs reported undertaking a structured evaluation of the most appropriate adaptation measures (e.g. of the costs and benefits of their implementation) for

<sup>10</sup> According to the 2017 post disaster needs assessment, a lack of a systematic approach to conduct damage assessment and reporting, has significantly delayed the compensation process (Government of Sri Lanka *et al.*, 2017).

<sup>11</sup> The few SMEs which had insurance were not compensated for damages/losses incurred due to floods.

<sup>12</sup> For example, one manufacturer of traditional Sri Lankan apparel diversified their production to include traditional Indian clothing for the local market as a previous flood event that had disrupted production consequently caused the loss of their previous market share.

their business. Such behaviour is confirmed in several studies, which highlight that SMEs typically lack the capabilities, resources and time to assess whether adaptation measures represent the best return on investment regarding the competitiveness of their business (i.e. Murray and Marmorek, 2004; Downing, 2012; Federation of Small Businesses, 2015; Surminski and Hankinson, 2018; Chaudhury, 2018). Furthermore, in lieu with Downing *et al.* (2016), SMEs in Sri Lanka were generally found to lack adequate knowledge about the financial metrics, models and indicators. Such tools and methodologies can help the company management, investors and external parties monitor and evaluate potential investments in climate resilience, and thus the absence of capabilities in this arena can potentially also constitute a barrier towards SMEs making these investments.

Some interviewees explained being cautious towards sharing details about the specific challenges they experience with flooding (e.g. extend of damages) and tend to be careful about revealing information of their actions related to flood risk management and adaptation, a behaviour which is also documented by Agrawala *et al.* (2011). Sharing information on adaptation initiatives implemented can constitute a source of competitive advantage. For example,

it demonstrates to one's client base that the enterprise is proactive in the management of business risk and therefore more likely to be reliable in a crisis situation. However, as explained by one of the respondent, in the case of existing and potential customers, who were not previously familiar with the flooding history of the business and future risks, it may also have negative consequences for the business' image. For example, knowledge of a business' high exposure to flooding could conceivably lead customers to lose trust in the business' ability to make deliveries on time, creating a perception that the business in question represents an unnecessary risk.

With this in mind, it seems that the benefits of communicating adaptation actions are less clear for SMEs than they are for communicating other forms of Corporate Social Responsibility (CSR); for example, climate change mitigation. This, in tandem with the extra complexity that surrounds the adaptation message, gives it less potential as a source of positive publicity and thus provides less incentive for companies to do it, particularly if they believe it may be harmful in some way to their reputation. Ultimately, this reduces the communication of adaptive actions in the public domain, thereby limiting the learning potential for other companies.

## 4.4 STIMULATING SMES TO PRIORITIZE FLOOD RISK MANAGEMENT AND ADAPTATION

As exemplified in the case of Sri Lanka, the business rationale for investing in flood risk management and adaptation is not always clear for SMEs and the means to engage uncertain. Studies by Freyoldenburg *et al.* (2018) and Patankar *et al.* (2018) across Morocco, Rwanda, Costa Rica, Ghana, and India also demonstrate that MSMEs in the Global South need to perceive an economically viable business need for adaptation before acting. Thus, addressing the ambiguity surrounding the link between adaptation and business advantages as well as providing targeted guidance on how to integrate flood risk management and adaptation strategies in business operations and activities, are key to stimulate SME action in this area.

At present, there is a dearth of well-documented interventions towards explicitly stimulating adaptation in the MSME segment. From what is available it seems that direct engagement is limited to two broad forms of intervention: (i) Building MSME capacity within Business Continuity

Management and Planning, and (ii) designing, producing and disseminating decision-making support tools. The former is a management process through which firms design and develop formal procedures to ensure minimal business discontinuity ensues under disaster scenarios – classifiable as soft adaptation. The latter is a tool that provides businesses with information concerning the 'climate risks and opportunities' and the 'available climate change adaptation measures' necessary for a firm's management to make an informed decision concerning the business case for a range of adaptive actions, and ultimately, an adaptation strategy – thus facilitating the adoption of both hard and soft adaptation. Studies highlight the need to further develop tools and approaches for identifying and evaluating robust adaptation strategies under conditions of high uncertainty (Lempert and Groves, 2010). And whilst a number of such tools have been developed (e.g. Climate Expert, GIZ; Aware for investment by Acclimatise; Wizard,

UKCIP), this sentiment continues to hold true with regards to tools and approaches tailored specifically for SMEs. In particular, tools and approaches which do not require support from consultants or technical experts in order to be applied.

To incentivize the management of climate risk and adaptation investments, the long-term benefits of investing in resilience building need to be clear for SME actors and guidance on how to evaluate appropriate measures and implement them needs to be provided, based on their specific realities and existing capacities, and in a language they understand. Businesses do not use climate terminology to describe their activities, and they do not separate climate and non-climate factors, but may rather take into account risks that impact on their business assets and property, supply chains, employees, logistics and other variables affecting their competitiveness. Key stakeholders who work with SMEs in Sri Lanka recommend that to stimulate commercial interest in flood risk management and adaptation, practitioners should start by focussing on actions that only require the investment of resources that are immediately available to the SME; which in the Sri Lanka context would typically only constitute time, at least in the initial stages of the intervention. They suggest that such an approach would be more likely to create goodwill within the company and management buy-in. Something that might not be achieved if cooperation requires substantial investments from the outset, which may not be a feasible option for SMEs. Developing support tools, such as games and apps, through participatory processes that ensure tools are adapted to their target audience's existing capacity and financial literacy, to demonstrate the economic benefits of implementing simple doable measures and actions, could prove to be an effective mechanism to stimulate interest in SMEs to integrate climate risk management and adaptation into their business operations.

Support organizations that SMEs are typically already involved with, such as chambers of commerce and business associations, can support this process by playing a brokering and mobilizing role as catalysts of SME engagement. By encouraging increased transparency and creating mechanisms for sharing experience and lessons learnt with risk management and adaptation initiatives between businesses that share the same localities, sectors, or experiences of climate impacts, they may also motivate others to act accordingly and thus support knowledge transfer, increase collaboration between SME actors and play a strong multiplier role. Similarly, as MSMEs play a key role in global value chains, and as such do not act or adapt in isolation, we also need to recognize that effective enabling environments require extending the focus beyond MSMEs to target the entire value chain and incentivize the companies with more resources and capacity to transfer resilience thinking to their suppliers.

Furthermore, connecting resilience thinking to SME-orientated financial products is considered key to incentivize adaptation investments, for example by linking insurance premiums to resilience efforts. In this line of thinking, the BBCR project aims to involve the insurance and banking sectors in the application of participatory tools for risk management and adaptation, and thereby integrating climate resilience thinking in their existing products for SMEs. As also suggested by Surminski and Hankinson (2018), evidence of business continuity plans (and the application of decision-making supporting tools) that include climate risks could become a precondition for cover, while insurers could offer complimentary support and advisory services. Similarly, others have proposed that the adoption of adaptation strategies could be integrated into the general risk assessment of loan-appraisal processes (Freioldenburg *et al.*, 2018).

## 5. CONCLUSION

While it seems increasingly clear that integrating climate resilience into firms' strategies and processes is becoming a priority for accelerating the adoption of resilience-building measures, it is also evident that this will not happen automatically. The question of how to enhance private sector adaptive capacity and business growth in practice remains, even more so in the context of smaller businesses situated in developing countries. At present, MSME adaptation represents a research gap, with empirical studies into the topic generally lacking. This is particularly pertinent for research that explicitly investigates the reasons underlying a MSME's decision to adapt, or their decision to adapt in a given way. Hence, a clear understanding of how enterprises develop their adaptation strategies and which rationales determine their strategy is thin on the ground (Neise and Revilla Diez, 2019).

Initial findings from Sri Lanka show that SMEs are willing to act to reduce flood risk, and while some have initiated long-term measures to respond to floods, they are often implementing individual and typically short-term and reactive measures, as they lack both knowledge and capacity to act on these risks. Given the numerous challenges that they face, SMEs will typically be less likely to engage in adaptation, unless they understand the risks at play and the business rationale to act, and have sufficient resources, incentives and skills to do so. Under the right conditions and supporting environment, various studies have demonstrated that MSMEs can possess an inherent agency to take action and change their practices. For example, scholars from innovation literature consider MSMEs to be capable of compensating for their relative lack of resources through their ability to be flexible and operate more informally than their larger counterparts (Qian and Li, 2003; Wolff and Pett, 2006). However, stimulating and supporting these changes successfully will, in many cases, require the provision of capacity building and technical assistance, a conducive enabling environment, and strong partnerships with, for example, providers of financial products. The right mixture of incentives, enabling environments and partnerships is therefore key to stimulating effective adaptation within MSMEs.

Moreover, there is a need for further research on how MSME actors make decisions and how they interact with their internal and external environment, as this is key in shaping their overall

risk-reduction strategy and thus, determines whether they work towards achieving adaptation outcomes. Social and cultural factors, such as different risk perceptions and related behaviours, will have profound repercussions, which contribute to increased or reduced risks and their related impacts. Various cognitive and subjective barriers therefore influence the perceptions of MSME actors regarding climate change and their own abilities to adapt and take responsibility of their own business continuity. An increased understanding of these and changing perceptions, cultural values and norms is therefore a critical component in building MSME resilience (Kuruppu, Mukheibir and Murta, 2014).

Recognition of the synergies between business development and climate change adaptation is relatively recent and there is a urgent need for a better integration of the literatures on private sector development, business risk management and climate adaptation, particularly with regards to research focusing on the Global South. While steps have recently been taken towards that direction, a greater international focus and debate on the role that MSMEs can play in resilience building, their specific needs and the particular contexts in which they operate should be encouraged. There is thus significant opportunity for further work to provide an increased understanding of the internal dynamics at play, the factors that affect risk perceptions, the attitudes and behaviour of actors, as well as the institutional environment and governance context, in which smaller firms situated in developing countries operate.



## 6. BIBLIOGRAPHY

- Agrawala, S. et al. (2011) *Private Sector Engagement in Adaptation to Climate Change: Approaches to Managing Climate Risks*, February 18. 39. doi: 10.1787/5kg221jfk1g7-en.
- Asgary, A. et al. (2012) 'Disaster recovery and business continuity after the 2010 flood in Pakistan : Case of small businesses', *International Journal of Disaster Risk Reduction*. Elsevier, 2(1), pp. 46–56. doi: 10.1016/j.ijdr.2012.08.001.
- Asgary, A. and Naini, A. S. (2011) 'Modelling the adaptation of Business Continuity Planning by businesses using neural networks', *Intelligent Systems in Accounting, Finance and Management*, 18(2–3), pp. 89–104. doi: 10.1002/isaf.326.
- Auzzir, Z., Haigh, R. and Amaratunga, D. (2018) 'Impacts of Disaster to SMEs in Malaysia', *Procedia Engineering*. Elsevier B.V., 212, pp. 1131–1138. doi: 10.1016/j.proeng.2018.01.146.
- Averchenkova, A. et al. (2016) 'Multinational and large national corporations and climate adaptation: are we asking the right questions? A review of current knowledge and a new research perspective Article (Accepted version) (Refereed)', *Wiley Interdisciplinary Reviews: Climate Change*, 7(4), pp. 517–536. doi: 10.1002/wcc.402.
- AXA and United Nations Environment Programme (2015) *Business Unusual: Why the climate is changing the rules for our cities and SMEs*. Available at: [https://www.unepfi.org/fileadmin/documents/business\\_unusual.pdf](https://www.unepfi.org/fileadmin/documents/business_unusual.pdf) (Accessed: 12 May 2019).
- Baba, H. et al. (2014) 'Area Business Continuity Management, a New Opportunity for Building Economic Resilience', *Procedia Economics and Finance*, 18(September), pp. 296–303. doi: 10.1016/S2212-5671(14)00943-5.
- Beck, T. and Demircuc-Kunt, A. (2006) 'Small and medium-size enterprises: Access to finance as a growth constraint'. doi: 10.1016/j.jbankfin.2006.05.009.
- Becker-Birck, C. et al. (2013) *Resilience in Action: Lessons from Public-Private Collaborations Around the World*. Boston. Available at: [https://cdkn.org/wp-content/uploads/2013/08/MCG\\_ResilienceinActionReportweb.pdf](https://cdkn.org/wp-content/uploads/2013/08/MCG_ResilienceinActionReportweb.pdf) (Accessed: 21 May 2019).
- Berkhout, F., Hertin, J. and Arnell, N. (2004) *Business and Climate Change: Measuring and Enhancing Adaptive Capacity The ADAPT project*. Available at: [https://tyndall.ac.uk/sites/default/files/publications/it1\\_23.pdf](https://tyndall.ac.uk/sites/default/files/publications/it1_23.pdf) (Accessed: 12 May 2019).
- Berkhout, F., Hertin, J. and Gann, D. M. (2006) 'Learning to adapt: Organisational adaptation to climate change impacts', *Climatic Change*. Springer Netherlands, 78(1), pp. 135–156. doi: 10.1007/s10584-006-9089-3.
- Bhardwaj, A. (2018) 'The new MSME definition in India: good or bad? Why?', *Times Of India*, 23 February. Available at: <https://timesofindia.indiatimes.com/blogs/thewindbeneaththewings/the-new-msme-definition-in-india-good-or-bad-why/>.
- Biagini, B. and Miller, A. (2013) 'Engaging the private sector in adaptation to climate change in developing countries: importance, status, and challenges', *Climate and Development*. Routledge, 5(3), pp. 242–252. doi: 10.1080/17565529.2013.821053.
- Chaudhury, M. (2018) 'Moushumi Chaudhury (2018) Conceptualizing micro, small and medium enterprise engagement in climate change adaptation Pg. 29-38', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 29–38. doi: 10.1007/978-3-642-15961-9\_82.
- Crick, F. et al. (2016) *Enabling private sector adaptation in developing countries and their semi-arid regions – case studies of Senegal and Kenya*, Centre for Climate Change Economics and Policy Working Paper No. 291. 291. London. Available at: <http://www.lse.ac.uk/grantham>. (Accessed: 13 May 2019).

- Crick, F. et al. (2018) 'Enabling private sector adaptation to climate change in sub-Saharan Africa', *Wiley Interdisciplinary Reviews: Climate Change*. John Wiley & Sons, Ltd, 9(2), p. e505. doi: 10.1002/wcc.505.
- Dougherty-Choux, L. et al. (2015) *Adapting from the Ground Up: Enabling Small Businesses in Developing Countries to Adapt to Climate Change*. Washington. Available at: [https://wriorg.s3.amazonaws.com/s3fs-public/Adapting\\_From\\_The\\_Ground\\_Up.pdf?qa=2.257459979.1805193353.1557690299-510386906.1552981909](https://wriorg.s3.amazonaws.com/s3fs-public/Adapting_From_The_Ground_Up.pdf?qa=2.257459979.1805193353.1557690299-510386906.1552981909) (Accessed: 12 May 2019).
- Downing, T. E. (2012) 'Views of the frontiers in climate change adaptation economics', *Wiley Interdisciplinary Reviews: Climate Change*, 3(2), pp. 161–170. doi: 10.1002/wcc.157.
- Downing, T. E. et al. (2016) *A Prototype Monitoring, Learning and Evaluation Platform: Benchmarking Climate Resilience in the Private Sector for PROADAPT*. Available at: <https://publications.iadb.org/en/publication/17215/prototype-monitoring-learning-and-evaluation-platform-benchmarking-climate> (Accessed: 12 May 2019).
- Druce, L. et al. (2016) *Demystifying adaptation finance for the private sector*. Geneva. Available at: [www.unepfi.org](http://www.unepfi.org) (Accessed: 12 May 2019).
- Ebitu, E. T. (2016) 'MARKETING STRATEGIES AND THE PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES IN AKWA IBOM STATE, NIGERIA', *British Journal of Marketing Studies*, 4(5), pp. 51–62. Available at: [www.eajournals.org](http://www.eajournals.org) (Accessed: 12 May 2019).
- Ebitu, E. T., Ufot, J. A. and Glory, B. (2018) 'An appraisal of Nigeria's Micro, Small, and Medium Enterprises (MSMEs): Growth, Challenges and Prospects', *International Journal of Small Business and Entrepreneurship Research*. *EA journals*, 6(3), pp. 15–29. Available at: [www.eajournals.org](http://www.eajournals.org) (Accessed: 12 May 2019).
- European Commission (2016) *User guide to the SME Definition*. doi: 10.2873/782201.
- Federation of Small Businesses (2015) 'Severe Weather a More Resilient Small Business Community', Federation of Small Businesses, (July), pp. 1–28. Available at: <https://www.fsb.org.uk/standing-up-for-you/national-offices/uk-westminster/uk-westminster-publications?page=3> (Accessed: 13 May 2019).
- Frei-oldenburg, A. et al. (2018) 'Climate Expert: a bottom-up approach to SME resilience to climate change', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 159–176. doi: 10.1007/978-3-642-15961-9\_82.
- Frey, B. et al. (2015) *The Business Case for Responsible Corporate Adaptation: Strengthening Private Sector and Community Resilience: A Caring for Climate Report*. Available at: [www.cdp.net](http://www.cdp.net) (Accessed: 12 May 2019).
- Gamage, P. (2015) 'Bank Finance For Small And Medium-Sized Enterprises In Sri Lanka: Issues And Policy Reforms', *Studies in Business and Economics*, 10(2), pp. 32–43. doi: 10.1515/sbe-2015-0018.
- Gardiner, A. et al. (2015) *Public-Private Partnerships for Climate Finance*. Copenhagen. Available at: [www.norden.org](http://www.norden.org) (Accessed: 13 May 2019).
- GEF Independent Evaluation Office (2013) *Review of GEF engagement with the private sector*. Washington. Available at: <https://www.gefio.org/sites/default/files/ieo/ieo-documents/ops5-td13-gef-engagement-private-sector.pdf> (Accessed: 13 May 2019).
- GEF Independent Evaluation Office (2017) *IEO brief: GEF Engagement with the Private Sector*. Washington. Available at: [www.gefio.org](http://www.gefio.org) (Accessed: 13 May 2019).

Gibson, T. and van der Vaart, H. J. (2008) *Defining SMEs: A Less Imperfect Way of Defining Small and Medium Enterprises in Developing Countries*. Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.627.8740&rep=rep1&type=pdf> (Accessed: 13 May 2019).

Global Reporting Initiative (2017) *Growing role for the private sector in the 2030 Agenda*. Available at: <https://www.globalreporting.org/information/news-and-press-center/Pages/Growing-role-for-the-private-sector-in-the-2030-Agenda.aspx> (Accessed: 13 May 2019).

Goldstein, A. et al. (2019) 'The private sector's climate change risk and adaptation blind spots', *Nature Climate Change*. Nature Publishing Group, 9(1), pp. 18–25. doi: 10.1038/s41558-018-0340-5.

Gonzales, E., Hommes, M. and Mirmulstein, M. L. (2014) *MSME Country Indicators 2014: Towards a Better Understanding of Micro, Small, and Medium Enterprises*. Available at: <https://www.smefinanceforum.org/sites/default/files/analysis%20note.pdf>. (Accessed: 13 May 2019).

Government of India (2015) Q.1. What is the definition of MSME? Available at: <https://msme.gov.in/faqs/q1-what-definition-msme> (Accessed: 13 May 2019).

Government of Sri Lanka, World Bank, UN Sri Lanka, and Global Facility for Disaster Reduction and Recovery (2017) *Sri Lanka Rapid Post Disaster Needs Assessment: Floods and Landslides, May 2017*.

Green Climate Fund (2016) *Establishing a programmatic framework for engaging with micro-, small- and medium-sized enterprises*. Available at: [https://www.greenclimate.fund/documents/20182/226888/GCF\\_B.13\\_15\\_-\\_Establishing\\_a\\_programmatic\\_framework\\_for\\_engaging\\_with\\_micro-small\\_and\\_medium-sized\\_enterprises.pdf/558ec8ba-f0f8-455a-a8ce-8544de51f719](https://www.greenclimate.fund/documents/20182/226888/GCF_B.13_15_-_Establishing_a_programmatic_framework_for_engaging_with_micro-small_and_medium-sized_enterprises.pdf/558ec8ba-f0f8-455a-a8ce-8544de51f719) (Accessed: 13 May 2019).

Haigh, N. and Griffiths, A. (2012) 'Surprise as a Catalyst for Including Climatic Change in the Strategic Environment', *Business & Society*, 51(1), pp. 89–120. Available at: <http://journals.sagepub.com/doi/10.1177/0007650311427425> (Accessed: 13 May 2019).

Hale, T. (2016) "All Hands on Deck": *The Paris Agreement and Nonstate Climate Action*, *Global Environmental Politics*. MIT Press One Rogers Street, Cambridge, MA 02142-1209 USA journals-info@mit.edu, 16(3), pp. 12–22. doi: 10.1162/GLEP\_a\_00362.

Halkos, G. et al. (2018) 'Bouncing Back from Extreme Weather Events: Some Preliminary Findings on Resilience Barriers Facing Small and Medium-Sized Enterprises', *Business Strategy and the Environment*. John Wiley & Sons, Ltd, 27(4), pp. 547–559. doi: 10.1002/bse.2019.

Herbane, B. (2010) 'Small business research: Time for a crisis-based view', *International Small Business Journal*, 28(1), pp. 43–64. doi: 10.1177/0266242609350804.

Herbane, B. (2015) 'Threat orientation in small and medium-sized enterprises Understanding differences toward differences toward acute interruptions', *Disaster Prevention and Management*, 24(5), pp. 583–595. doi: 10.1108/DPM-12-2014-0272.

Hussain, I. (2012) 'SMEs development and failure avoidance in developing countries through public private partnership', *African Journal of Business Management*, 6(4), pp. 1581–1589. doi: 10.5897/ajbm11.2526.

Hutchinson, J. and Xavier, A. (2006) 'Comparing the impact of credit constraints on the growth of SMEs in a transition country with an established market economy', *Small Business Economics*, 27(2–3), pp. 169–179. doi: 10.1007/s11187-005-4412-3.

International Finance Corporation (2017) *Creating Markets for Climate Business An IFC Climate Investment Opportunities Report*. Washington. Available at: [www.ifc.org](http://www.ifc.org) (Accessed: 13 May 2019).

IPPrepare (2017) 'Strengthening the Disaster Resilience of Small and Medium Enterprises in Asia', Adpc. Available at: <http://www.adpc.net/sme-resilience-asia/>.



- Jones, H. P., Hole, D. G. and Zavaleta, E. S. (2012) 'Harnessing nature to help people adapt to climate change', *Nature Climate Change*. Nature Publishing Group, 2(7), pp. 504–509. doi: 10.1038/nclimate1463.
- Kato, M. and Charoenrat, T. (2018) 'Business continuity management of small and medium sized enterprises: Evidence from Thailand', *International Journal of Disaster Risk Reduction*. Elsevier Ltd, 27(June 2017), pp. 577–587. doi: <https://doi.org/10.1016/j.ijdrr.2017.10.002>.
- Kulasinghe, S. et al. (2018) 'Catalyzing Small and Medium-sized Enterprise Venture Capital in Sri Lanka', (54).
- Kuruppu, N., Bee, S. and Schaer, C. (2018) 'Developing the business case for adaptation in agriculture: case studies from the Adaptation Mitigation Readiness Project', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 51–63. doi: 10.1007/978-3-642-15961-9\_82.
- Kuruppu, N., Mukheibir, P. and Murta, J. (2014) 'Ensuring small business continuity under a changing climate', in *Applied Studies in Climate Adaptation*. Chichester, UK: John Wiley & Sons, Ltd, pp. 429–436. doi: 10.1002/9781118845028.ch48.
- Lempert, R. J. and Groves, D. G. (2010) 'Identifying and evaluating robust adaptive policy responses to climate change for water management agencies in the American west', *Technological Forecasting and Social Change*. North-Holland, 77(6), pp. 960–974. doi: 10.1016/J.TECHFORE.2010.04.007.
- Linnenluecke, M. K., Griffiths, A. and Winn, M. (2012) 'Extreme Weather Events and the Critical Importance of Anticipatory Adaptation and Organizational Resilience in Responding to Impacts', *Business Strategy and the Environment*. John Wiley & Sons, Ltd, 21(1), pp. 17–32. doi: 10.1002/bse.708.
- Linnenluecke, M. K., Griffiths, A. and Winn, M. I. (2013) 'Firm and industry adaptation to climate change: a review of climate adaptation studies in the business and management field', *Wiley Interdisciplinary Reviews: Climate Change*. John Wiley & Sons, Ltd, 4(5), pp. 397–416. doi: 10.1002/wcc.214.
- Luo, P., Wang, H. and Yang, Z. (2016) 'Investment and financing for SMEs with a partial guarantee and jump risk', *European Journal of Operational Research*. Elsevier B.V., 249(3), pp. 1161–1168. doi: 10.1016/j.ejor.2015.09.032.
- Mendoza, R. U., Lau, A. and Castillejos, M. T. Y. (2018) 'Can SMEs survive natural disasters? Eva Marie Arts and Crafts versus Typhoon Yolanda', *International Journal of Disaster Risk Reduction*, 31(February), pp. 938–952. doi: <https://doi.org/10.1016/j.ijdrr.2018.08.004>.
- Murray, C. and Marmorek, D. R. (2004) *Adaptive Management: A Spoonful of Rigour Helps the Uncertainty Go Down*. Victoria. Available at: <http://www.cbfwa.org/rme.htm> (Accessed: 13 May 2019).
- Neise, T. and Revilla Diez, J. (2019) 'Adapt, move or surrender? Manufacturing firms' routines and dynamic capabilities on flood risk reduction in coastal cities of Indonesia', *International Journal of Disaster Risk Reduction*. Elsevier Ltd, 33(July 2018), pp. 332–342. doi: 10.1016/j.ijdrr.2018.10.018.
- Niranjala, S. A. U. U. and Jianguo, W. (2017) *Access to finance and related issues in the SMEs in Sri Lanka, 2017 3rd International Conference on Information Management, ICIM 2017*. IEEE. doi: 10.1109/INFOMAN.2017.7950363.
- Nossiter, A. (2009) 'In a Senegal Slum, a Building Material Both Plentiful and Perilous', *The New York Times*, 2 May. Available at: <http://www.nytimes.com/2009/05/03/world/africa/03garbage.html?ref=world>.

- O'Brien, T. and Brandes-van Dorresteijn, D. (2018) 'Government approaches to catalyse MSME resilience to climate change', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 111–121. doi: 10.1007/978-3-642-15961-9\_82.
- OECD (2017) *Entrepreneurship at a Glance 2017*. doi: 10.1787/entrepreneur\_aag-2017-en.
- Okereke, C., Wittneben, B. and Bowen, F. (2012) 'Climate Change: Challenging Business, Transforming Politics', *Business & Society*. SAGE Publications CA: Los Angeles, CA, 51(1), pp. 7–30. doi: 10.1177/0007650311427659.
- Papadopoulos, G. et al. (2018) *Statistics on small and medium-sized enterprises - Statistics Explained*, eurostat: Statistics Explained. Available at: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics\\_on\\_small\\_and\\_medium-sized\\_enterprises#General\\_overview](https://ec.europa.eu/eurostat/statistics-explained/index.php/Statistics_on_small_and_medium-sized_enterprises#General_overview) (Accessed: 21 May 2019).
- Patankar, A. et al. (2018) 'Developing a sustainable framework for SMEs to design, finance and implement suitable flood resilience measures in Mumbai, India', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 177–188. doi: 10.1007/978-3-642-15961-9\_82.
- Pathak, S. and Ahmad, M. M. (2016) 'Flood recovery capacities of the manufacturing SMEs from floods: A case study in Pathumthani province, Thailand', *International Journal of Disaster Risk Reduction*, 18, pp. 197–205. doi: <https://doi.org/10.1016/j.ijdr.2016.07.001>.
- Pathak, S. and Emah, I. E. (2017) 'Gendered approach towards disaster recovery: Experiences from 2011 floods in Pathumthani province, Thailand', *International Journal of Disaster Risk Reduction*. Elsevier, 24(May), pp. 129–134. doi: <https://doi.org/10.1016/j.ijdr.2017.06.007>.
- Pauw, P. and Chan, S. (2018) 'Multistakeholder partnerships for adaptation: the role of micro, small and medium enterprises', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 99–110. doi: 10.1007/978-3-642-15961-9\_82.
- Pauw, P. and Pegels, A. (2013) 'Private sector engagement in climate change adaptation in least developed countries: an exploration', *Climate and Development*. Routledge, 5(4), pp. 257–267. doi: 10.1080/17565529.2013.826130.
- Pierre, A. and Fernandez, A. (2018) 'Going deeper into SMEs' innovation capacity: An empirical exploration of innovation capacity', *Journal of Innovation Economics & Management*, 1(25), pp. 139–181.
- Pinkse, J. and Kolk, A. (2012) 'Multinational enterprises and climate change: Exploring institutional failures and embeddedness', *Journal of International Business Studies*. Palgrave Macmillan UK, 43(3), pp. 332–341. doi: 10.1057/jibs.2011.56.
- Qian, G. and Li, L. (2003) 'Profitability of small- and medium-sized enterprises in high-tech industries: the case of the biotechnology industry', *Strategic Management Journal*, 24(9), pp. 881–887. doi: 10.1002/smj.344.
- Schaer, C. (2018) 'Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 7–17. doi: 10.1007/978-3-642-15961-9\_82.

- Shishlov, I., Bellassen, V. and Leguet, B. (2012) *Joint Implementation: A Frontier Mechanism Within The Borders of an emissions gap*, Climate Report. Available at: [http://www.cdclimat.com/IMG/pdf/12-03-06\\_climate\\_report\\_33\\_-\\_joint\\_implementation.pdf%5CnShishlov, Bellassen et al 2012 - Joint Implementation.pdf](http://www.cdclimat.com/IMG/pdf/12-03-06_climate_report_33_-_joint_implementation.pdf%5CnShishlov, Bellassen et al 2012 - Joint Implementation.pdf).
- Surminski, S. and Hankinson, J. (2018) 'MSMEs, climate change risks and insurance: reflections on the use of insurance for climate adaptation', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 65–78. doi: 10.1007/978-3-642-15961-9\_82.
- Terpstra, P. and Ofstedah, A. (2013) *Micro, Small, and Medium Enterprises: Key Players in Climate Adaptation*. World Resources Institute (Adaptation and the Private Sector). doi: 10.1596/1813-9450-5631.
- UNISDR (2015) *Sendai Framework for Disaster Risk Reduction 2015 - 2030*. Geneva. Available at: <https://www.unisdr.org/files/43291sendaiframeworkfordrren.pdf> (Accessed: 13 May 2019).
- UNISDR (no date) *Private Sector - UNDRR*. Available at: <https://www.unisdr.org/partners/private-sector> (Accessed: 13 May 2019).
- United Nations (2015) *Transforming Our World: The 2030 Agenda For Sustainable Development* United Nations Transforming Our World: The 2030 Agenda For Sustainable Development. Available at: [https://sustainabledevelopment.un.org/content/documents/21252030\\_Agenda\\_for\\_Sustainable\\_Development\\_web.pdf](https://sustainabledevelopment.un.org/content/documents/21252030_Agenda_for_Sustainable_Development_web.pdf) (Accessed: 21 May 2019).
- United Nations Department of Economic and Social Affairs (no date) *Sustainable Development Knowledge Platform: Business and Industry*. Available at: <https://sustainabledevelopment.un.org/majorgroups/businessandindustry> (Accessed: 21 May 2019).
- United Nations Framework Convention on Climate Change (2010) *Copenhagen Accord*. Copenhagen. Available at: <https://unfccc.int/resource/docs/2009/cop15/eng/11a01.pdf> (Accessed: 14 May 2019).
- Watson, C. and Patel, S. (2018) 'The role of multilateral climate funds in unlocking climate finance and action in developing country MSMEs', in Schaer, C. and Kuruppu, N. (eds) *Private-sector action in adaptation: Perspectives on the role of micro, small and medium size enterprises*. 1st edn. Copenhagen: UNEP DTU Partnership, pp. 79–98. doi: 10.1007/978-3-642-15961-9\_82.
- Wedawatta, G., Ingirige, B. and Amaratunga, D. (2010) 'Building up Resilience of Construction Sector SMEs and Their Supply Chains to Extreme Weather Wvents', *International Journal of Strategic Property Management*, 14(4), pp. 362–375.
- Wijesinha, A. and Perera, N. (2015) *Banking on SME growth: Concepts, Challenges, and Policy Options to Improve Access to Finance in Sri Lanka*. 20. Colombo. Available at: [www.ips.lk](http://www.ips.lk) (Accessed: 13 May 2019).
- Wolff, J. A. and Pett, T. L. (2006) 'Small-Firm Performance: Modeling the Role of Product and Process Improvements\*', *Journal of Small Business Management*. John Wiley & Sons, Ltd (10.1111), 44(2), pp. 268–284. doi: 10.1111/j.1540-627X.2006.00167.x.
- Yohe, G. and Tol, R. S. J. (2002) 'Indicators for social and economic coping capacity—moving toward a working definition of adaptive capacity', *Global Environmental Change*. Pergamon, 12(1), pp. 25–40. doi: 10.1016/S0959-3780(01)00026-7.



**CLIMATE CHANGE ADAPTATION AND SMALLER BUSINESSES IN THE GLOBAL SOUTH:**

**DEFINING ROLES, LIMITATIONS, AND TOUCH POINTS**

**FOR POSITIVE INTERVENTIONS**

**FOR MSMEs SITUATED IN DEVELOPING COUNTRIES**