IMPACT OF CLIMATE CHANGE ON MANUFACTURING MICRO, SMALL AND MEDIUM-SCALE ENTERPRISES IN INDIA: CASE STUDY OF FARIDABAD INDUSTRIAL CLUSTER

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Overview

Micro, Small, and Medium-scale Enterprises (MSMEs) are the backbone of any economy and are the largest employers in the world. Several studies have confirmed that climate change is going to have serious impacts on the economy (IPCC 2022). However, its impact on the manufacturing MSMEs is under-researched, especially in developing countries like India. Climate Change risks for industry sector are not singular. There are physical risks which result from the physical and environmental changes (such as changing precipitation patterns, temperature variations, wildlife impacts etc.) of the climate change. There are also transition risks which result from changing economy due to sustainable transition (such as changing regulatory environments, market environments, public opinions etc.) (Carney 2017, UNEP FI 2023). Current Literature lacks a comprehensive framework to study the same. Hence, in this study, we aim to develop a framework to assess the impacts of climate change in the MSMEs, and quantify those impacts operationalizing the framework. Faridabad mixed engineering cluster, located in North India, was chosen to conduct this study. It is one of the oldest Indian industrial clusters and is heavily dependent on the Auto sector. The cluster supply auto components to major auto companies in India such as Maruti Suzuki India Limited, Tata Motors, JCB India Limted etc.

Methods

The present study considers both the physical and transition risks of climate change. Using an exploratory qualitative approach, we surveyed 9 MSME owners and 8 Key informants including trade assosciations in India to collect primary data. Using literature and stakeholder surveys, we develop a conceptual framework. We link each of the impacts to the supply or demand disruption of the enterprise. To operationalize the framework, we quantify the impacts of climate on MSMEs in the Faridabad mixed engineering cluster. Quantification was done by analyzing man-hours lost based on each risk. Further, we apply Thematic Analysis using an inductive approach to analyze how the stakeholders perceive the impacts on them.

Results

The conceptual framework defines four major components of climate change that impact the industry – increase in temperatures, increase in extreme events, changes in regulations, and market changes. MSME industry in Faridabad is currently facing many of these risks. In terms of physical risks, the industry faces loss of productivity among its workers due to rising temperatures, they also face regular disruptions in supply chain due to changing rainfall patterns. From the transition risks side, the cluster faces regular disruptions in their operations due to Air Quality Index (AQI) regulations because of being located in North India, and since it is dependent on the Auto sector, the industry faces phase-out due to transition of transport industry from Internal Combustion Engine (ICE) based vehicles to Electric Vehicles (EVs). Moreover, the industry also faces future risks from regulations such as Carbon Border Adjustment Mechanisms (CBAM).

On operationalizing the framework over Faridabad, the analysis shows that the cluster could lose around 10% of its turnover due to man-hours lost by 2030 due to climate change in a Business-as-Usual Scenario. Using a “just transition” lens, we found that MSMEs are affected disproportionately by climate change, especially from Distributive Justice and Procedural Justice tenets. This is mainly due to their limited resources and high dependence on manpower. The framework can be applied to other industries in all locations. Location and type of industry were found to be the two major factors that determine the kind of impact the enterprise might face.

Conclusions

The study shows that manufacturing MSMEs face significant impacts from Climate Change. These impacts might exacerbate in the future due to worsening physical environments as well as rapidly transitioning economy. This study will help bring awareness among MSME owners, buyers (which are often large companies), and policymakers. This awareness has implications towards policy formation especially, adaptation policy. The physical impacts have implications in adaptations and policy at enterprise level as well as city level and regional level to improve infrastructure and make it more resilient. The transition impacts have implications on policy at local, national and global scale in response to climate change. The "justice" lens here especially useful as policies can be formed to support MSMEs by both government and large companies for which MSMEs are suppliers and future-proofing the sector.

Additionally, India as a developing economy aims to increase its manufacturing capacity to support its growing population and strengthen its economy. Incorporating the "climate change impacts for MSMEs" framework can help in designing industries that are better prepared to handle these impacts or minimize the impacts altogether. Further, support can be provided in promoting industry sectors that can gain from climate change and ensuing transition.

References

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