

Climate change impact on small and medium enterprises in Senegal's semi-arid zones: a review

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Abstract

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The issues of climate change in Senegal have the potential of undermining sustainable development efforts if positive steps are not taken to respond to its adverse consequences. This study documents existing and available literature on impacts of climate change on Small and Medium Enterprises (SMEs) in semi-arid zones of Senegal. It is evident that there are significant negative impacts of climate on SMEs in Senegal. Loss of goods, low productivity and sales as well as loss of income are mainly observed by the small and medium enterprises due to the impacts of increased temperature, soil erosion and salinization, decrease of rainfall, frequency of extreme events on both supply and production processes. Despite this fact, there are limited adaptation and mitigation strategies to climate change at company or enterprise level in order to deal effectively with the changing climate. Ensuring Senegal's enterprises to develop more effective climate change adaptation and mitigation strategies, there is the need for the Senegalese government to support enterprises by providing the necessary resources such as credit, information, training for managers and employees on climate change adaptation strategies and technologies, and investing in climate resilient projects which will reduce significantly the adverse effects of climate change on business operations.

Keywords: climate change; small and medium enterprises; adaptation and mitigation; Senegal

Introduction

The Intergovernmental Panel on Climate Change (IPCC) reported that the climate is changing across our planet, largely as a result of human emissions of greenhouse gases (GHGs), and that the consequences of continued warming are likely to be severe (IPCC, 2014). Therefore, the risk of large-scale climate change is one of the central issues facing the world today. Also, the impacts of climate change are already occurring, and the scale, intensity, and scope of these

impacts are projected to increase overtime, which could be a threat to economic development (World Bank, 2014). Further, Linnenluecke & Griffiths (2010) asserted that scientific findings forecast that one of the major consequences of global warming and human-induced climate change is a greater occurrence of extreme weather events with potentially catastrophic effects for organizations, industries, and society. In addition, the changing climate adds another dimension of complexity to the continually changing social, technological, economic, environmental and political landscape that

businesses must navigate (Ridoutt et al., 2016). Moreover, the changing climate will have significant impacts on economic activity within the Sub-Saharan Africa region, as the production systems are altered to deal with the changing climate conditions, thus affecting the operations of businesses, profits, and competitiveness of small and medium enterprises and industries which are mostly informal and that add to their vulnerability to climate change (Crick et al., 2016). The Sub-Saharan Africa countries are among the hotspots that have been identified by the Intergovernmental Panel on Climate Change as being particularly exposed and vulnerable to the impacts of climate change, which pose increasing risks to their economic growth and development efforts coupled with the high level of poverty and low adaptive capacity (IPCC, 2014). A clearly observable feature of West African economies, in particular, is an increase in the establishment of small and informal businesses and operations, as individuals attempt to move out of low productivity agriculture (Owusu-Afari, 2018).

Located on the western coast of Africa, Senegal is a land of geographic and climatic contrasts, which present an additional stress to its economic development (Gueye et al., 2007). Mertz et al. (2009) reported that most of the country is subject to the weather conditions of the Sahel zone, which is characterised by a single rainy season that lasts for up to three months in general, thus making the country vulnerable to climate change impacts. Further, the average annual temperatures could rise between 1 and 3°C in Senegal, with faster warming rates in the semi-arid north and interior of the country and an increase in the frequency of hot days and nights (USAID, 2017). While Senegal has enjoyed a strong economic performance and a steady growth over recent years, the population's living standards are still very low. Poverty in Senegal is most prevalent in rural areas, where roughly 60% of the population resides (World Bank, 2020). Moreover, it has been estimated that low agricultural production, limited capacity of the economy to create sustainable jobs, and inadequate resource allocation for social services contribute to poverty in Senegal which is vulnerable to drought, flooding and related health epidemics, sea-level rise, coastal erosion and its corollaries, bush fire and locust invasion (World Bank, 2020). Additionally, climate change and climate variability affect various sectors of the national economy of Senegal including the small and medium enterprises sub-sector mostly informal and which play a driving role in the economic and social development of the country (Plan d' Actions du Senegal- CNSC, 2016). Therefore, this study documents the existing literature on the impacts of climate change on small and medium enterprises in semi-arid areas of Senegal. Specifically, the study is designed to:

- i Provide an overview of SMEs in semi-arid regions of Senegal.
- ii Identify the impacts of climate change on SMEs in Senegal.
- iii Explore the climate change adaptation interventions in Senegal's enterprises, and
- iv Recommend feasible and appropriate strategies that match the local context of SMEs in combating climate change.

The next section presents an overview of SMEs in semi-arid regions of Senegal. Section three identifies the impacts of climate change on SMEs in Senegal, while section four explores the climate change adaptation in Senegal's enterprises. The Final Section draws conclusion and provides policy recommendations that can help SMEs to deal effectively with the changing climate.

Overview of SMEs in Semi-Arid Regions of Senegal

The industry sector of Senegal comprises about 92.5 percent of small and medium-sized enterprises (SMEs) and the agricultural food industry accounting for 45 percent of all industrial manufacturing output (Mansoor et al., 2018; IUCN Senegal, 2018; ANSD, 2017). This food industry is highly dependent on agricultural production, which is significantly vulnerable to climate change (Benjamin & Mbaye, 2012). In the last decade, a considerable establishment of numerous small and medium-sized enterprises processing and marketing agricultural finished products such as fruit juices, dairy products, cereals, vegetables, and oil among others has been observed in Senegal (ANSD, 2017). Further, even enterprises with substantial balance sheets sometimes remain in the informal sector in Senegal because of the poor business environment and burdensome regulations (Benjamin & Mbaye, 2012). As a matter of fact, the informal sector of Senegal contributes to about half of the country's GDP, 90% of jobs and one-fifth of investment (Crick et al., 2016; Benjamin & Mbaye, 2012). In addition, in order to boost its economic and social development, Senegal has put in place a policy framework that can help the promotion of SMEs because of their role in the economic growth of the country (ANSD, 2017). Also, the SMEs are well represented in the local industrial fabric and mainly belong to the informal sector and generally work in the fields of agriculture, livestock, fishing, trade, and processing (Crick et al., 2016). Therefore, their membership to the informal sector can exacerbate the unfavorable environment in which they are operating, leading to low production and transformation of products. Thus, small and medium enterprises (SMEs) in semi-arid zones face sev-

eral constraints related, on the one hand, to the nature of the activities and their mode of operation and, on the other hand, to the economic and institutional environment in which they operate (ANSD, 2017; Diop et al., 2017).

These constraints are accentuated by the climatic uncertainties in which the country is confronted. This situation can have significant consequences on the activities of SMEs, their competitiveness and their profits (Crick et al., 2016). Therefore, SMEs need a multitude of supports in several areas to enjoy an enabling environment for adaptation to uncertainties because they play a positive role in creating jobs and wealth, especially in the semi-arid zones of the country (Diop et al., 2017). Yet, there is very little empirical research in Senegal on the adaptation of small medium enterprises in semi-arid zones and little information on how they are affected by climate change, the responses they try to provide, and the obstacles they face in dealing with the impacts of climate change.

Impacts of Climate Change on SMEs in Senegal

It has been argued that climate change presents real and measurable risks to the social and ecological systems on which small and medium enterprises depend to operate (Berkhout, 2012). Indeed, the agricultural production in Senegal encounters a reduction in crop quality and yields, and reduced availability and quality of freshwater resources due to climate change (Troisième Communication Nationale du Sénégal, 2015). Further, the small and medium enterprises which are located within the semi-arid regions of Senegal are highly exposed to climate risks including frequent temperature extremes, droughts and floods among others. (Crick et al., 2016). This could lead into a loss of income and livelihoods for households, businesses and communities because the agricultural sector employs around 60 percent of the total labor force of the country (Crick et al., 2018). In addition, the country is exposed to climate risks, including frequent temperature extremes and regular exposure to droughts and floods (Niang et al., 2014). Moreover, it has been reported that 91 percent of selected small and medium business operators that are operating in agriculture, livestock, trade and processing sector within the semi-arid zones, have explained that most of their economic units are affected in their activities by climate change in Senegal (Crick et al., 2018). Also, the same study revealed that the main climate extreme events that have affected the business activities of small and medium enterprises during the last five years are water deficit or even drought, extreme heat, floods within the semi-arid zones of Senegal. Therefore, loss of goods, low productivity and sales as well as loss of income are mainly observed by

the small and medium enterprises due to the negative impacts of climate change on both supply and production processes (USAID, 2017).

Further, the small and medium enterprises which are in the field of processing have experienced inability to run their businesses for several days, due to the lack of products and raw materials or ideal climatic conditions; some of those SMEs have been affected significantly by the adverse impacts of climate change (Plan d' Actions du Senegal- CNSC, 2016). It has been reported that the main climate extreme events that can affect negatively the small and medium enterprises in Senegal are extreme temperature, shortage of rainfall, strong winds, soil erosion and salinization which can affect directly the agriculture, livestock, trade, and processing sector in which operate principally the small medium enterprises in the country (ANSD, 2017; PANA, 2015; World Bank, 2020). Conversely, in the semi-arid regions of Senegal, the vulnerability of small and medium enterprises to climate change is increased by weak institutional support, the lack of adequate infrastructure, the low technical capacity of economic units, strong dependence on a production system focused on exploitation and processing of agricultural and livestock products, and natural resources which are becoming scarce increasingly (ANSD, 2017; Crick et al., 2018; PANA, 2015).

Climate Change Adaptation in Senegal's Enterprises

The Senegalese government recognises the importance of the business sector for its economy and has established several agencies to support its development and also within the business environment, the informal sector contributes 40% of Gross Domestic Product of the country (Banque Mondiale, 2020; Sall et al., 2011). Despite the proliferation of agencies, there is little focus on climate change integration into their plans, programmes and policies (Crick et al., 2016). Further, the businesses that are supported by those agencies have experienced extreme weather events in the past and will be vulnerable to future climate change (Gaye et al., 2015). For instance, over one third of small and medium enterprises (SMEs) which dominate the Senegal's industrial fabric, are involved in agricultural or agri-food processing activities and thus are at risk of climate change (Crick et al., 2016). As a result, Crick et al. (2018) who looked at Senegal SMEs responses to climate change maintained that frequent occurrence of extreme events results in business contraction, and thus in unsustainable adaptation. In other words, SMEs more at risk tend to reduce their business activities to cope with current climate change.

Additionally, the authors assert that the ability of firms to respond to climate risks is constrained by financial barriers and insufficient market access; acknowledging the clear role for public policy in facilitating good adaptation. Yet, there is no or little consideration and support for business sector adaptation in Senegal. Also, it has been argued that further research should be done on small and medium-sized and large enterprises' knowledge, attitudes and practices towards climate change impacts in Senegal so as to create wealth in the business sector including formal and informal activities (UNIDO, 2017). Overall, there remains a clear disconnect and lack of integration between the manufacturing industries development and climate change agendas despite the recognition that both agendas are critical for the sustainable development and economic growth of Senegal (République du Sénégal, 2015). Furthermore, at the national level, adaptation policy has remained a remit of the Department of Environment and Classified Establishments (DEEC) within the Ministry of Environment and Sustainable Development and therefore has not been integrated into other Ministries, such as finance, energy, industry, fisheries, agriculture, infrastructure among others which can play a key role in manufacturing industries' adaptation and mitigation to climate change (République du Sénégal, 2014). Indeed, the government of Senegal in its Intended Nationally Determined Contribution (INDC) report that climate change affects multiple key economic sectors and that there is a need to develop a cross-sectoral approach integrating adaptation considerations to ensure that Senegal's economic development is resilient to climate change (République du Sénégal, 2016). The approved Nationally Determined Contributions (NDC) submitted to the United Nations Framework Convention on Climate Change in 2020 reinforced the idea that effective resilience to climate change requires the adoption of a multisectoral and intersectoral approach to strengthen consultation between actors and facilitate the establishment of a harmonized framework for future interventions (République du Sénégal, 2020). In connection, the National Adaptation Plan (yet to be developed) will adopt a planning approach (climate proofing for development) in the short, medium, long term for future initiatives in Senegal.

Yet, there is no specific identification of the needs of the Senegal's enterprises to increase their adaptive capacity and resilience to the changing climate. Nevertheless, there are some economic and financial incentives and insurance initiatives and funds that have been put in place by the government of Senegal and its partners in order to support agro-industry, fisheries, craft and textile enterprises under the uncertainty of their business environment (IFC, 2013). Also, despite the existence of climate information and data in the country, the

manufacturing industries sub-sector struggle to access and use this data, because it is not communicated or is provided in a format not tailored to and not suitable for the needs of those manufacturing industries (République du Sénégal, 2015). Although the improvement in Information and Communication Technologies (ICTs) and development of market platforms and mobile applications in Senegal have enabled the business sector to gain better access to economic and market information, there is limited communication and dissemination of climate change specific information and how Senegal's enterprises could adapt to climate change (Direction des PME, 2014; Sylla et al., 2016). Further, in its approved NDC submitted in 2020, the Government of Senegal ensures that the country will develop an effective 'citizen' and 'decision-maker' oriented communication strategy to better involve all stakeholders in the implementation process without no explicit reference to businesses (République du Sénégal, 2020). Moreover, the government of Senegal has created specific business zones / centers and industrial parks, mostly in the capital area, to help support market activities of businesses, but there is limited information available on knowledge, capacity development and training specific to business sector development and adaptation to climate change (Cabral et al., 2011).

Conclusion and Policy Recommendation

Small and medium-sized enterprises (SMEs) represent the heart of the industrial fabric in semi-arid zones of Senegal but they are very vulnerable to extreme weather conditions that affect significantly their supply and production processes. In semi-arid areas of Senegal, the main climate extreme events that mostly affect the procurement and production processes of SMEs are mainly water deficit, extreme heat and soil erosion and salinization among others. Thus, the creation of an environment favorable to the adaptation of SMEs is essential for local private sector involvement in the national effort to fight against climate change, that requires planning and implementation of adaptation and mitigation strategies which are appropriate to the context and level of development SMEs in semi-arid areas of the country.

The paper recommends the government to create an enabling environment for climate change adaptation strategies of SMEs by emphasizing information and training on threats and opportunities related to climate change. The mobilization of funds in order to support local initiatives towards climate change adaptation processes and the improvement of institutional, regulatory and political framework in order to effectively tackle the adverse impacts of climate change in the business sector should be harnessed. It is important to

establish a training programme for SMEs on the threats and opportunities of climate change with the collaboration of the National Committee on Climate Change (COMNACC) and the Directorate of Small and Medium-Sized Enterprises (DPME) in Senegal in order to equip them with relevant information and tools that will enable them to effectively tackle the changing climate. Further, the SMEs must explore the opportunities for establishing partnerships with research and development structures in order to develop strategies to take climate change into account in their business plans to reduce the vulnerability of their economic activities. Moreover, in order to reduce the vulnerability resulting from heavy dependence on the exploitation of natural resources, SMEs must experiment, in collaboration with local communities and research institutions, technological and institutional processes which guarantee rational management of these natural resources. In this perspective, they must explore the different opportunities offered by green technologies in the production and processing of agricultural products among others.

Author contribution statement

All authors listed have significantly contributed to the investigation, development and writing of this article. Moreover, the concept and subject matter were developed by the first author, who serves as the Instructor of the co-authors.

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