Assessment of Disaster Preparedness Levels in Small and Medium Manufacturing Units in Nagpur District

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Abstract

This study examines the level of disaster preparedness among small and medium manufacturing enterprises (SMEs) in Nagpur District. Given their vital role in regional economic development, SMEs must be equipped to handle natural and man-made disasters to ensure business continuity and workforce safety. Using a descriptive research design and questionnaire-based data collection, responses from 100 manufacturing units were analyzed. The findings reveal significant shortcomings in awareness, availability of emergency resources, staff training, and coordination with local disaster management authorities. The study concludes that while some SMEs demonstrate basic preparedness, most require substantial improvements. Recommendations include targeted training, policy support, and collaborative efforts to build organizational resilience and disaster readiness in the sector.

Keywords: Disaster Preparedness, SMEs, Manufacturing Units, Risk Management, Nagpur District, Business Continuity, Emergency Planning, Resilience.

Introduction

Disasters, whether natural or man-made, pose significant threats to economies worldwide, particularly to the industrial sector. Among these, Small and Medium Enterprises (SMEs) are often the most vulnerable due to their limited resources, lack of contingency planning, and insufficient risk awareness. In India, SMEs contribute approximately 30% to the GDP and play a vital role in employment generation and regional development (Ministry of MSME, 2022). The manufacturing sector within the SME domain is particularly crucial, as it supports both domestic and export markets. However, the ability of these units to withstand and recover from disasters is highly dependent on their preparedness level. The Nagpur district, located in the heart of Maharashtra, has witnessed various risks ranging from fire accidents, industrial mishaps, and seasonal flooding, to power failures. This raises pertinent questions about the level of disaster preparedness among small and medium manufacturing units operating in this region.

Despite the growing emphasis on sustainable industrial development and risk management, there is limited empirical evidence available on how SMEs, particularly in regional hubs like Nagpur, assess, prepare for, and respond to disaster events. Most manufacturing units are focused on short-term operational efficiency and cost-cutting measures, often sidelining disaster preparedness as a non-priority or a reactive strategy. However, the increasing frequency and intensity of disasters call for proactive planning and resilience-building mechanisms, especially in industrial clusters.

Assessing the disaster preparedness of these SMEs is not just essential for reducing economic disruptions but also for safeguarding human lives, property, and the environment. The present study aims to evaluate the disaster preparedness levels of small and medium manufacturing enterprises in Nagpur District, identify existing gaps, and propose strategic recommendations for enhancing their resilience.

Literature Review

Disaster preparedness is defined as the knowledge, capabilities, and actions taken before, during, and after a disaster to ensure an effective response and recovery (UNISDR, 2015). It encompasses risk assessment, early warning systems, contingency planning, training, and resource allocation. Numerous studies have highlighted that SMEs, compared to large firms, often lack formalized disaster preparedness and continuity planning due to financial constraints, limited technical know-how, and absence of regulatory enforcement (Alesch et al., 2001; Herbane, 2010). Furthermore, SMEs tend to operate with informal management practices and minimal documentation, which impairs their ability to undertake systematic risk

assessments and build recovery frameworks.

According to Tierney (2007), smaller enterprises tend to underestimate the potential impact of disasters, viewing them as rare occurrences rather than plausible operational threats. This perception significantly hampers their motivation to invest in mitigation strategies. Similarly, Sullivan-Taylor and Branicki (2011) argue that while many SMEs demonstrate flexibility and improvisation during crises, their reactive nature often results in increased vulnerability, especially during high-impact, low-frequency events. The lack of preparedness not only leads to production halts and supply chain disruptions but can also result in permanent business closure, particularly in sectors where capital intensity and material losses are high.

In the Indian context, disaster preparedness in SMEs remains a neglected area of study. While the Disaster Management Act (2005) mandates preparedness and mitigation strategies across sectors, its implementation at the micro-enterprise level has been weak. Sharma and Rajput (2017) in their study on industrial preparedness in Gujarat observed that although some large-scale manufacturing units had emergency response systems in place, the majority of SMEs lacked structured preparedness plans and coordination with local disaster management authorities. This gap is further emphasized by Singhal and Gadre (2020), who examined the disaster resilience of MSMEs in Maharashtra and found that only a small fraction had conducted risk assessments or employee training programs for emergency scenarios.

Another critical dimension is the role of institutional support and awareness programs. According to Ahmed and Mallick (2021), disaster risk reduction in the SME sector requires a collaborative approach involving government bodies, local industry associations, insurance agencies, and civil society. However, in regions like Nagpur, there is a lack of targeted awareness campaigns and capacity-building workshops tailored to the needs of manufacturing SMEs. Moreover, the fragmented nature of industrial clusters and the diverse typology of manufacturing processes further complicate the standardization of preparedness measures.

In recent years, global frameworks like the Sendai Framework for Disaster Risk Reduction (2015– 2030) have emphasized the need for building resilience at all levels of business, including SMEs. Yet, implementation remains sluggish, especially in semi-urban and industrially developing districts. Studies such as that of Battisti and Deakins (2017) highlight the potential of integrating disaster risk management into business continuity and strategic planning, urging SME owners to view preparedness as a long-term investment rather than a cost. Tools like vulnerability mapping, scenario-based drills, and digital alert systems have been recommended for mainstreaming disaster readiness in the SME sector.

In sum, while there is a growing body of literature on business continuity and disaster resilience, there remains a considerable research gap in assessing and enhancing preparedness levels in small and medium manufacturing units, particularly in regional contexts like Nagpur. This study seeks to fill this gap by conducting a ground-level assessment and providing actionable insights for policy makers, industry stakeholders, and the local administration.

Objectives:

The primary objective of this study is to assess the current level of disaster preparedness among small and medium manufacturing units in Nagpur District, identify existing gaps, evaluate awareness and implementation of disaster management practices, and provide actionable recommendations to enhance resilience, minimize operational disruptions, and ensure business continuity during disaster events.

Methodology:

This study adopts a descriptive research design to systematically assess disaster preparedness levels among small and medium manufacturing units in Nagpur District. Data were collected using a structured questionnaire method targeting key managerial personnel. A sample size of 100 units was selected using purposive sampling to ensure representation across various manufacturing sectors within the district.

Data Analysis:

The primary data collected from 100 small and medium manufacturing units in Nagpur District was analyzed using descriptive statistics, including frequency distribution and percentage analysis. The responses were organized into key areas such as awareness of disaster management policies, availability of emergency resources, staff training, and coordination with local authorities.

Tabe 1 Awareness of Disaster Management Policy

Response	Number of Units	Percentage (%)
Aware	62	62%
Not Aware	38	38%

62% of the surveyed units reported awareness of disaster management policies, indicating a moderate level of cognizance among SMEs. However, the remaining 38% lacking awareness reflects a critical gap in basic disaster preparedness.

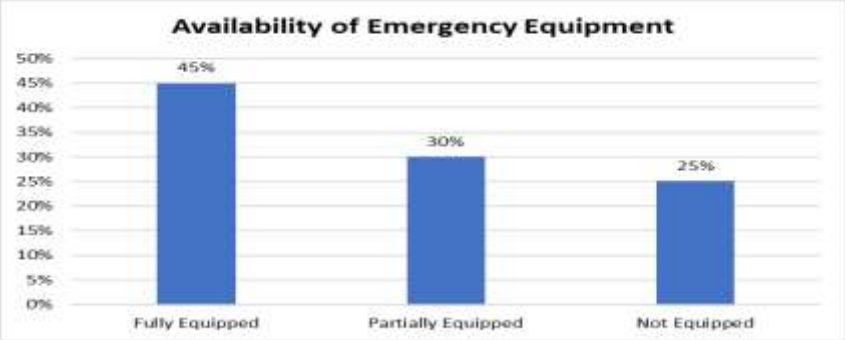

Fig. 1

Only 45% of units were found to be fully equipped with emergency equipment, while 30% had partial provisions. A significant 25% lacked even basic emergency tools, increasing their vulnerability during disaster situations.

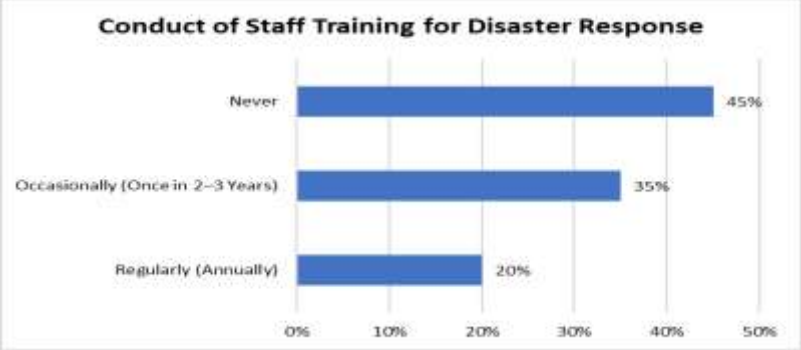

Fig. 2

A majority (45%) of units have never conducted any disaster response training for their employees, highlighting a serious deficiency in organizational preparedness. Only 20% ensure annual training, which is considered a best practice.

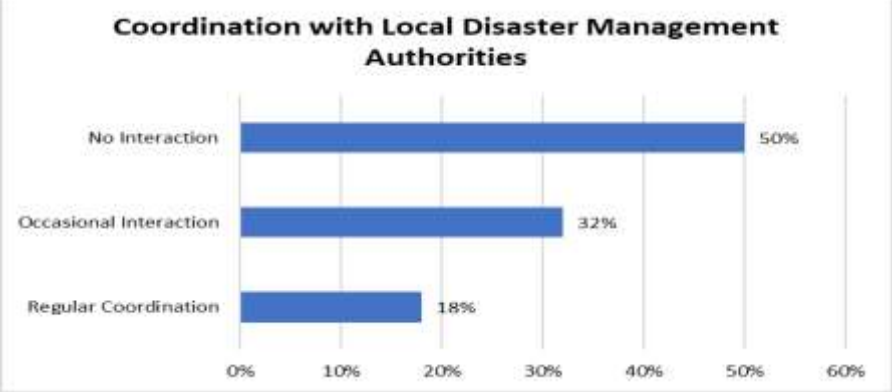

Fig. 3

Half of the manufacturing units surveyed have no interaction with local disaster management authorities. Only 18% maintain regular coordination, which is essential for integrated disaster response.

The data analysis reveals that while a portion of SMEs in Nagpur District demonstrate basic awareness and readiness, a significant percentage lack essential components of disaster preparedness. Gaps were especially prominent in areas of emergency resource availability, employee training, and external coordination. These findings underscore the urgent need for capacity-building initiatives and policy-level interventions to enhance disaster resilience in the SME manufacturing sector.

Conclusion

The study reveals that disaster preparedness among small and medium manufacturing units in Nagpur District is generally inadequate, with significant gaps in awareness, resource availability, training, and coordination. While some units exhibit a basic understanding of disaster management principles, the majority lack structured preparedness plans and fail to engage regularly with local authorities. The absence of systematic employee training and emergency infrastructure increases the vulnerability of these enterprises to both natural and man-made disasters. These findings highlight the pressing need for improved preparedness to ensure operational continuity, safeguard employee safety, and minimize potential economic losses in the event of a disaster.

Recommendations

To strengthen disaster preparedness in SMEs, it is recommended that targeted awareness campaigns and training programs be initiated in collaboration with local disaster management agencies and industry associations. Government and institutional support should be extended to facilitate the provision of emergency equipment and the development of customized disaster response plans. SMEs should be encouraged to conduct regular drills, establish crisis communication protocols, and create dedicated disaster management teams. Furthermore, policy frameworks must include incentives for compliance with safety standards and preparedness benchmarks, thereby fostering a culture of resilience within the manufacturing sector.

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