



Climate Change Resilience for Small and Medium-sized Enterprises (SMEs) in Africa



Prepared by
Gideon Ofori Osabutey, Lecturer, Humanities & Social Sciences, Ashesi University.
William Ohene Annoh, Assistant Director Prof. Adei Studio for Research Excellence,
Ashesi University.



In partnership with
Canada



Introduction

The concern of global warming and climate change is today one of the greatest challenges humanity has ever encountered. SMEs in Africa are vulnerable to climate change due to their heavy reliance on natural resources for national income and employment. Agriculture, fisheries, forestry, and ecotourism are the mainstays of many African economies, and these sectors are highly dependent on climate-sensitive natural resources. (Thongoh-muia, 2022) Climate change is likely to increase the incidence of extreme weather events in the form of floods, cyclones, and droughts. These events can have catastrophic effects on SMEs, destroying physical capital and disrupting markets and the vital ecosystem services upon which many SMEs depend for their sources of raw materials.

Small and medium enterprises (SMEs) have been identified as a sector which is going to suffer from increased climate variability (Msomi & Olarewaju, 2021; Skouloudis et al.2020; Alam et al.2022). The majority of businesses in Africa are SMEs, and businesses in urban areas will be most affected by climate change impacts due to their dependence on infrastructure, stable economic conditions, and predictable markets. These businesses tend to have weak adaptive capacity and will suffer disproportionately high levels of damage from extreme weather events (Abisuga-Oyekunle et al.2020; Simba et al.2024). It is these factors that make it imperative for finding strategies which can help to reduce the vulnerabilities of African SMEs to climate change.



Climate Change Resilience for SMEs

Adaptation to climate change is becoming a necessity for all businesses, but the rising costs and risks associated with climate change impacts, particularly for critical sectors in Africa such as agriculture and energy, signal a need for urgency and an increased focus on resilience. As small and medium-sized enterprises (SMEs) are of particular importance to African economies (formal and informal SMEs contribute up to 60% of employment and up to 40% of GDP in some countries) and are often the worst affected by extreme weather events or long-term changes in climate, building resilience to climate change is a critical issue for (Turkson et al.2022).

SMEs in Africa have the potential to lead in building climate resilience both within their own activities and as service providers to larger businesses and communities, but they face several obstacles. Among these are limited access to information and finance to support resilient investments, and the high opportunity costs of forgoing immediate profit or other needs to invest in resilience (Thakur-Weigold & Miroudot, 2024). Approaches to overcoming these obstacles and helping SMEs to build climate resilience that aligns with their own needs and capabilities are not well understood, and there is a need for guidance and targeted interventions (Saad et al.2021).

Assessing Climate Change Impacts on SMEs

The Intergovernmental Panel on Climate Change (IPCC) provides a methodology for conducting impact and vulnerability assessments to determine how climate change is likely to affect specific sectors. An impact assessment defines how a particular sector is likely to be affected in biophysical terms, recognizing that changes in climate are mediated through complex and non-linear processes. This allows identification of the key vulnerabilities and hotspots where climate change is likely to have the most effect. Hotspots can then be targeted for adaptation strategies. A vulnerability assessment considers the degree to which a system possesses the ability to cope with change. This is highly relevant for understanding the implications of climate change for SMEs who are concerned with building adaptive capacity.

A key aspect of building resilience is to understand the risks that climate change poses for business and to define how these risks have implications for specific sectors of the economy.

Key Climate Change Risks for SMEs

Changes in crop yields can affect the agriculture industry, and increasing food prices due to food scarcity can affect the food and beverage industry, both through increased costs of production and reduced consumer purchasing power. Shifts in the location and availability of natural resources can also lead to an increase in resource-based conflict. This is detrimental to all industries through increased security costs and damage to infrastructure. A major example of this is the Darfur conflict, which has been linked to climate change-induced desertification in the Sahara region.

Changes to the availability and quality of natural resources can also have a major impact on businesses. This can be shown by changes to the amount of water available from the Nile River, with predictions showing it to decrease by 80% in the next 30 years. This is particularly important for water-dependent industries such as beverage and tourism (Mengistu et al., 2021). The International Climate Initiative notes that agriculture is vital to Egypt's economy, contributing 11.4% to GDP and providing 23.3% of jobs. To bolster climate resilience, the SCALA program (Scaling up Climate Ambition on Land Use and Agriculture through Nationally Determined Contributions and National Adaptation Plans), launched in May 2022, aims to transition Egypt's agriculture to a low-carbon, climate-resilient sector, and encourage private sector and SME involvement in climate mitigation.

Climate change-induced health problems can reduce workforce effectiveness through increased illness and days off work. An example of this is the effect of the 1997-98 El Nino on the tea industry in East Africa. This resulted in a potential long-term effect of increased malaria in highland areas, which can reduce worker productivity (Palmer et al.2023).

There are various climate change risks for small and medium-sized businesses in Africa. The most immediate impacts relate to damage to assets due to extreme weather events. This can lower investment and prevent businesses from growing. As seen in the 1998 floods in Mozambique, disaster relief expenditure can divert funds away from investment into new technologies and market expansion (Nobre et al.2023).



Implications for Business Operations

1. Business operations cover all possible aspects in which a company delivers its services or products, from the supply-chain logistics through to product delivery. It affects all staff, partners, suppliers, customers, and other stakeholders and can also have numerous ramifications for the environment, both negative and positive. Changes in business operations including but not limited to water reuse, energy conservation, recycling, among others are very simple and effective ways to minimize the negative impacts of climate change and reduce long-term risks.
2. Changes to timber laws, for example, in many developed countries represent increasing pressure for companies to understand the direct and indirect impacts of their practices on the environment. SMEs importing timber are affected directly; those using wood and paper-based products are also affected indirectly due to rising costs. Understanding changes to climate environmental laws and production techniques in other industries will also help companies to forecast future impacts of legislation on their business sector. This type of proactive approach could be essential to the survival of certain industries.

Building Resilience Strategies

The need for businesses, particularly SMEs, to invest resources in building resilience strategies has been emphasized by numerous research studies. This is because many climatic and non-climatic shocks adversely affect businesses, often leading to some of them shutting down. Climate change in Africa is presenting challenges for businesses. The increased droughts and erratic rainfall are constraining the availability of water and increasing the cost of energy, for example. These factors will lead to increased costs of production and increased market volatility, potentially resulting in production losses. These problems will be multiplied for businesses that are highly dependent on natural resources.

Changing disease patterns, such as the increased incidence of Malaria, will also affect all businesses in terms of productivity loss and increased health and insurance costs (Ansah et al. 2021). All these issues will require effective responses to avoid business failure. Adapting the business model refers to the process of adjusting or creating new businesses that can better serve a targeted market under new conditions. It may involve changing the product, targeting new consumers, finding new ways to differentiate the product, or producing at a lower cost. This process involves acquiring information and utilizing it, as the decision to adapt is not possible without understanding the changed conditions (Tian et al., 2022). Each year, farming communities face many uncertainties and strategy changes in the agricultural sector. The increased climate variability and higher frequency of extreme weather events mean that climate risks must be integrated into all farming decisions to cope with the effects of climate change. This knowledge helps climate-resilient small farmers take a route to an end under specified conditions of high probability using few resources. This can be supported by enhancing access to resources and public-private services provided by the changing climate. The overall goal is to change small farmers' current suboptimal strategies, which are often based on minimizing current costs.

Adapting Business Models

Adapting business models to shifting climatic conditions typically requires modifying existing models. A study into the economic impact of climate change, based on extensive data and a number of scenarios, has found that there are likely to be significant differences between the impacts on various industry sectors and regions of the world (Laborde et al., 2021). Hence, adapting business models will be easier for some than others. It has also found that often the impact on specific business activity is due to heightened exposure to extreme weather events. For example, small-holder farmers in semi-arid regions are particularly vulnerable to drought and flood. Therefore, it is important to differentiate between the core business activity (e.g. farming) and the market conditions under which it is carried out (e.g. national fruit market, export market).

Firms will be reluctant to alter their model of the market conditions for the core business activity, hence to increase resilience, it is worth investigating alternative market conditions for the same business activity. This differentiation was used to design four strategies for switching to alternative market conditions: market persistence, market repositioning, market development, and market exit (Reed, 2023). This concept can also apply to businesses providing services or products. As stated previously, it may not be viable to change market conditions for the same core business activity; however, alternative sectors may present better opportunities. The aim here is to reduce climate-induced damage on specific business activities, with the least deviation from the core activity and cost.



Enhancing Supply Chain Resilience

At a more localized level, small changes can make a world of difference. Reducing the lead times on inventory can often result in the reduction of inventory levels. This reduces the financial and physical burden on a company, and in a climate change context, less stock can mean less risk of losses from damage due to extreme weather events. An example can be seen in the rice milling industries in Segou, Mali, where due to increasing irregularity of rice paddy supplies, the mills are choosing to store less paddy and instead opt for higher frequency but lower quantity transactions (Mbosso et al.2020). This ultimately makes them less vulnerable to both supply and demand side fluctuations in the market.

.For food and beverage SMEs in Africa, who deeply rely on agricultural inputs into their products, building flexibility can mean finding alternative sourcing locations. This was seen in the case of a coffee importing business in Ethiopia after unusually heavy rains affected their main supply source of coffee beans (Aschalew, 2023). The company was forced to import coffee beans from less familiar regions, and this experience highlighted the risks of maintaining concentrate sourcing in one location.

One way of reducing exposure to chronic disruptions and acute shocks from climate change is to enhance supply chain resilience. This can be done through several ways - building flexibility into the supply chain, reducing the exposure of the supply chain to climate-related risks, and building in redundancy as a last resort.

Investing in Climate-Smart Technologies

The primary goal in advancing climate-smart technology and resilient strategies needs an entrepreneurial approach in increasing the knowledge, awareness, and action on climate change impacts. The flow of technology and innovative climate change solutions in Africa is a criterion for investment for gradual and effective change towards climate-resilient development. The most important step to effective investment in technology, innovation, and resilient strategies is the knowledge of what kind of climate changes will impact the area where the business is taking place. This includes the trend of continuous long-term changes in the climate and disaster events that can reduce profits and increase the cost of the business or the community's livelihood.

These initiatives must involve a partnership with the public sector mixed with an incentive for disaster risk reduction, climate change adaptation, and mitigation through a long-term goal and a clear, responsible party. In building resilient strategies, the community must integrate climate change-driven disaster risk identification into alternative development paths. Describe the future of the community if it is not more resilient in the current and future disaster events and identify the strategies to make a change into more resilient development and the expected output.

Case Examples of SMEs Building Resilience Against Climate Change

Olivado Group (Kenya)

Olivado is a medium-sized enterprise based in Kenya that produces and exports avocado oil. The company has implemented several strategies to build resilience against climate change:

- a) **Diversification:** Olivado has diversified its sourcing regions within Kenya to mitigate the risk of crop failure in any single area due to changing climate patterns (Njagi, 2022).
- b) **Sustainable Farming Practices:** The company works with over 2,000 smallholder farmers, promoting organic farming methods and agroforestry. These practices help improve soil health, water retention, and biodiversity, making the farms more resilient to climate change (Olivado, 2021).
- c) **Water Management:** Olivado has invested in efficient irrigation systems and rainwater harvesting techniques to address water scarcity issues exacerbated by climate change (Njagi, 2022).
- d) **Waste-to-Energy:** The company has implemented a biogas plant that converts avocado waste into energy, reducing its carbon footprint and dependency on the grid. This also provides a reliable energy source in the face of climate-related power disruptions (Olivado, 2021).

Eco Fuels Kenya (EFK)

EFK is a small enterprise that produces biofuel and organic fertilizers from croton nuts. The company has adopted several strategies to build climate resilience:

- a) **Climate-Smart Supply Chain:** EFK works with a network of rural collectors who gather croton nuts from wild trees. This approach reduces the need for dedicated farmland and promotes the preservation of indigenous trees, which are more resilient to changing climate conditions (EFK Group, 2023).
- b) **Circular Economy Model:** The company has developed a zero-waste process where every part of the croton nut is utilized. This not only maximizes resource efficiency but also creates multiple revenue streams, enhancing the business's overall resilience (Ashden, 2020).
- c) **Soil Health Promotion:** EFK's organic fertilizer product helps improve soil structure and water retention capacity, making farms more resilient to droughts and erratic rainfall patterns (EFK Group, 2023).
- d) **Community Empowerment:** By providing income opportunities to rural communities through nut collection, EFK is helping to diversify livelihoods, reducing vulnerability to climate-related crop failures (Ashden, 2020).

Both Olivado and EFK demonstrate how SMEs in Africa can build climate resilience through a combination of sustainable practices, resource efficiency, diversification, and community engagement. These approaches not only help the businesses adapt to climate change but also contribute to mitigation efforts and support the resilience of their broader communities and supply chains.

Conclusion and Way Forward

SMEs, which form the backbone of many African economies, are particularly vulnerable due to their reliance on climate-sensitive natural resources and limited adaptive capacity. There is a need for building resilience in these enterprises, noting that they face obstacles such as limited access to information and finance, and high opportunity costs for resilience investments. Key climate change risks for SMEs include changes in crop yields, resource scarcity, increased conflict, and health-related productivity losses. This brief has highlighted several strategies for building resilience, including adapting business models, enhancing supply chain resilience, and investing in climate-smart technologies.

African governments, international development agencies and all other relevant stakeholders may collaborate to bring about changes in the following areas, among others, to create the enabling environments for SMEs to build resilience against climate change:

1. Enhance Access to Finance: Climate change adaptation and mitigation often require significant investments, which can be challenging for SMEs with limited financial resources. Governments and financial institutions should develop targeted financing mechanisms to address this gap. Green credit lines could provide loans at preferential rates for climate-resilient investments. Risk-sharing facilities could help reduce the perceived risks associated with lending to SMEs for climate-related projects. The Alliance for Financial Inclusion (AFI) for example, has developed risk-sharing toolkits to help formal financial institutions create risk-sharing facilities (RSF). These toolkits aim to encourage these financial institutions to finance AFI's women entrepreneurs and women-led micro, small, and medium enterprises (MSMEs). Climate insurance products, such as index-based weather insurance, could help SMEs manage climate-related risks more effectively. These financial tools would enable SMEs to invest in adaptive technologies, resilient infrastructure, and sustainable practices without compromising their financial stability (Agyei-Mensah, 2022).

2. Strengthen Climate Information Services: Access to accurate and timely climate information is crucial for SMEs to make informed decisions about their operations and investments. Improving the availability and accessibility of localized climate data and forecasts can significantly enhance SMEs' adaptive capacity. This could involve partnerships between national meteorological agencies, agricultural extension services, and private sector actors to develop user-friendly platforms for disseminating climate information. For instance, mobile apps or SMS services could provide regular weather updates, seasonal forecasts, and early warnings for extreme events. Additionally, training programs could be implemented to help SMEs interpret and use this climate information effectively in their decision-making processes (Conway et al., 2019).

3. Promote Technology Transfer: Many climate-smart technologies exist but are often out of reach for African SMEs due to lack of awareness, high costs, or technical complexity. Facilitating the transfer and adoption of these technologies is crucial for building resilience. This could be achieved through various means, such as offering tax incentives for the adoption of climate-smart technologies, establishing demonstration projects to showcase the benefits of these technologies in local contexts, and fostering partnerships between research institutions, larger companies, and SMEs. Such initiatives would not only help SMEs access cutting-edge technologies but also stimulate local innovation and adaptation of these technologies to suit specific needs and conditions in Africa (Adenle et al., 2015).

4. Develop Capacity Building Programs: Many SMEs lack the knowledge and skills necessary to effectively assess climate risks and implement resilience strategies. Targeted training and mentoring programs can address this gap. These programs should cover a range of topics, including climate risk assessment, adaptation planning, sustainable business practices, and accessing climate finance. Moreover, they should be tailored to specific sectors (e.g., agriculture, tourism, manufacturing) to provide relevant and practical guidance. Partnerships with local universities, business schools, and industry associations could be leveraged to develop and deliver these capacity building programs. Online learning platforms could also be utilized to reach a wider audience of SME owners and managers (Baarsch et al., 2020).

5. Mainstream Climate Resilience in SME Support Policies: Climate considerations should be integrated into existing SME development programs and policies to ensure a comprehensive approach to building resilience. This could involve incorporating climate risk assessments into business registration processes, including climate resilience criteria in public procurement policies to incentivize SMEs to adopt sustainable practices, and making climate adaptation a key component of business incubation and acceleration programs. By mainstreaming climate resilience, governments can ensure that all support provided to SMEs contributes to their long-term sustainability in the face of climate change (Simba et al., 2024).

6. Foster Collaborative Networks: SMEs often lack the resources to tackle climate challenges individually. Encouraging the formation of SME clusters and associations focused on climate resilience can facilitate knowledge sharing, collective action, and economies of scale. These networks could organize regular forums for exchanging best practices, pool resources for shared infrastructure or services (e.g., climate-resilient storage facilities), and collectively negotiate with suppliers or buyers to promote climate-friendly value chains. Government agencies and development partners could play a role in facilitating the formation of these networks and providing initial support for their activities (Saad et al., 2021).

7. Align with National Adaptation Plans: Ensuring that SME resilience strategies are aligned with and supported by national climate adaptation plans and policies is crucial for creating a coherent and effective approach to climate resilience. This alignment could involve explicitly including SME-focused measures in National Adaptation Plans (NAPs), creating mechanisms for SME representation in national climate policy dialogues, and establishing clear channels for SMEs to access support and resources allocated for climate adaptation at the national level. Such alignment would not only enhance the effectiveness of SME resilience efforts but also contribute to broader national climate resilience goals (Thongoh-muia, 2022).

By considering these policy areas and acting to implement workable solutions, African countries can create an enabling environment for SMEs to build climate resilience. This multi-faceted approach addresses the various challenges SMEs face in adapting to climate change, from financial constraints to knowledge gaps and policy barriers. As SMEs form the backbone of many African economies, enhancing their adaptive capacity will contribute significantly to building more resilient economies and achieving sustainable development across the continent. However, successful implementation will require coordinated efforts from governments, financial institutions, the private sector, and development partners, as well as continuous monitoring and evaluation to ensure the effectiveness of these interventions.

References

- Mbosso, C., Boulay, B., Padulosi, S., Meldrum, G., Mohamadou, Y., Berthe Niang, A., ... & Sidibé, A. (2020). Fonio and bambara groundnut value chains in mali: issues, needs, and opportunities for their sustainable promotion. *Sustainability*, 12(11), 4766. [mdpi.com](https://doi.org/10.3390/s12114766)
- Moat, J., Williams, J., Baena, S., Wilkinson, T., Gole, T. W., Challa, Z. K., ... & Davis, A. P. (2017). Resilience potential of the Ethiopian coffee sector under climate change. *Nature Plants*, 3(7), 1-14.
- Msomi, T. S. & Olarewaju, O. M. (2021). Climate change and the sustainability of small businesses in Africa. *Handbook of research on climate change ...* [HTML]
- Nobre, G. G., Pasqui, M., Quaresima, S., Pieretto, S., & Bonifácio, R. M. L. P. (2023). Forecasting, thresholds, and triggers: Towards developing a Forecast-based Financing system for droughts in Mozambique. *Climate Services*, 30, 100344. [sciencedirect.com](https://doi.org/10.1016/j.clser.2023.100344)
- Ochieng, J., Kirimi, L., & Mathenge, M. (2016). Effects of climate variability and change on agricultural production: The case of small scale farmers in Kenya. *NJAS-Wageningen Journal of Life Sciences*, 77, 71-78.
- Ofori, S. A., Cobbina, S. J., & Obiri, S. (2021). Climate change, land, water, and food security: Perspectives From Sub-Saharan Africa. *Frontiers in Sustainable Food Systems*. [frontiersin.org](https://doi.org/10.3389/fsufs.2021.684511)
- Opoku, S. K., Filho, W. L., Hubert, F., & Adejumo, O. (2021). Climate change and health preparedness in Africa: analysing trends in six African countries. *International Journal of Environmental Research and Public Health*, 18(9), 4672. [mdpi.com](https://doi.org/10.3390/ijerph18094672)
- Osabuohien, E., Efobi, U. R., Gitau, C. M., & Bruentrup, M. (2019). Agents and implications of foreign land deals in East African Community: The case of Uganda. In *Land Use-Assessing the Past, Envisioning the Future*. IntechOpen.
- Palmer, P. I., Wainwright, C. M., Dong, B., Maidment, R. I., Wheeler, K. G., Gedney, N., ... & Turner, A. G. (2023). Drivers and impacts of Eastern African rainfall variability. *Nature Reviews Earth & Environment*, 4(4), 254-270. [nature.com](https://doi.org/10.1038/s43017-023-0040-4)
- Reed, J. H. (2023). Modeling and measuring strategic alignment. *Journal of Strategy and Management*. [HTML]
- Rosendo, S., Celliers, L., & Mechisso, M. (2018). Doing more with the same: A reality-check on the ability of local government to implement Integrated Coastal Management for climate change adaptation. *Marine Policy*, 87, 29-39.
- Saad, M. H., Hagelaar, G., Van Der Velde, G., & Omta, S. W. F. (2021). Conceptualization of SMEs' business resilience: A systematic literature review. *Cogent Business & Management*, 8(1), 1938347.

Simba, A., Tajeddin, M., Dana, L. P., & Ribeiro Soriano, D. E. (2024). Deconstructing involuntary financial exclusion: a focus on African SMEs. *Small Business Economics*, 62(1), 285-305.

Skouloudis, A., Tsalis, T., Nikolaou, I., Evangelinos, K., & Leal Filho, W. (2020). Small & medium-sized enterprises, organizational resilience capacity and flash floods: Insights from a literature review. *Sustainability*, 12(18), 7437. [mdpi.com](https://doi.org/10.3390/s12187437)

Thakur-Weigold, B. & Miroudot, S. (2024). Supply chain myths in the resilience and deglobalization narrative: Consequences for policy. *Journal of International Business Policy*. [springer.com](https://doi.org/10.1007/s43062-024-00000-0)

Thongoh-muia, W. M. (2022). Analysis of Integration of Climate Smart Initiatives by Micro, Small and Medium Enterprises in Beef Value Chain in Kajiado County. [uonbi.ac.ke](https://doi.org/10.25237/2474-2475)

Thongoh-muia, W. M. (2022). Analysis of Integration of Climate Smart Initiatives by Micro, Small and Medium Enterprises in Beef Value Chain in Kajiado County. University of Nairobi.

Tian, J., Coreynen, W., Matthyssens, P., & Shen, L. (2022). Platform-based servitization and business model adaptation by established manufacturers. *Technovation*. [vu.nl](https://doi.org/10.1016/j.technovation.2022.102500)

Turkson, F. E., Amissah, E., & Gyeke-Dako, A. (2022). The role of formal and informal finance in the informal sector in Ghana. *Journal of Small Business & Entrepreneurship*, 34(3), 333-356. [ntu.ac.uk](https://doi.org/10.1080/0898/16236000000000000)





*Ghana Climate
Innovation Centre*

Find out more about the GCIC at

www.ghanacic.org