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GLASS INDUSTRY CLUSTERING AND DEVELOPMENT OF LOCAL EMPLOYMENT IN FIROZABAD

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ABSTRACT

The glass industry of Firozabad, widely recognized as the *Glass City of India*, constitutes one of the country's most significant traditional industrial clusters and plays a vital role in local employment generation and regional economic development. The present study investigates the structure and functioning of the glass industry cluster in Firozabad and examines the major challenges and opportunities influencing sustainable employment in the sector. The research is based on both primary and secondary sources of data. Primary data were collected through field surveys, structured questionnaires, personal interviews, and direct observations of glass manufacturing units and workers involved in different stages of the production process. Secondary data were sourced from District Industrial Profile reports, Census of India publications, MSME and DCMSME reports, academic studies, government documents, and newspaper sources.

Keywords: Glass Industry Cluster; Firozabad; Local Employment; Industrial Clustering; Informal Sector; Sustainable Employment; MSMEs

INTRODUCTION

Firozabad, popularly known as the *Glass City of India*, has long served as the principal center of glass manufacturing in the country, especially renowned for its bangle industry and the production of decorative items, laboratory ware, containers, and chandeliers. Rooted in traditional craftsmanship dating back to the Mughal period, the industry evolved from small-scale artisanal practices such as melting discarded glass in indigenous furnaces (*Bhainsa Bhatti*) into one of India's largest and most specialized industrial clusters. Today, the Firozabad glass cluster comprises numerous Micro, Small, and Medium Enterprises that contribute significantly to the unorganized glass sector, generate export earnings, and provide livelihoods to a large segment of the local population. In this context, industry clustering refers to the geographical concentration of interconnected glass units, suppliers, and support services, while local employment development denotes the creation and sustenance of jobs for skilled, semi-skilled, and unskilled workers arising from this cluster. Despite its economic importance, the cluster faces serious challenges such as fluctuating demand, rising

energy costs, environmental regulations, competition from low-cost imports, and the dominance of informal and home-based production units, leading to job insecurity, low wages, and limited access to modern technology. Against this backdrop, the present study aims to examine the role of glass industry clustering in shaping local employment patterns, assess its socio-economic benefits and constraints, and identify factors influencing sustainable job creation in Firozabad. The study is significant as it enhances understanding of how traditional industrial clusters contribute to regional employment and economic development, offering valuable insights for policy formulation and sustainable industrial planning in similar regions.

REVIEW OF LITRATURE

Studies such as the Technology Centre System Programme (DCMSME) diagnostic report emphasize the extensive geographical clustering of glass units, which include bangles, decorative ware, laboratory glassware, and container glass, and point to the cluster's contribution to both domestic markets and exports. DCMSME

Other investigations highlight the role of home-based and informal labor—especially women and skilled artisans—in sustaining production and enabling flexible participation in economic activities. IJHSSI

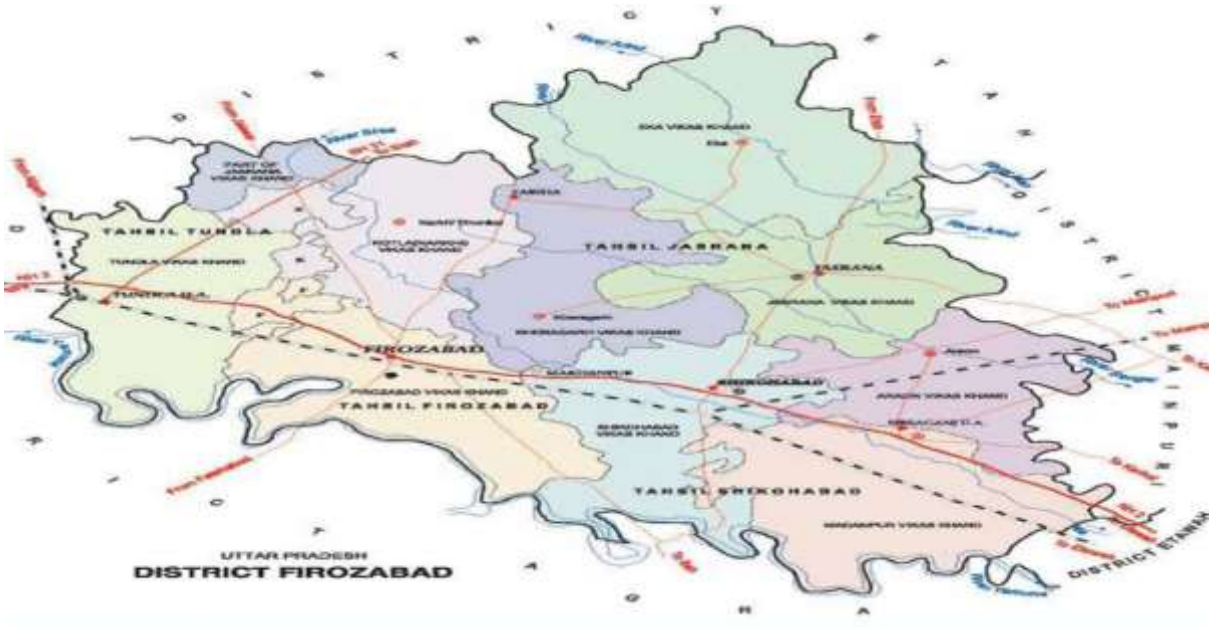
Several researchers and reports have examined the *socio-economic implications* of this clustering. An in-depth working paper on Firozabad notes how cluster formation has created a multiplicity of jobs that integrate home-based work, workshop production, and factory labor, knitting together diverse skills within the community. csh-delhi.com

esearch literature also examines the labour dynamics and trade consciousness among glass workers. Studies like *Of glass, skills and life* highlight how caste hierarchy, gender roles, and community practices influence skill transmission, labor relations, and occupational identity in Firozabad's glass sector, demonstrating that social structures shape the patterns of employment and worker agency. ResearchGate

Other literature underscores scale and diversity of employment within the cluster. Government-sponsored cluster reports estimate that Firozabad hosts thousands of household and furnace-based units that together employ several hundred thousand workers across segments like bangle decoration, glassblowing, and container production. These studies reveal how labour is organized across formal and informal units, with contractual and daily-wage work predominant in many parts of the cluster. DCMS

METHODOLOGY

Study area: Firozabad is both a district and an important urban center in the state of Uttar Pradesh, India, situated about 40 km east of Agra and nearly 250 km south-east of the state capital, Lucknow. Located in the north-central plains of India, the district covers an area of approximately 2,362 sq. km and is well connected by road through National Highway-19 (Delhi–Howrah Highway) and an extensive rail network; it is bordered by Etah district to the north, Etawah and Mainpuri to the east, and Agra district to the south-west. The glass industry of Firozabad has deep historical roots, with evidence of glass objects from early periods, though organized glassmaking developed mainly during and after the Mughal era, when artisans remelted rejected glass in indigenous furnaces known as *Bhainsa Bhatti* to produce bangles and small items. Over time, technological improvements and rising demand led to diversification into glassware, decorative items, chandeliers, containers, and laboratory glass, and the industry expanded rapidly during the twentieth century, particularly after the Second World War. With a population of around 24.98 lakh, Firozabad today is popularly known as the "Glass City of India," as the glass industry forms the backbone of its local economy, accounting for nearly 70 percent of India's unorganized glass production and providing direct and indirect employment to more than half of the city's workforce. In addition to meeting domestic demand, the sector contributes significantly to exports and sustains a wide range of ancillary activities such as packing, transportation, trade, and craft-based services.



Source: Census of India, 2011

https://media.assettype.com/outlookindia/2024-06/225cd3cd-a693-4630-a8b2-4cf4edfa7682/Day%20in_7.jpg?w=800&auto=format%2Ccompress&fit=max&format=webp&dpr=1.0

Primary data were collected through extensive field surveys conducted in selected glass-manufacturing localities of Firozabad. Information was gathered using structured and semi-structured questionnaires administered to glass unit owners, managers, skilled artisans, and workers involved in various stages of production, including melting, molding, decorating, polishing, and finishing. In-depth personal interviews and informal discussions were undertaken to obtain qualitative insights into working conditions, wage patterns, skill levels, job security, and occupational health issues. Additionally, direct field observation was used to study the spatial distribution of glass units, production processes, and labour organization within the cluster, enabling the capture of ground-level realities, particularly in the largely informal sector where official data are often inadequate.Secondary data were sourced from a variety of published and unpublished materials, such as District Industrial Profile reports, Census of India publications, documents of the Ministry of Micro, Small and Medium Enterprises (MSME), District Industries Centre (DIC) records, DCMSME cluster diagnostic reports, labour department publications, academic journals, books, research theses, and official government websites. Newspaper reports and policy documents were also consulted to assess recent trends, challenges, and regulatory measures affecting the glass industry. These sources provided essential information on the historical development of the glass industry, the demographic and economic profile of Firozabad, employment patterns, industrial structure, and relevant policy initiatives.

The study follows a descriptive and analytical research design. For primary data collection, a sample-based approach was adopted, wherein representative glass units and workers were selected from major glass-producing areas using a combination of purposive and random sampling techniques. Efforts were made to include different categories of enterprises—micro, small, and medium—as well as workers with varying

levels of skills to ensure a balanced and representative sample.Both quantitative and qualitative techniques were applied for data analysis. Quantitative data were analyzed using simple statistical tools such as percentages, averages, and ratios to assess employment patterns, workforce composition, income levels, and the degree of dependence on the glass industry. Qualitative data derived from interviews and field observations were examined through thematic analysis to identify major challenges, opportunities, and perceptions related to sustainable employment. Spatial analysis was also undertaken to evaluate the geographical concentration and distribution of glass manufacturing units within the city and its surrounding areas.

Employment Development in Firozabad Glass Industry (Approx. Last 10 Years)

Year / Period	Estimated Employment	Trend / Remarks
2015–2016	~2,00,000 workers (mainly bangle industry)	Strong labour demand and dominance of traditional production.
2016–2017	~65,000 – 1,20,000 workers	Sharp decline due to demonetisation and production slowdown.
2017–2018	~1,50,000+ workers	Gradual recovery with reopening of industrial units and export demand.
2018–2019	~2,00,000 workers (direct & indirect)	MSME reports indicate industry supports over 50% of local population.
2019–2020	~2,50,000 – 3,00,000 workers	Growth due to product diversification and rising domestic demand.
2020–2021	~1,50,000 – 2,00,000 workers	COVID-19 lockdown caused production stoppage and job losses.
2021–2022	~3,00,000 workers	Post-pandemic recovery and revival of household-based units.
2022–2023	~4,00,000 workers	Employment increase due to cluster development schemes and exports.
2023–2024	~4,50,000 workers	Rising demand for decorative, container, and export-quality glass products.

2024–Present (2025–26 approx.)	~5,00,000 workers	Industry currently provides livelihood to nearly half a million people directly and indirectly.

NATURE AND STRUCTURE OF THE GLASS INDUSTRY CLUSTER IN FIROZABAD

The glass industry cluster of Firozabad is one of the most significant examples of a traditional industrial cluster in India, marked by strong spatial concentration, product specialization, and deeply rooted artisanal skills. Over time, the cluster has evolved through the interaction of traditional craftsmanship, localized production systems, and market-oriented specialization, forming a complex and interdependent industrial ecosystem that supports large-scale employment and sustains the local economy.

Types of Glass Units:

The cluster consists of diverse and specialized production units. Glass bangle manufacturing forms the core of the industry and defines Firozabad's identity as the "Glass City of India," supplying a wide range of bangles to domestic and export markets. Alongside this, numerous units produce decorative glass items such as chandeliers, lamps, showpieces, and ornamental products that require high levels of artistic skill. Another important segment includes tableware and utility glass units manufacturing bowls, bottles, jars, and

laboratory glassware to meet commercial and industrial demand. This product-based specialization has strengthened diversification and enhanced the resilience of the cluster.

Scale and Nature of Industries:

The glass industry in Firozabad is dominated by micro, small, and household-based units, with a limited presence of medium-scale enterprises. Most units operate informally or remain unregistered and are often located within residential areas or small workshops. Household units play a key role in labour-intensive activities such as decoration, polishing, cutting, and finishing, relying heavily on family labour, including women. While traditional furnaces and manual tools are widely used, a few medium-scale units have adopted semi-mechanized techniques. The predominance of small-scale and informal units allows flexible production but also limits access to credit, technology, and formal labour protection.

Spatial Concentration of Units

A defining feature of the cluster is its dense spatial concentration within the city and surrounding localities. Glass units are clustered in specific neighborhoods, enabling close coordination among producers and reducing transportation costs for raw materials and semi-finished goods. This localized concentration supports efficient subcontracting and strengthens inter-firm linkages, contributing to the overall productivity of the cluster.

Supply Chains and Skill Networks:

The cluster operates through localized supply chains and strong skill networks. Raw materials and inputs are sourced through local traders, while production is organized through a fragmented system in which different units specialize in specific stages such as melting, shaping, coloring, decorating, and finishing. Skills are transmitted through informal apprenticeships and community-based learning, ensuring continuity of traditional craftsmanship. Social and community networks play a crucial role in labour coordination, knowledge sharing, and sustaining production within the cluster.

FINDINGS AND DISCUSSIONS

The study reveals that the glass industry cluster in Firozabad is marked by a strong spatial concentration of predominantly micro, small, and medium enterprises located in close proximity to one another. The cluster operates through a highly segmented yet mutually dependent production system, in which various stages of glass manufacturing—such as melting, molding, decorating, polishing, and finishing—are performed by specialized units as well as home-based workers. This geographical concentration supports the easy availability of skilled labour, facilitates the transmission of traditional craftsmanship, and ensures convenient access to raw materials and nearby markets. While the production process continues to rely largely on

traditional methods, some medium-scale units have introduced semi-mechanized techniques. Employment within the cluster remains largely informal, with limited institutional support; however, strong social ties and subcontracting arrangements play a crucial role in maintaining production continuity and reducing costs. Overall, the cluster represents a combination of traditional artisanal skills and localized industrial organization, enabling it to sustain large-scale employment despite a low level of formalization.

The study points out several structural constraints that hinder sustainable employment in the Firozabad glass industry, such as escalating energy costs—especially the price and availability of natural gas—unstable market demand, increasing competition from low-cost imported products, and environmental regulations that limit furnace operations. In addition, the predominance of informal employment results in low wages, job insecurity, and insufficient social security coverage for workers, while health risks, poor working conditions, and limited access to modern technology further undermine employment stability. At the same time, the study identifies considerable opportunities to improve employment conditions, including technological modernization, skill enhancement initiatives, diversification of products, adoption of energy-efficient furnaces, and stronger institutional and policy support. The effective implementation of cluster-based development programs, greater formalization of enterprises, improved labour welfare provisions, and expanded market access through branding and export promotion can enhance the resilience of the glass industry and contribute to more secure, productive, and sustainable employment for the local workforce.

LIMITATIONS

The study is constrained by the predominance of informal and unregistered glass units, which leads to limited availability and reliability of employment data. Additionally, time limitations, limited access to certain enterprises, and hesitation among workers to provide accurate information affect the depth and accuracy of the analysis.

CONCLUSION

The study concludes that the glass industry cluster of Firozabad occupies a central position in the local economy by generating large-scale employment and preserving traditional artisanal skills through a well-developed system of industrial clustering. The cluster is marked by a high concentration of micro, small, and medium enterprises functioning within an interlinked production framework that integrates traditional craftsmanship with localized industrial practices. Although the industry holds substantial economic importance, it faces multiple challenges such as escalating energy costs, fluctuating market conditions, environmental regulations, limited technological advancement, and the dominance of informal employment, all of which negatively impact job security and labour welfare. At the same time, the study identifies

significant opportunities to enhance sustainable employment through technological modernization, skill development initiatives, adoption of energy-efficient production methods, and effective implementation of cluster-based development policies. Improved institutional support, better working conditions, and expanded market access can strengthen the resilience and long-term sustainability of the Firozabad glass industry, thereby promoting inclusive regional economic development.

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