BACKGROUND PAPER

TRADE & INDUSTRIAL POLICY STRATEGIES

ALL IS NOT GREEN:

CLIMATE CHANGE ADAPTATION AND SMALL BUSINESS RESILIENCE IN LOW- AND MIDDLE-INCOME COUNTRIES

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Executive Summary

Climate change impacts are being felt in low- and middle-income countries at an ever-increasing pace. The high dependency on climate-sensitive sectors as well as high vulnerability to climate change raise the need for quick responses and action. These climate events wreak havoc, ripping apart the fabric of societies, economies, and lives. Micro, Small, and Medium Enterprises (MSMEs) are vital components of economies and particularly vulnerable to the impacts of climate change.

This paper explores three inter-related themes: the material risks that small businesses face, the state of adaptation in low- and middle-income countries, and potential recommendations on a way forward. From a material risk perspective, climate change impacts manifest in different and often unpredictable ways, creating complex and interconnected risks. This is further complicated by climate change impacts occurring alongside a range of other interacting and dynamic stresses, such as unemployment, inadequate access to basic services, food insecurity and disease. Risk of climate impacts vary not only by region but also by sector. MSMEs do not operate in silos and are often positioned in value chains. Climate impacts on value chains must also be considered when analyzing risks, as downstream and upstream effects can affect businesses. Thus, understanding vulnerability from a multiple stressor perspective is important as it can help identify the most exposed and the most vulnerable groups.

While the extent to which MSMEs in low- and middle-income countries are engaging in adaptation remains unclear, key lessons can be drawn from the experience of adaptation measures instituted in these countries. MSMEs face an assortment of risks related to climate change and adaptation action can be driven internally or externally. While

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adaptation is costly, global experience points to the fact that MSMEs can increase their resilience and that a business case exists for MSMEs to also act as producers of adaptation-related goods and services.

To aid MSMEs to increase resilience and exploit market opportunities, it is vital to understand the barriers they face. The evidence thus far indicates that MSMEs in low- and middle-income settings have limited access to climate data and information on locally-appropriate adaptation options; have difficulty in choosing among options; face limited access to the appropriate finance; lack technical skills and tools for small business development and management; lack appropriate risk-transfer mechanisms; face unfavorable business environments; and have to navigate socio-cultural barriers.

An array of solutions has been tested in various settings and provide a useful base of experience for future development. Improving the resilience of MSMEs involves frameworks that address policies and institutions; data, information, and capacity development; infrastructure, markets and information and communications technologies (ICT); and financial environment factors.

On the basis of an analysis of the risks and current state of adaptation, a vision for the future hinges on a participatory inclusive approach, involving the MSMEs themselves in directing the transformation, and supported by the state alongside large businesses and financial institutions that determine access to finance, markets and resources for MSMEs. This would serve to increase MSMEs' resilience and enable them to exploit market opportunities.

There is a need for a multiple-stressor view of climate change adaptation that acknowledges complex and interrelated systems. The involvement of multiple stressors requires the collaboration of a number of stakeholders within and beyond value chains. Governments have an important role to play by absorbing adaptation-thinking across various levels of government, shaping policy that addresses the general business environment and other forms of support for MSMEs, including finance and risk-transfer mechanisms. A key gap is the lack of progress in countries developing their National Adaptation Plans (NAPs), which can include a specific focus on adaptation of MSMEs in key sectors. Large businesses also have a role in catalyzing adaptation actions by their smaller counterparts in established value chains through procurement processes that encourage adaptation investments by MSMEs. In addition, climate-sensitive sectors tend to be those characterized by labor-intensive activities. Reducing the dependency of economies on climate-sensitive sectors and increasing the resilience of systems by diversifying into other sectors less vulnerable is an option. Finally, the effect of socio-cultural barriers has to be addressed to catalyze adaptation activity among small businesses.

Collective action requires working towards a common vision and harnessing the lessons learned from adaptation activities globally. While the need for action is urgent, it is not too late for MSMEs to be galvanized from the ever-increasing impact of a changing climate, and for these institutions to become beacons of change, proliferating adaptation-thinking and activities throughout their localities, economies and value chains.

1. Introduction

MSMEs are key economic players driving inclusive and sustainable development in low- and middle-income countries throughout the world. MSMEs contribute substantially to economic production and employment, and have considerable potential to reduce poverty and inequality. They improve livelihoods of communities by stimulating local investments,[1] and providing employment to large parts of the population.[2] MSMEs link into local economies and contribute to social cohesion through integrating diverse populations.[3] They are a pathway to inter-generational development and social growth.[4] In particular, they promote the inclusion of disadvantaged groups of society — particularly women, immigrants and minority groups.[5,6] They underpin development in rural areas, with many people deriving their livelihoods from family businesses in agriculture and retail.[7]

While most businesses around the world fall into the category of MSMEs,[8] there is no broadly accepted international definition of MSMEs. Definitions vary across countries and regions by measures, such as the number of employees, turnover and assets. The MSME Country Indicators study conducted in 155 economies[9] identifies the most common MSME definition as micro (less than 10 employees), small (10-49 employees), medium enterprises (50-249 employees), and large firms (250 or more employees). The upper limit of 249 employees for medium enterprises is regarded as relevant to high-income

countries. The World Bank's Enterprise Surveys[10] stratifies firms as follows: small firms (5-19 employees), medium firms (20-99 employees), and large firms (100 or more employees). Though there are various definitions of MSMEs across the world, in this paper, which focuses on low- and middle-income countries, the World Bank's Enterprise Surveys' upper limit for medium-sized firms of less than 100 employees is applied.

MSMEs have a propensity for innovativeness. They have been noted to be versatile, innovative, adaptive and entrepreneurial, which contributes to higher economic growth in countries.[11,12] They are nimble and have shorter investment horizons than larger enterprises, which allows them to respond to new opportunities and risks more rapidly.[12]

In addition, MSMEs tend to be more willing than large firms to adopt broader innovative, sustainable strategies than incremental sustainability practices with short-term results.[13] They are more likely to seize opportunities and act as bottom-up agents of change. Social enterprises, which apply commercial strategies to improve financial, social and environmental well-being, illustrate this. Similarly, MSMEs are key adopters of radical environmental innovations (often neglected by established firms) in the production and manufacturing of environmental goods, services and technologies.[14] Such enterprises are at the forefront of climate responses and innovations, both adaptation and mitigation, building resilient and adaptive community structures and processes. Grassroots enterprises can play a role in strengthening not only the productive but also the social networks, and in developing more inclusive pathways to sustainability.[15]

Yet, despite their benefits, MSMEs still face challenges that relate to their size, limited resources, and unfavorable policy, industry and market conditions, which limit their ability to grow, scale up, and take advantage of regional and global value chains. Indeed, even though MSMEs in resource-constrained settings, such as developing countries or arid- and semi-arid lands, might be heterogeneous, the core constraints influencing their decision-making tend to be similar.[16] For example, limited start-up skills and poor human capital linked to low levels of education have been observed in small businesses. This makes small businesses struggle to fully exploit economic opportunities or sustain a growing enterprise.[17,18] These challenges become even more pronounced for informal enterprises, and those owned by vulnerable groups, such as women and the youth. Beck and Cull[8] observed that many enterprises in Africa consist of informal microenterprises necessitated by the lack of alternative economic opportunities.

Climate change exacerbates these challenges and generates a number of additional risks. These include supply chain risks when adverse weather events can threaten the supply of inputs, or climate change policy affecting the cost of inputs; financial risks, such as lost revenues due to damaged goods or livestock; and risks associated with damage to infrastructure and assets. Given the key role of MSMEs in the economy and society, it is instrumental to ensure that they are resilient[i] to climate change impacts. Yet, the responses of MSMEs to climate impacts and the need to assess their adaptive capacity have largely been neglected to date[20] and warrant greater scrutiny.

Using a literature review and insights from a number of case studies, this paper aims to provide insight into the climate change risks faced by MSMEs, the current state of adaptation, and the potential role of these enterprises in advancing climate change adaptation in low- and middle-income countries. Broadly, the paper seeks to understand the current material risks to MSMEs due to climate change and unpacks the current and future vulnerability of MSMEs to these risks. It also characterizes the risks and how they vary across geographies and populations. The paper also evaluates the state of adaptation, seeking to understand current adaptation measures and interventions across geographies and populations. The paper concludes with a vision for the future by suggesting how progress on adaptation can be advanced to move MSMEs in low-and middle-income countries beyond the status quo.

To provide a holistic evaluation of the state of play in these countries, the framework developed by Crick et al[21] is applied. The framework outlines the elements (or building blocks) required to create an enabling framework for MSME adaptation in Sub-Saharan Africa. In setting out these elements for increasing adaptive capacity, the framework draws on private sector adaptation and private sector development literature.

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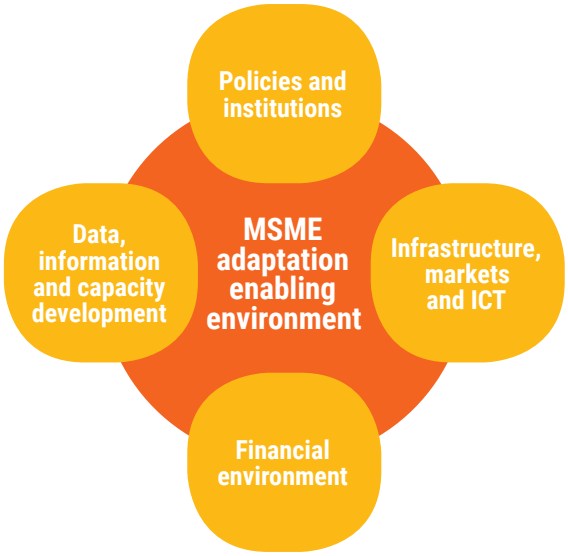
i The IPCC defines resilience as follows: "*the ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions*"[19] p.563

The framework provides a useful base for the analysis of adaptation in developing countries as it is framed for the Sub-Saharan context, and is structured in such a way as to be broad, accounting for the nature of adaptation efforts being localized and highly context-dependent. The framework consists of four key factors [21] that are taken into account when looking at enabling MSME adaptation (see Figure 1).

- Policies and institutions encompass institutional and governance arrangements and regulatory frameworks and policies targeting MSME adaptation.
- Infrastructure, markets, and ICT refer to basic infrastructure (e.g. water, electricity and access to inputs) and information and telecommunications systems that are available to MSMEs.
- The financial environment accounts for the importance of economic and financial incentives and affordable and accessible finance that MSMEs can use to adapt.
- Finally, data, information and capacity development refer to the need for knowledge, capacity development, training, and data and information by MSMEs in making adaptation-related decisions. Another benefit of the framework is that it also accounts for interlinkages between the various elements.
- These four elements do not exist in isolation and the framework also acknowledges interlinkages between these different elements. These interlinkages refer to the ability of one (or more) factors to influence each other in creating an enabling environment. For example, where public policies and institutions do not effectively promote adaptation among small businesses, climate data, information and capacity development interventions may not be easily available/accessible. MSMEs are hindered in their adaptation decision-making, or at the worst unable to function/operate.
- The framework is used in the analysis in this paper in the material risk section (Section 2) and as a guiding framework for the analysis of the state of adaptation (Section 3) and the vision for the future (Section 4). The rest of the paper is organized as follows: Section 2 presents the material risks which MSMEs face. Against this background, Section 3 reviews the state of adaptation of MSMEs. Section 4 looks forward and formulates a vision for the future, while Section 5 concludes.

FIGURE 1 The building blocks of an enabling environment for MSME adaptation



Source: Author's adaptation of Crick et al.[21]

2. Material Risks

Increasing the adaptive capacity of MSMEs in low- and middle-income countries requires an understanding of the risks they face. The most obvious risk within the scope of this paper is naturally the climate change risks that these enterprises face, which stand to wreak havoc on their immediate operations. Climate change risks are defined in this paper as the intersection of hazards, vulnerability[ii] and exposure.[iii] Such risks raise the urgency for adaptation[iv] to expected and unexpected impacts to improve the resilience of businesses, the economy and society at large. However, other risks that can prevent adaptive development are also present, and these are also covered. As MSMEs play a significant role in all economies, particularly in low- and middle-income countries, the translation of MSME risks into economy-wide impacts is also considered. An integrated approach is adopted that recognizes the inter-relationships between climate change risks and socio-economic processes,[22] and adaptation is framed in the broader context of sustainable development.

2.1 Material Risk: A Topology of Climate Risks for Small Businesses

Humanity is well-versed at responding to risks that can be easily isolated. It is harder to respond to risks that are complex and interconnected, with feedback loops, threshold effects and cascading disruptions.[23] Climate change has multiple direct effects that result from changes in weather patterns and extreme weather events. These patterns and events include temperature rise, storms, floods, droughts, and sea level rise. The resulting climate change impacts are associated with water and food shortages, human health risks, biodiversity loss, and impact on ecosystems. The impacts also interact with and, in some cases, exacerbate or are exacerbated by other global and local processes that worsen an already precarious situation. In this complex system, climate change is a direct driver that worsens the impact of other drivers on nature and human well-being.[24] Climate change impacts occur simultaneously with a range of other interacting and dynamic stresses, such as unemployment, inadequate basic services, trade liberalization on particularly sensitive domestic sectors, and disease,[25,26] thus entrenching broader socioeconomic inequalities.[27] The interplay of all these factors can further worsen the underlying political and security risks.

The vulnerability of businesses, including MSMES, and the ultimate impact on them depends on the complex interplay of the multiple determinants of risk.[28] In some cases, there is "double vulnerability" which manifests as climate stress at the business as well as the household level.[27] Climate change impacts affect all areas of business performance – operational, financial and environmental performance, social interactions, regulatory compliance, contractual obligations, and legal constraints.[29] Climate risks faced by MSMEs in low- and middle-income countries are both direct and indirect. Direct risks relate to assets and processes that are under the control of the entrepreneur while indirect risks relate to the broader environment on which the enterprise has less influence, such as infrastructure disruptions, the availability of finance, economic and political stability, policy risk, and supply chain risk. From a multiple-stressor perspective, these risks cannot be tackled in isolation and without taking cognizance of the broader environment. Trade-offs exist between short- and long-term benefits for some adaptation options.

MSMEs face a diversity of climate change-related risks. Their vulnerability to particular risks is context-specific and varies greatly depending on the type of operation, sector, location, size and degree of resilience. Exposure to climate risk is not equal and varies by demographic. Women, for example, may be exposed to risks to a greater degree in settings where they tend to be engaged mostly in marginal agricultural activities in the informal sector.[27] The processes which impact on MSMEs operate mainly at scales external to individual enterprises.[20] Modern supply chains are characterized by global geographical reach, specialized inputs that are produced in specific locations, and reduced inventories associated with just-in-time production, further increasing these value chains vulnerability to climate risks.[30] This has been referred to as transnational climate impacts,[31] implying that climate impacts can reach across borders, affecting one country and requiring adaptation there are due to climate change events or impacts in another country. Hence the need for a transboundary view of climate risk.[32]

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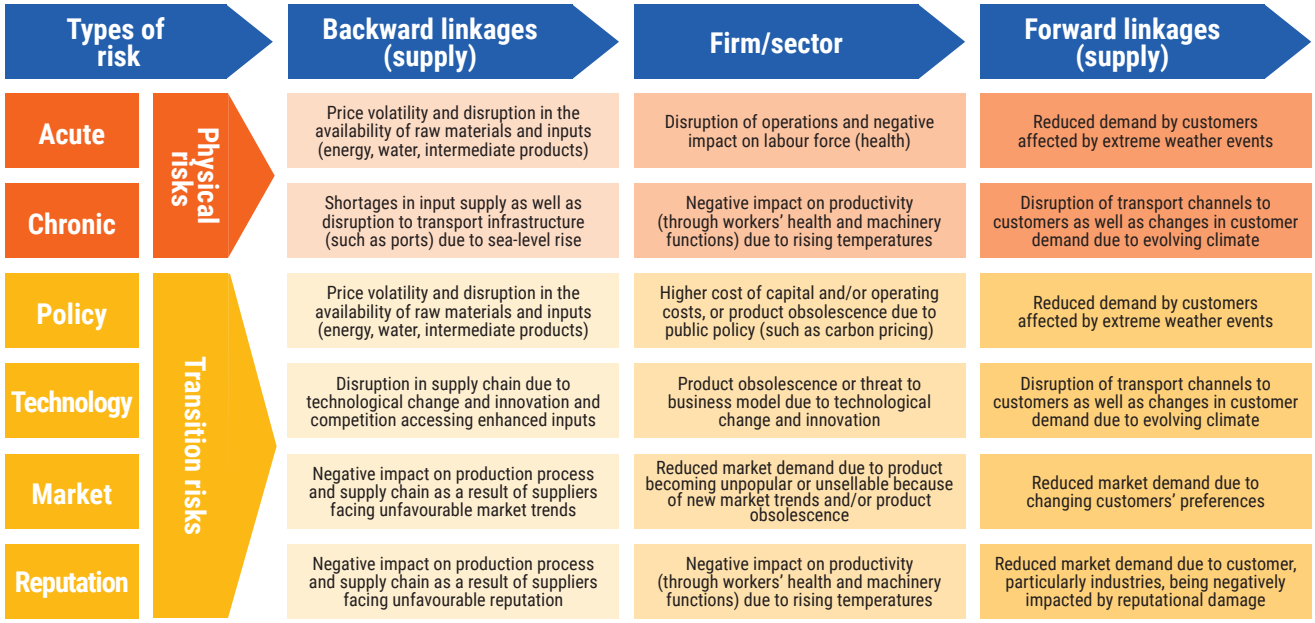
ii The IPCC defines vulnerability as follows: *"The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt."*[22] p.5

iii The IPCC defines exposure as follows: *"The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected."* [22] p.5.

iv The IPCC defines adaptation as follows: *"In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities."* [19] p.556

FIGURE 2 Typology of risks faced by businesses in a value chain



Source: Authors (based on references 22,23,30,34,22,23,30,34)

A conceptual framework can be formulated to better understand the range of risks and their potential impacts on vulnerable MSMEs. Importantly, such climate change-related risks must be understood from a value chain perspective, as depicted in Figure 2. Climate change affects MSMEs beyond their fence lines and national borders.[33] A value chain approach helps identify the direct effects of climate change on an enterprise, the indirect effects through its upstream (supply) and downstream (demand) sectors, and on transversal sectors supporting value chains operations, such as infrastructure and logistics.[16] This approach can help facilitate the development of business cases for risk sharing and investment, and the prioritization of women and other vulnerable groups.[27]

Climate change-related risks have two broad characteristics: physical and transition risks.[30,35] Physical risks relate to direct climatic hazards, inflicting damage to infrastructure such as power supply, railways and roads, and other assets such as buildings, factories and capital equipment, as well as people and communities. They can be acute or chronic and vary from one region to the next:

- Acute physical risks are event-driven. They correspond to short, intense, and largely-unpredictable climatic events, such as cyclones, hurricanes, wildfires and floods.

- Chronic physical risks refer to long-term shifts in climate patterns, such as droughts, sea-level rise, rising temperatures and chronic heat waves.

Transition risks come from the changes required to shift to sustainable development pathways, particularly in the areas of climate change mitigation and adaptation.[22,23,30,34,35] Mitigating climate change through reducing greenhouse gas emissions helps limit impacts and minimize the future need to adapt, while adaptation is a core component of resilience as it deals with both current and future vulnerability. As the economy and society moves to a low-carbon and climate-resilient model as part of a broader sustainability transition, the operating environment of MSMEs and other businesses is indeed transforming. Transition risks can originate from four different sources:

- Policy risks emerge as changes in the regulatory and legal framework, both domestically and globally, affect business operations. MSMEs and other businesses increasingly need to shift to low-carbon, climate-resilient business models and operations to avoid carbon

taxation and penalties, comply with regulations on resource-use efficiency, or avoid climate change-related litigation.

- Technology risks originate from the technological improvements and innovation triggered by the transition to a low-carbon, climate-resilient economy and society, such as renewable energy, resource efficiency, e-mobility and integrated smart technologies. The emergence of such technologies, by displacing old solutions, may render MSMEs unattractive, uncompetitive and/or obsolete, if they do not adopt new trends rapidly enough.

- Market risks are driven by the shifting demand for goods and services as the transition unfolds. As the new replaces the old and climate-compatible business practices are being adopted, the demand for goods and services is negatively affected. More broadly, a move away from carbon-intensive activities is also increasingly impacting MSMEs.

- Stakeholder/reputation risks materialize as the market, i.e. customers, penalizes MSMEs and other businesses for their negative climate change-related impacts and/or their lack of action to mitigate them. Brand damage may have long-lasting impacts on business operations, possibly affecting sales but also partnerships, market capitalization, and access to as well as cost of capital.

At the local level, these risks cannot be controlled as they depend on external global factors. MSMEs and other businesses can, however, implement adaptation measures to counter the negative impacts of such events, should they materialize. They have to adjust their production systems to maintain their production capabilities under changing conditions.[36] The nature of a business also has implications for its ability to withstand climate change-related risks. While MSMEs are versatile and capable of considerable adaptation, larger and formal enterprises tend to have higher degrees of resilience due to higher human, institutional and financial resources.[12] A higher degree of integration into value chains also strengthens resilience, although it comes with its own sets of risks.

Physical and transition risks in a supply chain can trickle down to the operations of a MSME or other businesses, by disrupting access to raw materials, intermediary products, energy, water or any other inputs into the production process. In addition, the lack of climate-compatibility of a business's supply chain can lead to market and reputational damage, particularly for MSMEs which do not have control over their supply chains.

Impacts can also trickle-up from customers. MSMEs supplying large lead businesses may face significant pressure to transition to low-carbon and climate-resilient operations to maintain supply contracts. Climate change risks, either physical or transition, may also have negative impacts on a MSME's market. Their sales may face dire consequences if clients are negatively affected by climate change, either reducing their purchases or even closing down.

2.2 The Link Between Small Business Risk and Wider Socioeconomic Impacts

The risks that MSMEs and other businesses face can also have significant impacts on the economy and society, particularly for poor and marginalized groups. MSMEs are important in the economy providing employment, and products and services that society needs. The disruptions that these enterprises face can translate into disruptions on the broader economy. Climate risks can increase the cost of producing goods and services; increase the uncertainty and magnitude of supply chain disruptions; reduce the quality of goods and services provided; and disrupt the delivery of goods and services in a speedy and timely fashion.[30] For example, the severe flooding in Thailand in 2011 saw more than 14 500 businesses reliant on Thai suppliers suffering business disruptions worldwide.[30,33]

Many MSMEs are active in climate sensitive sectors and are significant employers. The relationship between jobs and climate change has three key issues.[1] First, most jobs are dependent on ecosystem services, which are highly sensitive to climate impacts. For instance, three out of four jobs worldwide are heavily or moderately dependent on water. Second, the provision of jobs as well as safe, healthy and decent working conditions rely on the absence of environmental hazards, which can be triggered or exacerbated by climate change. At the global level, about 23 million working-life years were lost annually between 2000 and 2015 because of such environment-related hazards. Third, the risks and hazards associated with environmental degradation are more likely to affect vulnerable workers who do not have proper safety nets.[1]

MSMEs also have economy-wide linkages through international trade. While most manufacturing MSMEs tend to have low participation rates in forward and backward global value chains compared to large enterprises, MSMEs are indirectly involved in international trade through supplying intermediate goods and services, although their products are not directly exported.[37] MSMEs contribute indirectly to exports by acting as domestic suppliers of exporters.[38] In a study on the coffee value chain in Uganda, climate hazards were found to negatively affect all actors along the chain from production to export.[39] Coffee farmers and processors were more vulnerable compared to traders, middlemen and exporters. Climate hazards reduced coffee yields and quality, which translated further to lower coffee prices and margins earned by the various actors, and the country's competitiveness on the international market was also affected.

The various interlinkages show that negative climate change impacts on MSMEs, or their failure to adapt, have wider negative socioeconomic impacts. MSMEs operate within locally defined spatial and socioeconomic systems. Disruptions to the local economy affect the local people as well as local enterprises.[20] Poor performance of MSMEs has significant implications for local livelihoods. The close linkage between community risks and business risks implies that any disturbance from climate impacts can potentially result in local instability.[33] This includes high unemployment and low incomes, which can cascade further into other socioeconomic challenges such as food insecurity, crime, migration, and political instability.

3. State of Adaptation

The preceding section shows how MSMEs in low- and middle-income countries not only face direct climate change risks but are vulnerable to an assortment of other risks. Further, these risks can interact with impacts being amplified throughout value chains. These risks do not exclusively affect MSMEs but also other businesses, communities and individuals that rely on them. Given these risks, the need to adapt is urgent, and there is still a long way to go in MSMEs adapting to climate change in low- and middle-income countries.

MSMEs – especially informal and micro or very small enterprises – in low- and middle-income countries are expected to face the most severe climate change risks as they are highly vulnerable to extreme weather events and often have low adaptive capacities. Simultaneously, some of the main opportunities for building the resilience of these enterprises to climate risks are already being realized in many countries. Improving the resilience of MSMEs to climate change cannot take place in isolation but requires a multipronged approach involving various actors, policies and strategies and tailored to the specific social, economic and political circumstances of the country, region and enterprise.[40,41]

3.1 The Micro, Small and Medium Enterprise Context

It is important to understand the MSME context when thinking about their adaptive capacity. The incentives for MSMEs to participate in adaptation (as consumers or producers) can be voluntary or imposed. Businesses can make internal choices to adapt, or be driven by cost-mitigation/efficiency reasons, to reduce susceptibility to future climate change-related risks, or to exploit adaptation-related market opportunities. External influences can also force or incentivize the business to participate in adaptation and can be driven by the risks outlined in the previous section.

However, MSMEs in low- and middle-income countries lack resources, which prevent them from enhancing their resilience or from producing adaptation-related goods and services on their own. These resources are cross-cutting and include general business knowledge, technology, infrastructures, and skills. MSMEs also often lack technical skills and tools for effective business development and management,

including in specialized areas, such as accounting, business forecasting, marketing and value chain analysis.[42–44] Internal capacity issues in MSMEs constrain their productivity and innovation, including poor governance and lack of a well-educated workforce.[44,45] A tendency exists towards short-term horizon planning, in which MSMEs prioritize immediate risks and goals such as low yields, price fluctuations or quick profits over longer-term investments.[21,40,44] An anticipatory approach to adaptation is therefore uncommon for MSMEs as they often fail to recognize the long-term benefits of financial savings and improved profitability that outweigh upfront costs.[21,44] This already places these businesses on the back foot, before having to contend with adaptation-related challenges. Limited access to knowledge also presents the risk of maladaptive lock-in effects that could potentially decrease future resilience.[46]

Incorporating climate change risks into business decisions has received some global attention. While the extent to which MSMEs engage in adaptation remains unclear given the limited evidence base in low and middle-income countries,[21,44,47,48] a number of well-documented programmes and initiatives are seeking to increase the resilience of MSMEs.[12,42,43,49,50] These initiatives offer key examples and insights into adaptation actions by these businesses.

What would motivate an MSME to increase its resilience? First, small businesses can increase the resilience of their business operations and value chains to reduce their vulnerability, protect their interests, and add value. Second, small businesses can innovate and develop products and services to meet demands for adaptation solutions in vulnerable communities, creating new market opportunities for themselves and increasing their brand image.[12,44] These new products could potentially range from early warning systems to energy or water efficient technologies, resistant crop varieties, and insurance products.[18,50] Finally, through legislation and regulation, MSMEs can be forced to increase resilience.

A value chain approach to climate risk management (CRM) is an area of increasing attention. CRM refers to climate-sensitive decision-making, and endeavors to promote sustainable development through increasing resilience associated with climate risk.[51] CRM examines strategies to reduce the vulnerability of communities in sectors such as agriculture, food security, water resources, and health. CRM covers a broad range of potential actions, including early-response systems, strategic diversification, dynamic resource-allocation rules, financial instruments, infrastructure design and capacity building, and accounts for interrelationships among actors. Thus far, much emphasis has been placed on the ability of large businesses to foster adaptation, but there is a growing literature on the role of MSMEs in supporting CRM across value chains.[52]

Numerous examples of MSMEs providing adaptation approaches, goods and services in value chains or engaging in resilience-enhancing measures are available. For example, Solar Sisters in Uganda provides solar cooking stoves and related products that enhance energy security and reduce reliance on imported, carbon-intensive fossil fuels.[42] Another example is a sanitation business in Ghana that has designed above ground pit latrines for flood-prone areas.[12] Also, a brewery in Zimbabwe has developed new beer products using resilient red sorghum grains.[21] Another example is a joint initiative among farmer cooperatives and the local district council in Nadia, West Bengal to implement a vetiver grass system for river bank and slope stabilization to address increasing flood risks.[53] In South Africa, Montmasson-Clair et al[18] highlight MSMEs that are developing innovative technologies in the water and sanitation sectors. For instance, Loo Afrique and Isidima focus on improving efficiency of waterborne sanitation systems; Waste Intrique Services is active in water conservation and demand management; while EWEF-Sustech focuses on providing efficient and effective water treatment solutions. In the same vein, Algas Organics is taking advantage of Sargassum (seaweed) blooms choking Caribbean coastlines, partly driven by climate change, to create an award-winning organic fertilizer.

3.2 Analysis of Adaptation Risks and Interventions

Notable adaptation initiatives have already been conducted globally in response to the need for MSMEs to adapt. These form useful examples from which learning experiences can be gleaned to inform further initiatives in other settings and provide a basis for recommended actions. Applying the framework [21] introduced earlier, a review of the state of play of adaptation as it pertains to MSMEs in low- and middle-income countries is provided below. This analysis informs the recommendations which follow in the next section.

3.2.1 POLICIES AND INSTITUTIONS

Policies and institutions refer to institutional and governance arrangements, regulatory frameworks and policies. Institutional and governance arrangements can be assessed based on the availability of climate change coordinating bodies at national and regional levels, national and/or regional bodies supporting private sector development, multi-stakeholder or public-private partnerships to support climate change adaptation decision-making, private sector multipliers, private sector associations (such as chambers and business associations), and networks or consortia on climate change adaptation.[21] Regulatory frameworks and policies refer to climate change adaptation policies at national and regional levels, building standards and/or codes incorporating climate change considerations, local zoning rules incorporating climate change considerations, private sector development policies, and climate change considerations integrated into policies supporting the development of the private sector and/or MSMEs.[21]

At the global level, institutions such as the United Nations Framework Convention on Climate Change (UNFCCC) have supported countries in developing strategies to address climate adaptation. In 2010, the UNFCCC established the process to formulate and implement NAPs. The initiative provides for developing countries to identify their key climate change risks, identify adaptation needs, and develop and implement strategies and programmes to attend to the adaptation needs.[54] NAPs are plans which guide countries through this process. While these plans are not MSME-centric, they seek to build overall resilience of the economy, of which MSMEs and other businesses are a component. Such an initiative is a step in the right direction in proliferating adaptation-thinking throughout these economies. Despite such drivers for adaptation, the latest UNFCCC review indicates that most developing countries are still at the early stages of developing NAPs, and are still laying the ground and addressing gaps.[55] Out of the 153 developing countries under the UNFCCC, only 11 countries had successfully completed and submitted their NAPs in 2018, with a further 80 having only initiated the process. Some countries are nevertheless more progressive. In 2018, for example, Saint Lucia approved a suite of Sectoral Adaptation Strategies and Action Plans (SASAPs) which support the implementation of its established NAP. Priority sectors for adaptation identified in the NAP were tourism, water, agriculture, infrastructure and spatial planning, natural resource management, fisheries, education, and health. They outline the investment priorities, adaptation opportunities and MSME participation in these sectors.[56] Kenya, Brazil, Burkina Faso and Sri Lanka are also some of the low- and middle-income countries that have already established NAPs. To date, SASAPs have been developed for tourism, water, agriculture and fisheries.

At the national level, governments have an important role in supporting MSMEs and other businesses to invest in building their resilience through developing and implementing a relevant and coherent mix of policies, regulatory mechanisms, financial incentives, as well as providing training and capacity building initiatives. There is need to promote the development and implementation of integrated climate change adaptation and MSME development policies at national and regional levels, as well as promoting and implementing building standards, codes and local zoning rules.[21,57]

Adaptation policy support measures enacted by the state assist MSMEs to lower their costs, become more profitable and exploit new market opportunities. In India, adaptation support measures (including capital subsidies, tax breaks and changes in legislation) saw sugar mills produce sustainable energy from biomass, increase the efficiency of production, and open up new markets for electricity generation and alcohol production.[58] In this case, a value chain approach to adaptation was also important. Bagasse, an output from sugar production, was used by downstream paper mills to produce paper pulp and waste paper, and as fuel. Upstream support at the sugar production level saw sugar producers divert the sales of bagasse from paper mills to use for their electricity production and climate mitigation reasons. This left downstream paper consumers with reduced supply of a key input material and the paper producers turned to an alternate supply source, local jaggery-based[v] bagasse producers. These producers supplied a sugar-derived substitute, which was previously disregarded by jaggery producers, and often burnt in fields. It was discovered that superior quality paper could be produced, and the input substitution has also catalyzed activity and investments in a new jaggery bagasse production for which there was substantial demand from stranded paper mills.

v Jaggery refers to a traditional cane sugar/date/palm product that contains molasses and crystals, and is consumed in countries such as India, Pakistan, and Bangladesh.

BOX 1 Insight from examples in Uganda, India and Mongolia

In Uganda, stakeholders have teamed up to protect and restore the ecological integrity of River Rwizi, whose catchment system covers 10 districts in western and central Uganda and is part of the Nile Basin. There has been pressure on the Rwizi catchment due to increased demand for land by local communities, including MSMEs,[61] to carry out economic activities in agriculture, brick-making, and sand-mining, among others. Some of the activities are environmentally unfriendly and have polluted the water, and this has been compounded by the effects of climate change. The problems in the Rwizi catchment are multi-scale, as they were not only affecting people within the catchment area but also those in other Nile Valley riparian states since Rwizi catchment is part of the Nile basin. Such challenges require the participation and cooperation of various stakeholders at different scales, hence the involvement of the Ugandan government research organizations (such as the Advocates Coalition for Development and Environment), non-governmental organizations, local communities, private sector and development partners. As a result, positive results have been realized. The once-degraded wetland has been restored and has regenerated. Information and massive public sensitization through multiple channels (such as radio, TV talk-shows, community meetings, and dialogs) to inform the public were necessary, and the government played a leading and coordinating role. Monitoring and evaluation was also essential in providing lessons learned, and highlighting opportunities that could be scaled up.

In India, Development Alternatives, with support from the National Bank for Agriculture and Rural Development, uses the Ridge-to-Valley approach to community development. This involves promoting and supporting the development of farmer producer organizations. Farmer producer organizations can enhance productivity through efficient, cost-effective and sustainable resource use, and strengthening the collective action needed to realize higher returns. In this context, the Sakshi Dairy Producer Company Limited was privately incorporated in 2016, and has 225 farmers as shareholders from 14 villages of Orchha block of Tikamgarh district of Madhya Pradesh. The main focus of the company is procurement, processing, and value addition of organic compost, spices, and animal balanced feed. These efforts seek to rejuvenate the entire value chain of livestock-based economy through integrated livestock development. This includes electricity generation from biogas derived from cow dung, with the slurry being used for vermin-composting production, thus waste to wealth value addition. The approach has yielded a number of sustainability benefits. These include having positive community impact, engagement, and improvement of livelihoods. The use of local materials and capacity building of local stakeholders enhanced the local buy-in to ensure positive socio-economic outcomes.

In Mongolia, the basin area of Uvs Lake and Tes River located in Uvs province in the western part of Mongolia is one of the most vulnerable regions to climate impacts, as there is an increase in the frequency of natural disaster occurrences such as *zud*[vi] and droughts. The Uvs province has a long history of vegetable growing. Water inputs are vital to locals for household purposes, and directly linked to the main economic activities in the region. In recent years, severe water shortages have resulted in disputes. To adapt to climate change, the locals of Uvs province formed groups known as the Water User Groups, with the support of the United Nations Development Programme (UNDP) in 2015. This was based on the principles of ecosystem-based adaptation, an approach that involves collective action among stakeholders (governments, communities, businesses and conservation, and development organizations) to conserve and restore natural ecosystems and ecosystem services and increase resilience to climate change.[62] The purpose of the association was to promote sustainable means of protection, use and management of water resources.[63] The association helps resolve disputes over unequal access to water between users, particularly farmers and businesses. The collective voices and discussions through the association helped the locals to better understand and more efficiently allocate and manage local water resources. The project generated a change in thinking from local to the national level on climate change impacts and solutions. Interventions included institutional and financial arrangements for communities, investments in adaptation infrastructure and operations, and non-structural interventions including awareness-raising, training, and linkages development.

vi Zud is a Mongolian term describing severe winter conditions that result in the loss of a large number of livestock due to starvation and cold.

An important angle to acknowledge when governments think about adaptation policy in low- and middle-income countries is the role MSMEs play in communities, and cost-effective solutions to increase adaptive capacity. MSMEs in rural communities, for example, are among the most vulnerable to the impacts of climate change since they are heavily dependent on natural and environmental resources for their inputs. They typically concentrate in the agricultural, fisheries, forestry, and community-based tourism sectors. Fostering informal and formal support networks, such as farmers' groups, business partnerships and cooperatives within a sector or region can better enable formal and informal enterprises to overcome capacity challenges through the pooling of resources, improved information sharing and dissemination, co-financing, and risk-sharing.[12] Initiatives like the International Fund for Agricultural Development provide for partnership building in their provision of finance to the agricultural sector, which recognizes this position that MSMEs play.

Local enterprises that engage local market and social systems have to form local relations of reciprocity to thrive. Therefore, participation becomes both a driver and a consequence of good business. Formal and informal support networks, such as agricultural cooperatives and women's groups, have been crucial in building adaptive capacity of agricultural small businesses in countries, such as the Gambia and Kenya.[59,60] These social networks have been important for women-led businesses in Kenya's semi-arid lands, for example, to more actively engage in adaptation planning and actions at the local level through supporting each other. Examples of support include improving access to credit and cash (such as table banking where groups save and lend money among themselves); the pooling of resources like group purchase of inputs and equipment (such as drought-resistant seeds and agricultural tools); and the sharing of technical knowledge on viable adaptation measures.[59]

3.2.2 DATA, INFORMATION AND CAPACITY DEVELOPMENT

Data, information and capacity development concern the availability of data and information systems that predict future weather patterns, provide risk assessment and decision-making tools, provide information on adaptation measures, as well as their cost and applicability to different MSMEs in differing regions and sectors.[21] Capacity development relates, to the availability of adaptation training programmes, research institutions focusing on adaptation, forums and conferences on climate change, agricultural extension, and centers that focus on training and technology development.[21]

Limited access to climate data and information on locally-appropriate adaptation options hinders the ability of the majority of MSMEs to effectively plan and adapt as it creates an environment of uncertainty.[12,44,64] This gap is particularly stark for MSMEs in low- and middle-income countries in Africa, Asia, and Latin America.[12] The challenge of limited access to information also affects key stakeholders, such as governments, businesses, and the general public. As consumers and promoters of adaptation-related goods and services, stakeholders require knowledge and data on adaptation, the available options and the best choices. Uncertainties over future climatic changes also reduces the attractiveness of investing in adaptation if there are no cost savings or requirements for compliance with specific legislation or standards.

Poor awareness about climate risks and uncertainties (either through information that is unavailable or inaccessible) makes it difficult for MSMEs in low- and middle-income countries to successfully incorporate these risks into their business planning and decision-making. This climate information must furthermore be available to firms in a format that is understandable and actionable.[12] Entrepreneurs also need to be empowered to understand the business case for adaptation, know the available appropriate and cost-effective adaptation measures and why they stand to benefit from investing in adaptation. Difficulties in choosing among adaptation options when multiple options are available are also inherent. MSMEs lack the tools and knowledge to evaluate these options. Capacity to assess adaptation options and plan adaptation strategies requires a certain level of technical knowledge which is not always available to low- and middle-income country MSMEs.[12]

Wilson[50] highlights work under the Proadapt program, which includes 11 technical assistance projects in 14 Latin American and Caribbean countries to raise climate change awareness and promote the adaptation of MSMEs. The program involves market assessments of climate risks within the relevant sectors; awareness-raising and outreach to local enterprises, resource users and other stakeholders;

BOX 2 Insight from examples in Zimbabwe, Peru, Cambodia and Trinidad and Tobago

In Zimbabwe, for example, agricultural MSMEs have been able to better incorporate climate risks and variability into their agricultural decision-making and planning due to the improved provision and availability of weather and climate information and forecasting. This was enabled by the installation of a higher density of weather stations by the Environmental Management Authority, with assistance from the UNDP and the Special Climate Change Fund. These farms have been able to use this climate information to improve their crop cycle planning, for drought preparedness, and adjusting farming practices in line with forecasts, thereby improving yields and realizing increased revenue and other business benefits.[12]

In Peru, communities living 3 800 meters above sea level depend on limited economic activities such as livestock farming, small-scale agriculture, fiber production and mining. Most MSME owners live in poverty and struggle to preserve their genomic wealth. Water stocks are highly vulnerable to climate change affecting grasslands and threatening livestock and fiber industries. To facilitate adaptation, the Agrarian University La Molina has successfully tested an affordable drone-driven grassland monitoring device to help inform communities. Using a grant from INNOVATE (a public-financing mechanism for innovation), an early warning system to monitor the quality of grasslands in eight regions has been developed to provide relevant information, data, and warning to producers on a wide range of threats to grassland quality. Awareness is just a first step of a successful adaptation strategy, and this is helping to improve the health of the grasslands.

In Cambodia, where farmers were unaware of the climate risks facing them and their MSMEs, a cost-effective solution was found to build their resilience. A community link among farmers and related MSMEs was used where volunteers entered communities and disseminated climate information to households. Equipped with latest climate information, farmers modified their farming practices based on predicted weather patterns, to anticipate weather changes and protect their crops from the effects of extreme weather events.[12]

In Trinidad and Tobago, the Caribbean Natural Resources Institute (CANARI) implemented a project known as *Building climate-resilient rural enterprises in Trinidad and Tobago* to increase community resilience and the resilience of natural resource-based enterprises.[43,65] Using value chain analysis, microenterprises based on cocoa and honey production in the village of Brasso Seco were supported through small grants to assess key vulnerabilities to climate change and related hazards and implement cost-effective solutions to adapt. With business mentoring support, the enterprises identified potential adaptation strategies to "climate proof" their business. In the case of the cocoa enterprises, drought-resistant species and crop diversification were adopted. For the honey enterprises, drought-resistant plants that produced flowers needed for honey production even during periods of water scarcity were replanted.

and training and implementation in adaptation strategies to address climate risks. It also seeks to promote business opportunities related to adaptation through improved access to market intelligence and business advice. For example, Proadapt is working with six MSMEs run by farmer cooperatives (of which three are female-led) in the semi-arid Sertao region of northeast Brazil. Based on a market assessment of the dairy and meat sectors, smallholder farmers were provided with target training on a climate-smart agricultural system using 17 field-tested, low-cost technologies. These technologies have included using more water-efficient methods, drought-resistant cacti as animal feed, and low tillage. Since 2013, there has been a net 85% increase in earnings per family for milk and lamb, 27% average daily increase in milk production, and improved land management and reforestation in 100% of pasture areas under the program.[50] The six cooperatives are further developing a commercial distribution platform and credit program to support farmers to access affordable climate smart technologies.

Governments, in collaboration with development partners, academia and private sector actors (such as chambers of commerce and industry) can also support education and training on adaptation measures for MSMEs and other businesses. Building capacity on the proper use of climate information and tools to incorporate climate risks in business planning, budgeting and implementing

adaptation measures is required to successfully enable MSMEs' adaptation.[12] Between 2014 and 2017, the German Development Agency (GIZ) implemented a global program to strengthen climate change adaptive capacity of MSMEs in various sectors (such as tourism, water transportation, industry, and food-processing and manufacturing) in Morocco, Rwanda, Bangladesh and Central America. Training and education of MSMEs on adaptation measures was an important project component.[66] The outcomes of this project have been favorable and have assisted MSMEs to develop strategies for increasing their resilience.[67]

Enabling business and entrepreneurship development through incubation programmes also encourages MSMEs to invest in new opportunities and commercialize climate-friendly products and services.[12] Since 2012, Climate Innovation Centers (CIC) have been established in low- and middle-income countries around the world under the Climate Technology Program of the World Bank Group. CICs provide a country-driven approach to addressing climate change as well as early-stage financing, business incubation and other services to enable local entrepreneurs to proactively develop profitable, innovative climate technology solutions that meet local needs.[68] Currently, seven CICs have been established in Morocco, Ethiopia, Kenya, South Africa, India, Vietnam and the Caribbean. The Caribbean CIC, for example, is the only clean technology incubation in the region and focuses on establishing regional capacity to support clean-tech start-ups and early stage companies as well as contributing to the creation of new green industries.[68] The Caribbean CIC has developed a suite of business incubation services which target entrepreneurs across different stages, starting from idea generation services, a three-day boot camp (to help entrepreneurs turn ideas into concrete business plan), and a six-month accelerator which provides product development and business development services.

Perceptions and socio-cognitive factors also influence adaptation as they affect the willingness and ability of an individual to make use of climate information and take action.[69] Social barriers can be a potent force to overcome, and are often overlooked in the context of adaptation.[12] Social dimensions, such as education level and income, can affect the willingness of MSMEs to adapt. Established cultural norms and traditional practices require collective effort, and in certain contexts, decisions tend to be made at a community level.[12] Low acceptance and negative perceptions of climate change or specific adaptation strategies also present a barrier to adaptation.[70] Often, norms, culture and traditional practices may dictate and lock-in approaches rendered unsustainable due to climate change.

Therefore, focusing on socio-cognitive factors can help improve predictions about future adaptation and vulnerability. This can also increase the overall adaptive capacity by improving the communication of risk and information on possible, efficient and cost-effective adaptation options.[71] This implies a need to overcome the socio-cultural barriers that may hinder many MSMEs and other businesses, through changing their perceptions on the need to be more proactive on adaptation. Promoting learning and innovation is crucial for creating and implementing solutions. Social learning, which involves shared understanding of a problem and the recognition of the need and motivation to work together in tackling the problem, is important particularly for the generation and transfer of knowledge in the adaptation space, and needs to be focused at both the organizational level as well as the individual level.[72] MSMEs rarely make decisions in isolation,[12] and for a single enterprise to depart from the norm is atypical.

For example, initial disdain from others in the same sector or community has been noted as a key barrier to MSME adaptation in Namibia,[12] despite solutions providing better outcomes for these enterprises. In Cambodia, adaptation interventions also were met with resistance from risk-averse farmers, as well as women feeling that they did not possess the knowledge and skills to implement new methods.[12] Social barriers were overcome with two key interventions in the latter case. First, local entrepreneurs were involved from the onset of the adaptation intervention and asked for their opinions on new technology. They were also asked to share their experience of changing weather patterns. This intimate involvement secured their buy-in from the onset. Second, the use of demonstration or pilot projects, where incomes, expenditure and profits were recorded, allowed the risk-averse farmers to view for themselves the business case for the adaptation interventions.

3.2.3 INFRASTRUCTURE, MARKETS, AND INFORMATION AND COMMUNICATION TECHNOLOGIES

Infrastructure and markets refer to the availability of basic infrastructure, such as transportation, water and electricity as well as business zones and centers. ICT is singled out and refers to the availability of information and communications technologies and systems.[21] Any business requires basic infrastructure to operate efficiently, and MSMEs are no different. In low- and middle-income settings, infrastructure tends to be developed to a lower degree compared to wealthier nations.

In Cambodia, adaptation interventions saw the rehabilitation of irrigation schemes to increase water supply to farmers. While the upfront costs were substantial (about US$200 000 to supply 2 000 households), the scheme increased water security for the villages. A useful lesson from that experience was the need to accurately account for maintenance costs, which increased over time, leading financers to consider models that involved consumers paying for use of the scheme.[12]

An increased adaptation focus can also open up new market opportunities for MSMEs.[18] In South Africa, a greater sustainability focus by fresh produce retailers encourages MSMEs to adapt and increase resilience through undertaking investments to ***green*** their businesses, increasing their resilience and producing goods in a sustainable manner, and providing them with the opportunity to enter established value chains.[73] In Tajikistan, adaptation interventions to assist farmers to increase their resilience through increasing crop diversity, and the introduction of labeling and quality standards, saw the opening up of new markets for diversified produce and saw profit levels increase by 40% on average.[74] The marketing and sale of climate-resistant rice seeds in northern Uganda to vulnerable farmers saw farmers reduce their vulnerability to climate hazards.[52] This was evident through improved production yields, and a lower sensitivity to pests, diseases and climate hazards, notably droughts. In that case, the proximity of a MSME seed supplier to consumers (typically closer than larger businesses) also assisted farmers with flexibility of supply in times of need.

As the Caribbean tourism sector is becoming painfully aware that milder winter weather in northern countries means fewer visitors during the traditional peak season, when visitors flooded in from North America and Europe, the sector is exploring new opportunities. The sector is developing new markets with more intra-Caribbean visitors and diversifying products, for example away from the traditional "sun, sea and sand" brand to emphasize cultural festivals and events. New marketing thrusts by government and tourism associations seek to support the MSMEs that form a key part of the Caribbean's largest economic sector.

3.2.2 DATA, INFORMATION AND CAPACITY DEVELOPMENT

The financial environment refers to the availability and access of MSMEs to adaptation-related government incentives, financial instruments, and insurance schemes.[21] Governments can also ensure that finance for MSME adaptation is available and adequate through the roll-out of economic incentives and funds for climate change adaptation.

In Vietnam, for example, various economic incentives, including insurance schemes and revolving loan funds, have been developed to support building adaptive capacity of agricultural MSMEs.[57] In addition, Vietnam introduced the Small and Medium Enterprise Development Fund in 2013 as a platform to support adaptation investments for MSMEs. In 2017, this Fund was expanded to include four preferential loan programmes for MSMEs with a focus on innovation; agriculture, forestry and aquaculture; processing and manufacturing; and water supply, management and treatment.[75]

Resource mobilization issues can hinder implementation of adaptation measures by MSMEs despite increased climate awareness and understanding of viable adaptation options. The International Finance Corporation indicates that between 200 and 245 million formal and informal MSMEs worldwide are still unable to access financial and risk management instruments such as loans, insurance, credit and venture capital.[76] It is further estimated that MSMEs suffer an approximate US$2 trillion gap in financing globally. Access to financing is a challenge as MSMEs in developing countries typically have limited capital or assets to cover high upfront costs for adaptation, and are perceived as having a high-risk profile by financial institutions.[12,21,42,44,45] This is particularly true for the informal sector in which more than 50% of MSMEs operate.[45]

While formal MSMEs may be able to access micro loans or grants up to US$10 000, larger amounts of US$20 000-US$250 000 are generally inaccessible,[42,77] which significantly limits opportunities to scale up.

To date, MSMEs have unfortunately been neglected in adaptation financing. This has been acknowledged as a key priority area for future finance.[74] While climate action by MSMEs is increasingly supported, a strong mitigation focus in financing remains. This lack of access hampers MSMEs from instituting adaptation measures even when they know what needs to be done. Given that investments in adaptation measures by businesses generally involve large upfront costs, relatively long payback periods and climate uncertainties, improving resource mobilization and securing financing for MSMEs to invest in adaptation is key.[12]

Financial risk mitigation products have been gaining traction in recent years as a means to transfer risk to the financial sector in exchange for a premium. However, appropriate risk-transfer finance mechanisms, such as microinsurance arrangements, that are available and accessible to MSMEs to adapt are lacking. The uptake of such products depends on the consumer's risk perception and this varies between sectors and clients. Risk transfer products like insurance also provide income security, protecting vulnerable MSMEs through smoothing consumption and lessening the financial and economic shocks of adverse climate events. Certain consumers are constrained in their ability to purchase insurance, particularly if the activity they are insuring against is high risk. For vulnerable groups like MSMEs, affordability is likely to be key for uptake.

In 2019, the Caribbean Catastrophe Risk Insurance Facility and the World Bank issued the Caribbean Oceans and Aquaculture Sustainability Facility (COAST) fisheries parametric insurance policy to Grenada and Saint Lucia. Recognizing that small-scale fisherfolk are highly vulnerable to extreme weather events (such as hurricanes), which are exacerbated by climate change, the COAST insurance policies provide coverage for fisherfolk and other players in the fisheries industry to enable them to recover quickly after weather-related events.

4. Vision for the Future

While interventions aimed at MSME adaptation are gaining traction worldwide, the pace still needs to be ramped up substantially. The economics of climate change, and in particular adaptation, are dynamic and evolving. As shown by the Stern Review on the Economics of Climate Change, the cost of mitigating climate change is much less than the cost of inaction, and many mitigation interventions actually bear socioeconomic benefits.[78] While adaptation is still considered relatively costly (although estimates vary greatly, from US$4 billion to US$100 billion a year), many adaptation-related interventions also bring positive socio-economic spillovers.[79]

An enhanced role for climate-sensitive decision-making and supporting MSME resilience to climate change is clear. The multi-stressor view points to the importance of understanding the complexities of different impacts and how climate change vulnerability overlaps with other socioeconomic challenges, such as poverty and inequitable access to resources. Strong context-specific factors need to be considered when thinking about increasing the resilience of small businesses.

Importantly, MSMEs do not have to be limited to increasing only their resilience. The position, role, and characteristics of such businesses also allow for them to act as ***solution providers*** – proliferators of adaptation-related goods and services in the sectors in which they operate. MSMEs are vital conduits through which adaptation technologies and goods can spread. They account for substantial shares of employment; are closer to local communities and households, which translates into a greater understanding of their needs; and tend to have a greater capacity to test innovative and flexible business models.[80]

4.1 An Inclusive Vision

An ambitious vision should be based on MSMEs playing an important role in the adaptation process, in which they are empowered by key stakeholders to adapt to current and future climate change risks, thereby increasing their resilience. This vision also extends to ensuring a landscape that is fertile for MSMEs and other businesses to go beyond increasing their own resilience and using their resources to participate in adaptation markets as suppliers of adaptation-related goods and services. Ultimately, such a vision

enables economies to predict, plan for, invest in, and overcome climate-related risks and have an accurate forecast of future impacts and how to deal with these impacts.

This vision has a number of supporting elements. A vision for the future must include resilient livelihoods and local socio-ecological-economic systems that protect and provide opportunities for the poor, marginalized and vulnerable. Inclusive adaptation and climate-resilient development that effectively builds resilience would require putting MSMEs at the core of the process to address the complex and intertwined short- and long-term climate risks in low- and middle-income countries. Resilient enterprises deliver multiple social benefits – including job creation, income diversification and improved well-being – while minimizing their ecological footprint and delivering positive environmental benefits.

MSMEs provide a strategic entry point to mainstream adaptation across sectors and along value chains, that can deliver positive benefits in both local and national economies. Inclusive climate change adaptation therefore requires a reframing of MSME development to strategically focus on delivering social, environmental and economic co-benefits, the so-called "triple bottom-line" rather than traditional economic returns (profits). Such a broader vision highlights the opportunity for MSMEs to be climate-resilient while actively participating in the transition to a low-carbon, climate-resilient, socially inclusive and environmentally sustainable economies.

The vision supports the Paris Agreement, Agenda 2030 and the Sustainable Development Goals (SDGs) framework, in that it ensures the realization of synergy and co-benefits in the implementation of various programmes and projects. Given that small business appraisal and development has been historically focused on the economic dimension (i.e. financial returns) only, a multi-criteria approach with a greater focus on socioeconomic and environmental dynamics underpinning MSMEs is required.[80] This would bring to the fore the significant and diverse benefits that MSMEs can provide, and notably their role in achieving the SDGs by bridging the gap between economic well-being and viability, social equity and inclusion, as well as ensuring environmental sustainability. For instance, SDG 1 embeds the ambition to end poverty in all its forms, while SDG 8 aims to promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all. SDG 9 seeks to build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. SDG 10 targets reducing inequality within and among countries. SDG 11 seeks to make cities and human settlements inclusive, safe, resilient and sustainable. SGD 13 rallies all to take urgent action to combat climate change and its impacts. From the various SDGs, it can be seen that MSMEs have an important role to play in contributing to the much-needed solutions for a range of global issues.

4.2 Recommendations

Having identified the key risks facing MSMEs and the state of adaptation interventions thus far, proposed gaps for further support are identified below. The recommended actions are categorized according to the Crick et al[21] framework.

4.2.1 POLICIES AND INSTITUTIONS

Governments have to inculcate an adaptation-lens into central decision-making. Based on the latest UNFCCC assessment of progress of NAPs, many low- and middle-income countries have not yet fully articulated their adaptation responses to climate change. This points to a clear lack of progress in prioritizing national adaptation policies. Importantly, policy can act as both an enabler and a hindrance to adaptation efforts. Policymakers may not fully understand the complexities related to climate change adaptation and how these complexities interrelate to other developmental priorities. Even when this understanding exists, the appropriate policy solution is not always clear. This often results in inadequate or misinformed policies being formulated and their implementation not yielding the desired results. Climate change presents new challenges as well as worsening existing ones. Path dependency by highly bureaucratic and rigid government and governance systems need to be transformed so that they are flexible and responsive to current and future needs and challenges. A key starting point for governments is developing internal capacity in assessing the vulnerabilities of geographies and sectors in the economy, including the vulnerability of MSMEs, and drawing from the experience of neighboring/similar countries. By forming dedicated institutions that assess, communicate and plan adaptation strategies, governments can track the extent to which the entire economy is resilient to impacts. Effective adaptation

strategies for MSMEs need to be developed with MSMEs. Mechanisms for effective input of MSMEs, particularly informal and microenterprises, where the most vulnerable work, into decision-making institutions need to be created or strengthened.

New and innovative risk-transfer mechanisms require upscaling. Financial-security measures, such as risk-transfer products, also have their place in protecting vulnerable enterprises. An array of mechanisms have been developed that target MSMEs and include products such as microinsurance and parametric insurance, which provide compensation in an adverse climate event.[18] Development of such products has to draw on the expertise of the insurance industry, financial regulators, and governments to accurately assess the risk profiles of MSMEs and their ability to pay for insurance. Fine-tuned mechanisms can then be developed to shield small businesses from adverse climate events. Governments can lead in this by engaging with the financial and insurance industries that are capable of assessing risk. These industries can be incentivized to provide insurance products that target MSMEs and assist governments. A key issue will be providing financial and insurance industries with data on the MSME sector, and the risks they are facing. This will require expanded data collection mechanisms to reach an often unreported sector.

4.2.2 INFRASTRUCTURE, MARKETS, AND INFORMATION AND COMMUNICATION TECHNOLOGIES

Greater support is required to address basic resource deficits that MSMEs face. MSMEs in low- and middle-income countries lack access to basic resources, such as infrastructure, fundamental business knowledge and management, skills, and technology. The formation of business development hubs that provide MSMEs with knowledge on business management, financial statements, formulating business plans, managing costs, and supplier and consumer relationships, are fundamental business support measures for MSMEs. This will help overcome steep learning curves early on. The importance of a strong business model, the ability to leverage financing through multiple streams, and the use of ICT that enable small businesses' comparative advantages in new online markets are also noted, and can be developed through dedicated support institutions that are set up and sponsored by the state or donor organizations. These institutions will need to work in new ways to reach MSMEs, especially informal and microenterprises, which are often marginalized in traditional support programmes. Supporting MSME associations and other bottom-up peer-support mechanisms created by MSMEs will also be key.

A conducive business environment for MSMEs to flourish must be promoted in many low- and middle-income countries. Numerous aspects continue to hamper the success of MSMEs. These include unclear regulatory and tax regimes, long permit approval periods, and weak contractual enforcement. At times, the physical infrastructure is not well developed, which limits the extent to which entrepreneurs can explore various production, transport, and marketing options. All these imply higher costs of doing business, therefore addressing these will greatly contribute to lessening the burdens that small businesses face. Governments must ensure that adequate infrastructure is provided to small businesses as public goods, and where the state cannot afford large capital spends, other models such as public-private partnerships should be explored to make them viable. Donor organizations can also be approached for infrastructure funding and other capital-intensive investments. The state should also ensure that regulatory hurdles for MSMEs are not onerous and that contractual law is upheld.

Proactive adaptation by large businesses can also promote adaptation by stakeholders along their value chains including MSMEs. The extent to which large entities embrace resilience has a bearing on MSMEs' resilience. Increasingly, large businesses are beginning to embrace climate change fundamentals (including adaptation) into their business operations and supply chains, which is a move in the right direction. These large businesses clearly stand to benefit, as increasing the adaptive capacity of their value chain enhances security of supply and their brand image, among other benefits. Policies that seek to incentivize larger players to support adaptation by MSMEs can transition sectors towards becoming more resilient. A suite of government incentives, including tax breaks and subsidies for larger players involved in MSME development, and support in the form of resources such as capital subsidies/grants for investments for MSMEs, can stimulate such adaptation activity in markets.

4.2.3 DATA, INFORMATION AND CAPACITY DEVELOPMENT

MSMEs have to be empowered to understand the risks they face and why adaptation is important. While adaptation needs are evident, action is constrained by the often long-term, uncertain, and misunderstood nature of the risks. The state can drive interventions that promote knowledge generation and transfer within and among MSMEs so that they understand the adaptation processes as well as the adaptation market place. This has to be preceded by each state identifying priority sectors, relevant MSMEs, their competencies and the risks they face. Capacity building interventions must recognize and build on competencies MSMEs already have. Interventions need to think beyond training to incorporate combined strategies using mentoring, coaching, peer learning, and support. Reforming existing business support programs, whether by government or other actors, to better address the needs of MSMEs is crucial. A dedicated national capacity building institute can also be set up to drive efforts targeting the vulnerable MSMEs as well as communities. Bringing climate resilience expertise into the work of traditional business support experts and programs should be part of such efforts.

Social learning is a potent force to be leveraged. Learning is crucial for providing lessons from past experience, as well as lessons from other people, areas or systems. In this context, greater investment in participatory monitoring and reporting tools, which allow for iterative learning and adjustments is needed. It is also necessary to embrace various forms of knowledge when attempting to incentivize MSMEs to increase resilience. Particularly, there is a need for the state and donor organizations to create institutions that can navigate the complexities and complementarity of indigenous and modern (scientific) knowledge and practices. This capability assists in overcoming social friction between traditional practices and newer and innovative ones. It is crucial to develop ways to capture and share what is already being done by MSMEs to enhance their adaptation.

Adaptation requires cooperation, linkages, and partnerships among multiple actors along the value chain. Successful adaptation is required at both the individual and group level. While individual action can, to some extent, enhance individual resilience, more system-wide resilience is needed. Optimal sustainable win-win solutions can be achieved when stakeholders come together to collaborate on solutions with better understanding of the challenge and are equipped with appropriate technical skills to address the challenge.[72] It is necessary to test and share methodologies to support adaptation by MSMEs and other businesses. Sharing cases, approaches, and lessons learned is important for stimulating and motivating adaptation action. Partnerships and linkages to wider knowledge networks through other enterprises, government and civil society organizations allow for innovation and pooling of resources to address climate-related shocks and take advantage of new opportunities.[12,21] To this effect, if left uncoordinated, interventions will be disparate and isolated. The state has a role to play in coordinating the various stakeholders including the private sector (large businesses and MSMEs), state-owned entities, state departments, communities, labor unions, and academia/researchers. Supporting partnerships among MSMEs at all levels (local, national, regional and international) will be key.

4.2.4 FINANCIAL ENVIRONMENT

Funders need to be mindful of the delicate intricacies of entrepreneurship and adaptation finance. MSMEs face financial constraints, particularly in the early stages of development. Added to this is specifically how to finance adaptation by MSMEs. Financial institutions, such as development finance institutions or governments, need to be empowered to serve as climate-sensitive decision-makers that understand the need for adaptation and the risks involved in undertaking adaptation-related investment with MSMEs. Since adaptation is based on forward-looking assessment of risks, financing institutions need to tailor expectations on a fundamental understanding of this uncertainty. For some adaptation investments, costs savings may accrue immediately. In other cases, typical of large infrastructure resilience-enhancing investments, it is not certain that an adverse climate event may happen. In the case of MSMEs acting as suppliers of adaptation-related goods and services, markets may be new and untested. A key barrier noted in certain contexts is that financers do not understand the broader climate goals that are achieved through adaptation investments, as they over-emphasize profitability and returns in providing funding (which is difficult especially in the short term).[18] Financers need to have a fundamental understanding of this business context and tailor financing based on these constraints.

Strengthening resilience of climate-sensitive sectors goes hand in hand with diversifying through new, green opportunities. There is a strong correlation between labor-intensive sectors and climate-sensitive sectors, which implies that climate change impacts will have direct impact on MSMEs and employment. Ensuring that MSMEs thrive in the face of climate change is necessary to safeguard existing employment and create new employment activities. Many MSMEs in low- and middle-income countries are highly dependent on climate-sensitive sectors or areas. As part of identifying areas for new growth, the state has a role to play in enabling the growth of new, green opportunities. Reducing the dependency on climate-sensitive sectors by diversifying into other sectors less affected by climate change is one strategy for reducing the climate and employment risk. Physical and socioeconomic environments may, however, impair and limit the ability of MSMEs to diversify into alternate economic activities, hence the need for the state to create a conducive and enabling environment for more product and process innovation.

5.Conclusion

This paper has explored three inter-related themes: the material risks that small businesses face; the state of adaptation in low- and middle-income countries; and potential recommendations on a way forward.

Climate change impacts manifest in different and often unpredictable ways creating complex and interconnected risks. This is further complicated by the fact that climate change impacts take place alongside a range of other interacting and dynamic stresses. While adaptation is costly and the extent to which MSMEs in low- and middle-income countries are engaging in adaptation remains unclear, MSMEs can increase their resilience, and a business case exists for MSMEs to also act as producers of adaptation-related goods and services.

A vision for the future hinges on a participatory inclusive approach (involving the MSMEs themselves in directing the transformation) supported by the state alongside large businesses and financial institutions that determine access to finance, markets and resources for MSMEs. This would serve to increase MSMEs' resilience and enable them to exploit market opportunities.

Collective action requires working towards a common vision and harnessing the lessons learned from adaptation activities globally. While the need for action is urgent, it is not too late for MSMEs to be galvanized from the ever-increasing impact of a changing climate and for these institutions to become beacons of change, proliferating adaptation-thinking and activities throughout their localities, economies and value chains.

Glossary

CANARI	Caribbean Natural Resources Institute
CIC	Climate Innovation Centers
COAST	Caribbean Oceans and Aquaculture Sustainability Facility
CRM	Climate Risk Management
ICT	Information and Communications Technologies
MSMEs	Micro, Small, and Medium Enterprises
NAPs	National Adaptation Plans
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
SASAPs	Sectoral Adaptation Strategies and Action Plans
SDGs	Sustainable Development Goals

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CONTRIBUTING ORGANIZATIONS

TRADE & INDUSTRIAL POLICY STRATEGIES

CANARI

ABOUT TRADE & INDUSTRIAL POLICY STRATEGIES

TIPS is a not-for-profit economic research organization based in Pretoria, South Africa. Its focus areas are trade and industrial policy, inequality and economic inclusion, and sustainable growth.

ABOUT THE CARIBBEAN NATURAL RESOURCES INSTITUTE

CANARI is a non-profit regional technical institute and based in Port of Spain, Trinidad and Tobago. Its focus is on participatory natural resources management in the Caribbean particularly in the areas of climate change resilience, forests and coastal and marine resources management, sustainable livelihoods and green-blue economy.

ABOUT THE GLOBAL COMMISSION ON ADAPTATION

The Global Commission on Adaptation seeks to accelerate adaptation action and support by elevating the political visibility of adaption and focusing on concrete solutions. It is convened by more than 20 countries and guided by more than 30 Commissioners, and co-managed by the Global Center on Adaptation and World Resources Institute.