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# Glass Industry of Firozabad Uttar Pradesh: Traditional craft to Industrial heritage of India

## MASTER OF ARCHITECTURE (CONSERVATION)

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# GLASS INDUSTRY OF FIROZABD, UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

**A RESEARCH THESIS**

**Submitted**

In partial fulfilment of the requirements for the award of the degree of

## MASTERS OF ARCHITECTURE

## (CONSERVATION)

By


## AKSHITA JAIN

SCH. NO. 2020MCO013


Under the guidance of

## AR RAMESH P BHOLE


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**MAY-2022**

## Declaration

I, **Akshita Jain**, Scholar No.**2020MCO013,** hereby declare that the thesis titled "Glass Industry of Firozabad Uttar Pradesh: Traditional craft to Industrial heritage of India" submitted by me in partial fulfilment for the award of Master of Architecture (Conservation) at School of Planning and Architecture, Bhopal, India, is a record of bonafide work carried out by me. The matter/result embodied in this thesis has not been submitted to any other University or Institute for the award of any degree or diploma.

Akshita Jain

Date: 10/06/2022

## Certificate

This is to certify that the declaration of Akshita Jain is true to the best of my knowledge and that the student has worked under my guidance in preparing this thesis.

RECOMMENDED

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Ar Ramesh P Bhole
Thesis Guide

ACCEPTED

_____

Prof Vishakha Kawathekar
Head, Department of Conservation

May 2022, Bhopal

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# ABSTRACT

Firozabad is a district situated near Agra. It is known as the Glass City of India for its large manufacturing of glass-related products. For more than 200 years the Firozabad industry is indulging in making glass bangles and now has become the world's largest producer of glass bangles. Bangle making skills had been transferred from generation to generation passing on the traditional technique. Now the business of glass industry is grown in various fields like glassware like beakers, flasks, containers for laboratories, other products like the light bulb, battery bulb and other lighting and spotting equipment, glass art items are also made like toys, candle stands, fruits, birds and animal figurines and images of gods and goddesses and domestic glass goods like drinking glasses. It has now become a culture of small households in the city to indulge in making items related to glass. Most of the population is connected to the business. To produces all these products, one requires skill, craft and knowledge which cannot be gained without proper practice and knowledge.

There are two towns Shikohabad and Tundla which come under the Firozabad district. Tundla is located in the west and east of Shikohabad city. The main trade in the district is bangles. Due to over pollution coal is replaced with gas thus coal business in the city is reduced. Women of the city are employed in their houses to prepare and give the final touch to the bangles.

The industry is a place where raw material is processed to make a product which is later used as an economic asset. In the case of Firozabad, the industries and craft are interdependent to create a final product for the market.

Firozabad glass industry had been looked upon the aspects like pollution, child labour and poor condition of labour in the industry. This thesis wants to highlight the background of skill and how it impacts the industrial status of the city and the interdependency of community, craftsmen and industry.

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# LIST OF ABBREVIATION

*FZD- Firozabad*
*UP- Uttar Pradesh*
*DW- Domestic Ware*
*MW- Marriage Ware*
*AW- Art ware*

# CHAPTER 1. INTRODUCTION

## 1.1 AIM

Research journey of glass industry from craft to industrial heritage.

## 1.2 OBJECTIVE

- To study the historic evolution of glass industry in India and Firozabad.
- To document craft of glass making and its various products.
- To identify traditional knowledge behind glass making.
- To study interrelationship between craft, community and industries.
- Understanding the paradigm shift from craft to industries.

## 1.3 SCOPE

The scope of the thesis is to study the Traditional knowledge system of making various glass products in Firozabad in the present context. Understanding the network and requirements of glass industry. Study of the community, process and spaces related to glass craft.

## 1.4 LIMITATION

- The thesis will be limited to recommendatory framework no proposals will be suggested.
- There is no much literature material about craft and history of Firozabad.

## 1.5 NEED OF THE STUDY

Firozabad glass work was a house hold work initially, the first industry setup happened in 1910 before that the glass work was done in houses and time unremembered. The skill and efforts of the artisans had been passed to generation to generations. The detail study of interrelation between craft and industry is required to understand the future of glass making in Firozabad.

## 1.6 METHODOLOGY

The methodology is divided and sub divided into various stages. It starts from previous research papers Glass industry of Firozabad and the Evolution of Firozabad. From that study area is defined which is the boundary of Firozabad city. From all of this and the primary literature study, I came down to finalizing the aim and objective of the thesis. The methodology further is about data collection which is divided into secondary and primary data collection. Secondary data collection involves literature review and collecting all the relevant data regarding the thesis like history and the glass industry which helped understand the oncept

and context. Primary data collection involves the documentation of making various glass products and the skill involved. This is the part of site visit documentation and it helped create a database for the thesis.
From all the understanding from primary and secondary data collection and database I further came down to site observations, analysis and recommendatory framework.

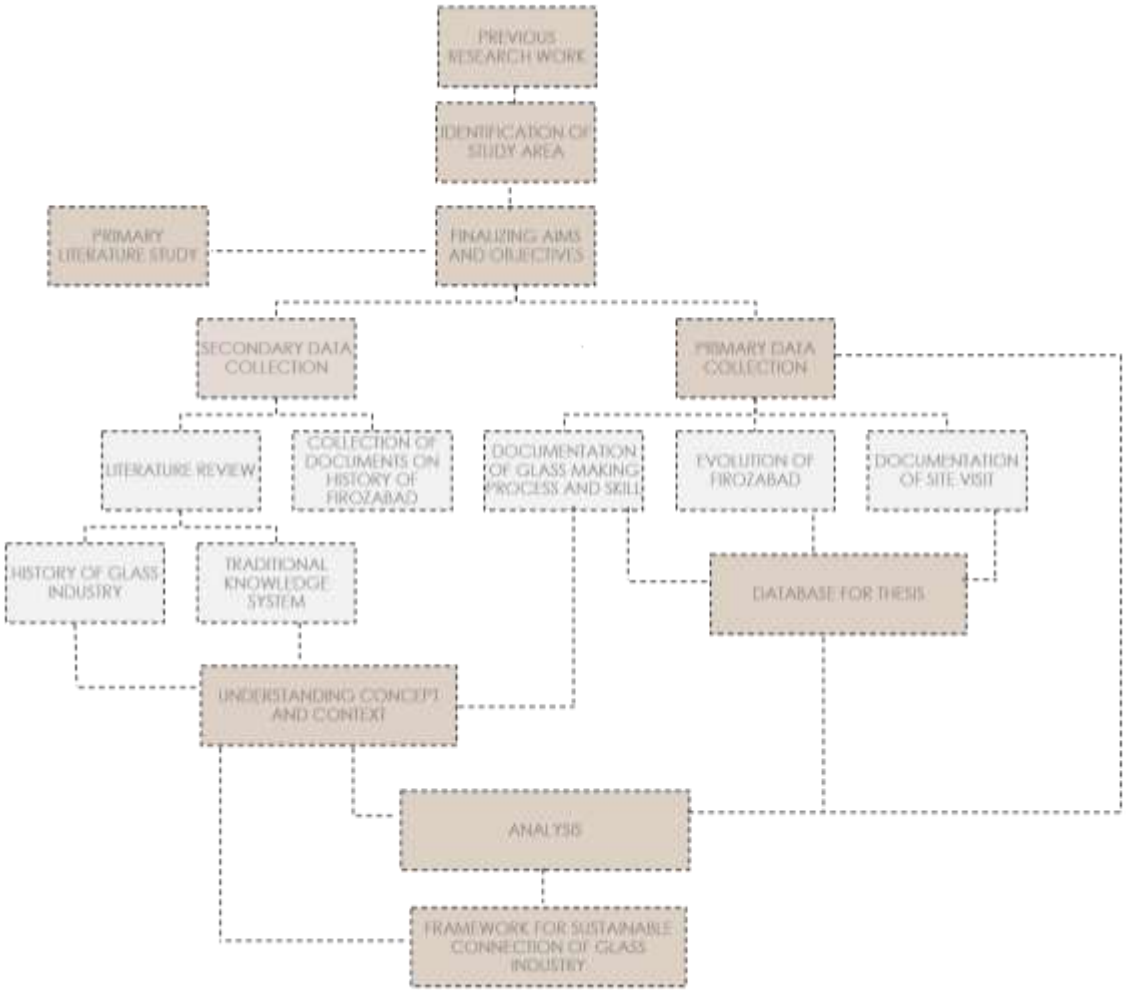



*Figure 4: Methodology*

## 1.7 EXPECTED OUTCOMES`

- Documentation of networks and connections of glass cluster via site study.
- Significance of glass industry in Firozabad as industrial heritage.
- Recommendatory framework of sustainable development of glass cluster of Firozabad.

# CHAPTER 2. LITERATURE REVIEW

| YEAR | NAME | AUTHOR | TYPE | THEME |
|---|---|---|---|---|
| 1966 | Firozabad ka pracheen itihas | Ratan Lal Bansal | Book | Detailed (assumed) history of firozabad |
| 1980 | The technique of glass making in India | Mamata Chaudhuri | PDF | History of glass making in India |
| 1980 | Prospects and problems of glass industry in India | Sharma Kailash Kumar | PDF | economical aspect of glass industry |
| 2001 | Urban history of firozabad | Anil Yadav | PHD thesis | Gave insight about industrial background of the city |
| 2009 | Intangible Cultural Heritage and Intellectual Property: Communities, Cultural Diversity and Sustainable Development | Toshiyuki Kono | Book | About ICH and its operational guidelines |
| 2011 | District census handbook 2011 | Directorate of census operation | PDF and book | Details about demographics and socio-economic data |
| 2012 | Product development program for export on glass at Firozabad | Santosh Shah | PDF | Document on glass industry of Firozabad |
| 2014 | Industrial Relations in the Glass Industry of U P | Garg, Rahul | PDF | Industrial relations with employees and modernization |
| 2017 | the socio-economic plight of artisans in the bangle industry - a comparative study of north india firozabad (glass bangle) and south india hyderabad (lac bangle) | Gunjan Sharma | PDF | To study and compare the socio economic existence of artisans in both the industries |
| 2018 | Glass apart: the story of 200 year old Firozabad's glass industry | Anushruti Singh | Article | Glass industry of Firozabad and its working conditions |
| 2018 | traditional method of attar making process, kannauj, u.p | Chandra Prabha | Thesis | Thesis on similar topic |
| 2019 | industrial heritage of central india | AJINKYA AVINASH VEKHANDE | Thesis | Thesis on similar topic |
| 2020 | UNESCO Creative Cities Network for sustainable development | UNESCO | PDF | Defines and explains UNESCO creative city network |
| 2020 | List of glass blowing tools | Working the flame | Article | Complete List of Glass Blowing Tools, Supplies & Their Uses |
| 2022 | Government of Uttar Pradesh | District administration | District website | About the city |
| 2016 | FIELD VISIT REPORT ON BANGLE FACTORY, FIROZABAD, UTTAR PRADESH, INDIA | Teri university | PDF | About bangle industry of Firozabad |

| | | | | |
|---|---|---|---|---|
| 2015 | Cluster Profile Firozabad glass industries | TERI supported by the Swiss Agency for Development and Cooperation (SDC) | PDF | Overview on glass cluster of Firozabad |
| 2010 | Glass Work of Firozabad | Sakshi Gambhir | Available in Dsource | Document on process of making different glassware |
| 2012 | Assessing the Impact of Local Socio-Cultural Milieu on Social Upgrading and Challenges to Inclusive Development of Glassware Cluster Firozabad | Nasiruddin | Research paper | Gave insight on social culture of glass industry of Firozabad |
| 2021 | OF GLASS, SKILLS AND LIFE: CRAFT CONSCIOUSNESS AMONG FIROZABAD'S GLASSWORKERS | Arnaud Kaba in collaboration with Shankare Gowda | PDF | About work culture and skill of glass industry |
| 2003 | Story of Glass in India & the World | Pankaj Goyal | Online article | About the history of glass in India and world |
| 2003 | Traditional craftsmanship | UNESCO | Available on UNESCO website | To understand more about the traditional craft and its importance |

*Table 1: List of literature referred*

The literature review of the thesis is divided in three parts as per the need of the study.

1. About Firozabad: This study is necessary to understand the context of Firozabad as study region like about the city from source like census handbook and various articles.
2. About the glass industry: Various literature sources were studied apart from site visit to understand the origin of the glass industry in Firozabad and also to understand the importance of the same. History of glass in India and world had been studied if in case it had influenced the industry of Firozabad.
3. Study of artisan's background and their relation with industry: the study is important to understand the interrelation between industry and the artisans. Not many articles were available for the same as none of them refer artisans as craft persons they were mainly referred to as local labourers.

The study of points 1 and 2 combined gave us the understanding of evolution of glass industry in Firozabad. The study of points 2 and 3 made us understand the importance of glass industry and its traditions and major knowledge gaps were

found during the same. The study of points 3 and 1 helped me to identify standards to establish my aim.

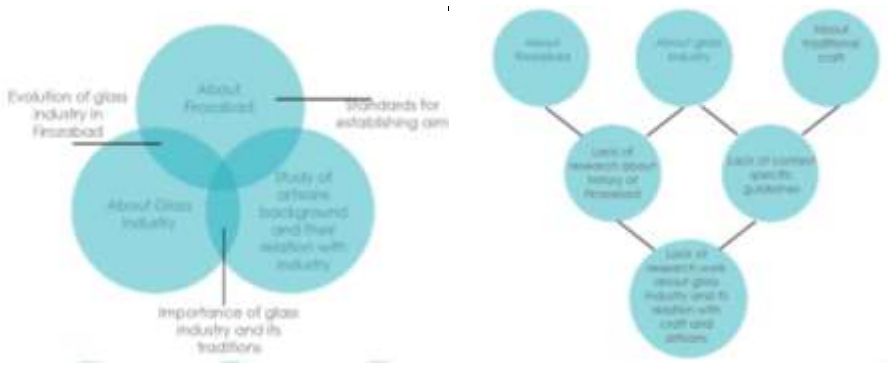


*Figure 5: Framework for literature review*

## 2.1 INTRODUCTION TO SITE


*Figure 6: Location of Firozabad*

Firozabad is Uttar Pradesh's district headquarters. Firozabad district was established on 5Feb 1989. The industry of creating glass bangles is well-known in the city. The towns of Shikohabad and Tundla are located in the Firozabad district. Tundla is situated to the west and east of the city is Shikohabad. It shares a boundary with four districts Etah, Mainpuri, Etawah and Agra. Etah district in the north and Mainpuri and Etawah in the East. Glass bangles are the primary business in the area. The river Yamuna is in the southern direction of the district. The space of the locale is about 0.8% of the all-out space of U.P. Furthermore, the population is 1.1% of the all-out populace of U.P. Around 73.6% population is living in a rural territory. It has extreme winter and summer seasons. For the most part, an area is a plane and its slope is from northwest to south. National Highway 2 passes through the city.

Firozabad lies on the south city district of state at 27 ° and 27 ° 24' (north)

latitude and 77 °60' and 90 °4' (East) longitude. To the north lies the district Etah, within the east lies Etawah and Mainpuri. Within the south there's river Yamuna and limits of Agra district and within the west it touches the boundaries of Agra district. It covers a region of 2407.0 Sq.km.


*Figure 4: Soil map of Uttar Pradesh*

Source: ENVIS centre: Uttar Pradesh

The area has land that gives rise to agriculture in the region. The soils of Firozabad are typical of these within the floodplain of the Upper Ganges. The porosity and texture of the soil provide good drainage and other favourable conditions for agriculture. Due to the influence of various drainages, canals and partly due to the presence of the Yamuna River. Flood soils remove sediments and nutrients that flow into adjacent water. They will also remove other pollutants from the rivers and improve water quality for communities downstream.

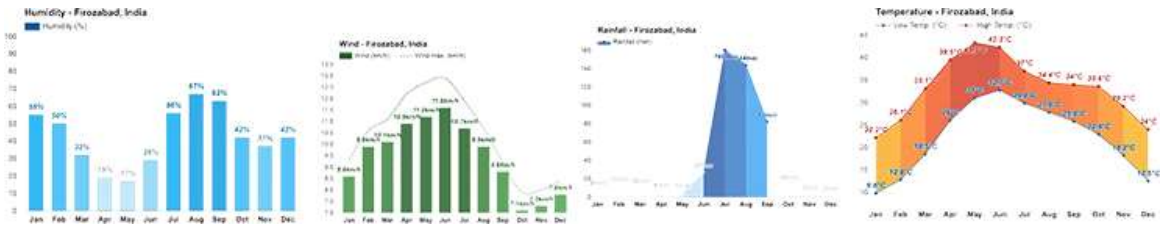



*Figure 5: Climate graphs for humidity, wind, rainfall and temperature*

Source: Weather atlas

Maximum humidity recorded within the region is 67%. High humidity ends up in veranda planning of the residences. Highest wind rate which is 11.6km/hr. ends up in courtyard planning for better ventilations. In many residences these courtyards acts as working space for whole family. Maximum rainfall is recorded in month of July which is 16omm. Thanks to not proper drainage within the area in time of year water clog is that the major issue. The most sources of irrigation are government and personal small irrigation system. Maximum recorded temperature of the town is 43.3°C within the month of June. The artisans find it really difficult to figure during this weather because the use of fireside is involved in every stage.

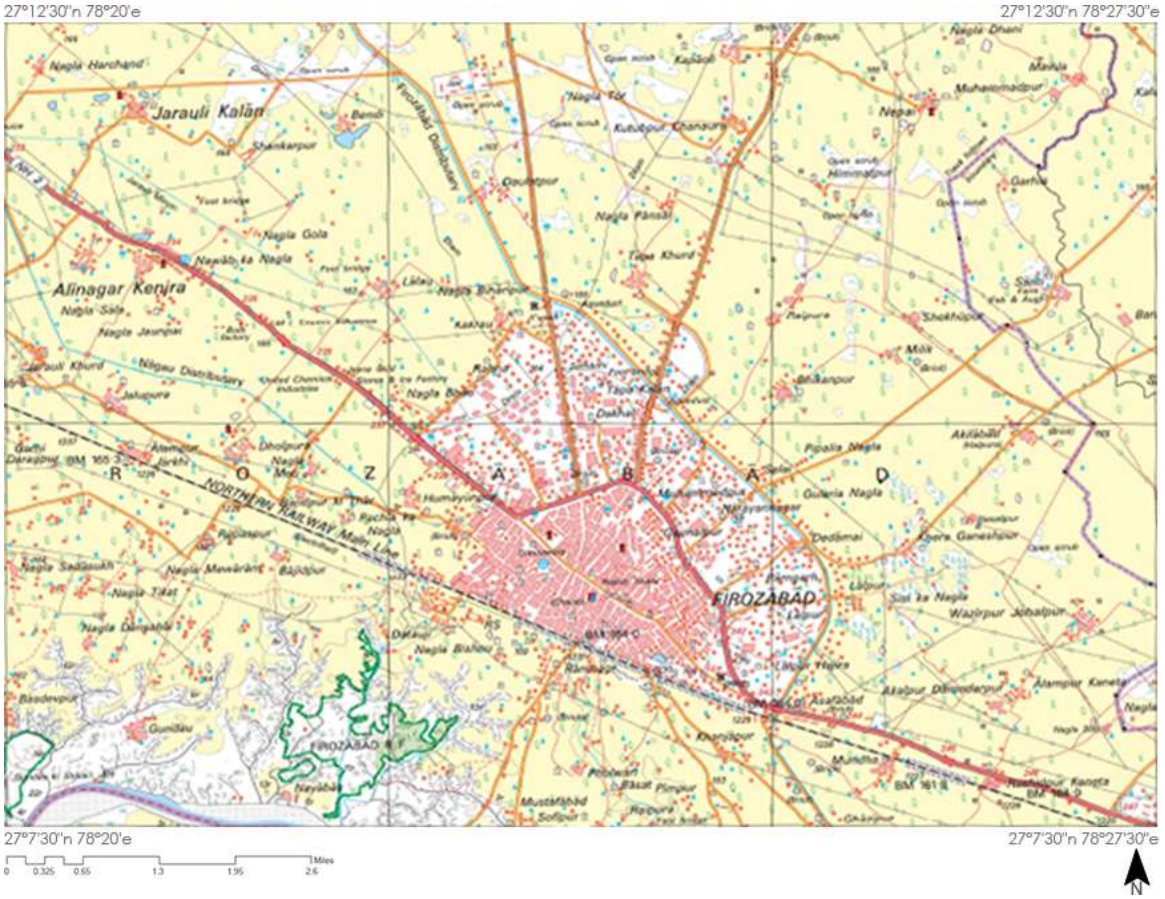


*Figure 6: Toposheet of Firozabad (2011)*

Source: Survey of India

The city is well connected with railway and bus services. Its proximity with Agra helps to flourish glass business among tourists.

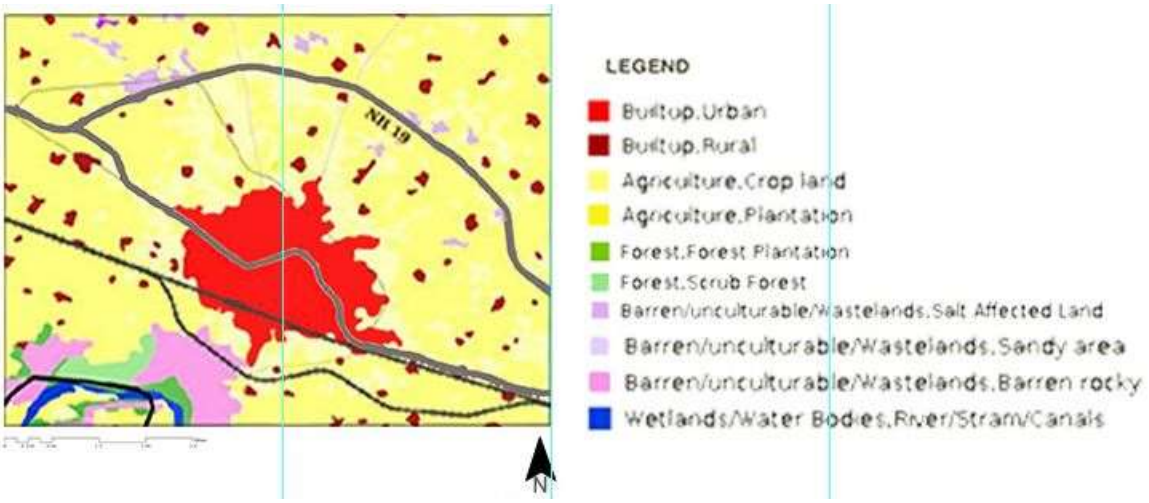



*Figure 7: Landuse landcover map of Firozabad as per today*

Source: BHUVAN

The land use of the area is majorly built-up in the core and agricultural in the outskirts with rural settlements. Rural and agricultural area covers 2344.0 sq.km and urban covers 63 sq.km from total of 2407.0 sq.km.

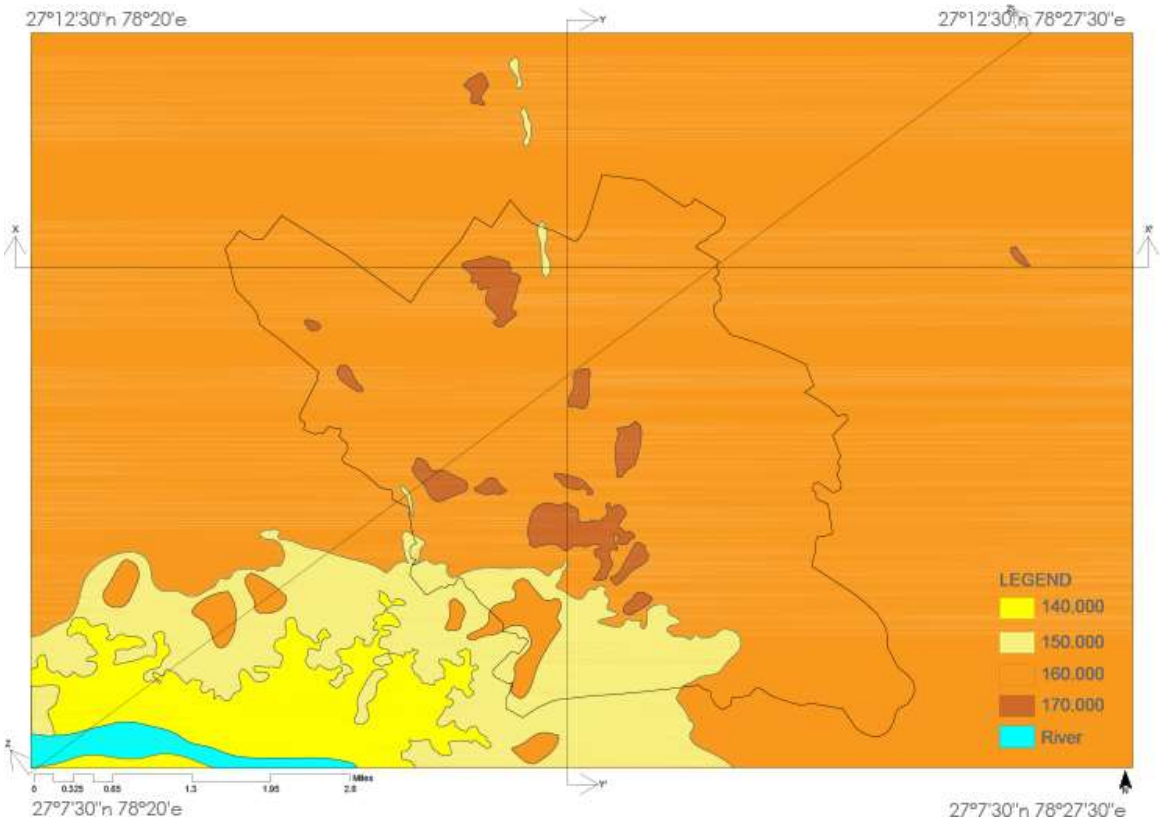



*Figure 8: Contour map*

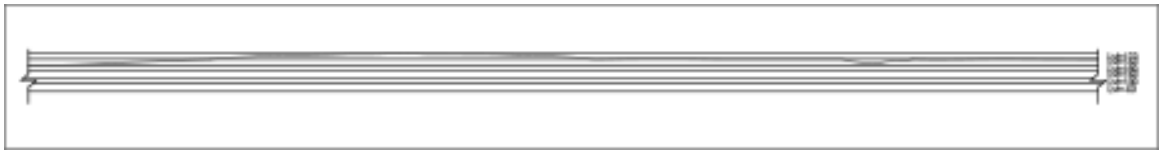


*Figure 9: Section at XX'*

*Figure 10: Section at YY'*

*Figure 11: Section at ZZ'*

After studying the contour the analysis was that the contour range from 140m to 170m and maximum area of the city is flat land. It slopes towards the river Yamuna in south. The flat land is feasible for built structures. Drainage also is according to the slope of terrain, the direction is North-West to South-East. The

flat land shows how the contours had been altered as per the demand of the land.

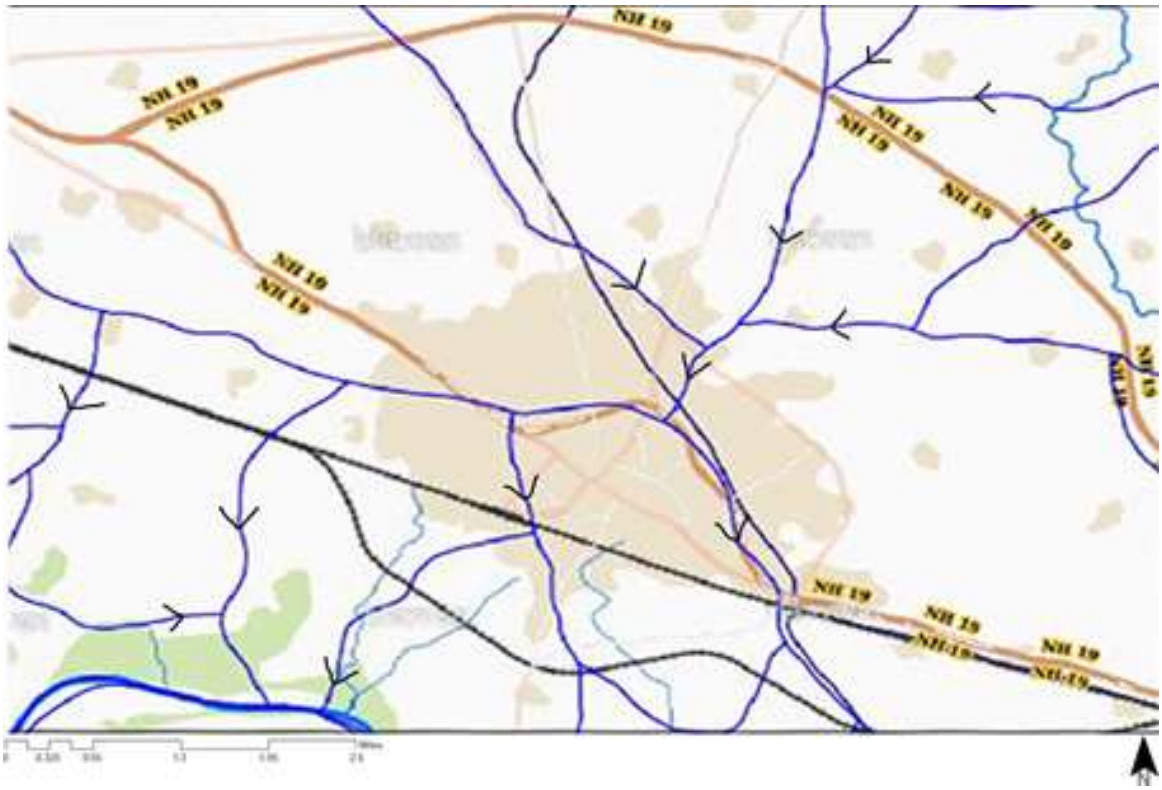



*Figure 12: Watershed map*

Source: BHUVAN

After studying watershed map it had been inferred that there are total of 18 watersheds. The flow of the water is towards the river Yamuna as studied through contours of the area. Majority of the area is flat land which lead to accumulation of rain water in certain areas within the city due to lack of slope.

The area is well irrigated by the river Yamuna and its tributaries.

Major landmarks

Jain mandir: It is made in marble and marks the entrance of the city.

Tomb of Firoz Shah: It is made in the remembrance of mansabdar[1] Firoz Shah from whom the name Firozabad had been derived.

Bus stand: It is located in the middle of the city making travelling to neighbouring cities possible for all. It has a basic local market of glass bangles and art wares.

[1] Mansabdar: Means servant in royal Mughal court

Railway station: The railway line connects the city to other cities making transportation easier for everyone.

Nagar Palika: It is situated opposite to bus stand. It manages all the municipality works.

Sadar bazaar: It was preliminary a *nagar palika* when Firozabad was announced a district and now a fully-fledged market with shops like daily use, clothing and bangles.

*Boran gali*: This is the major hub for buying authentic glass bangles in wholesale and retail prices.

*Ramleela* ground: All the social gatherings related to religion, society or festivities takes place here.

Gandhi Park: It is the only open ground accessible for everyone also known as company *bagh*[2].

*Figure 13: Jain mandir, Figure 14: Tomb of Firoz Shah*

*Figure 15: Bus stand, Figure 16: Railway station*

[2] Bagh: Means a park where people of every religion, caste or age can come.


*Figure 17: Nagar Nigam, Figure 18: Ramleela ground, Figure 19: Gandhi Park*

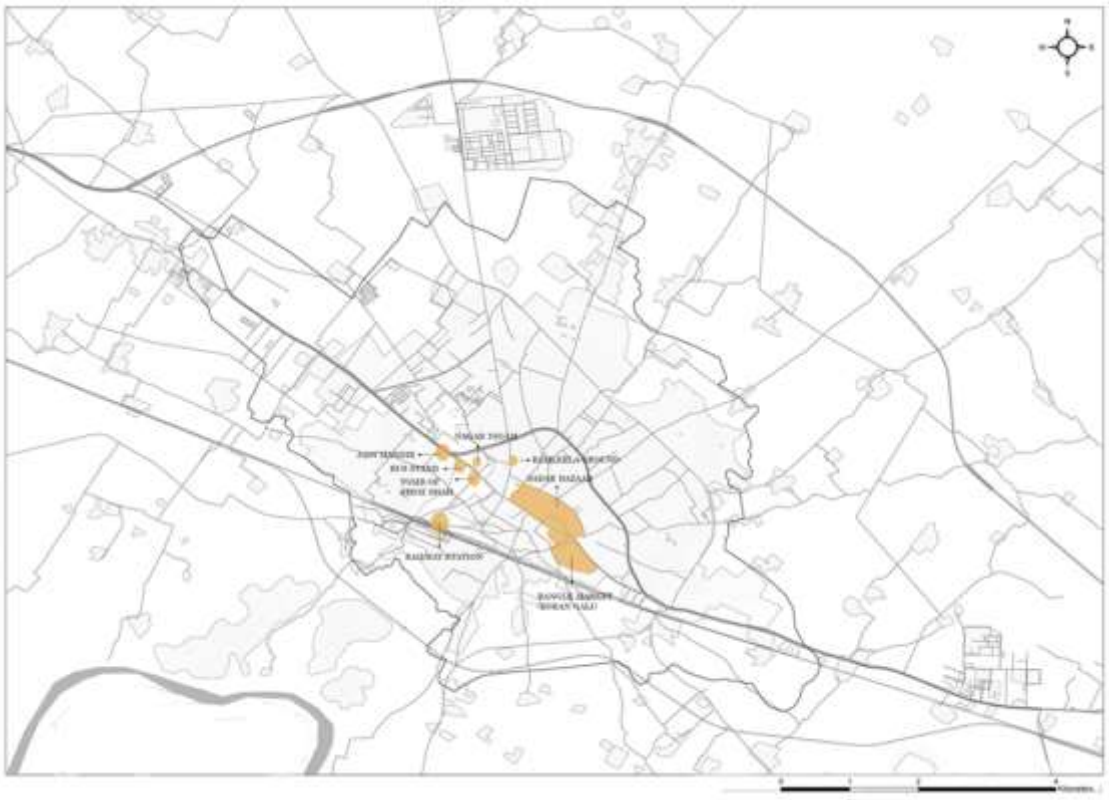


*Figure 20: Firozabad base map*

## 2.2 INTRODUCTION TO GLASS INDUSTRY

The city of Firozabad is also called the city of glass of India or the city of bracelets. The city produces a variety of glassware and related items in modified designs and styles to enhance the collection of household and decorative items. The city is one of the main producers and exporters of glass; around 50% of glass production is exported and almost 35% is exported internationally.

From the start, Firozabad was an industrial city and the most important in the Glass industry. It is one of the oldest household profession in the city. Earlier it was done without any scientific or technical knowledge. At the beginning of the 20th century, in 1900 blowing technique was introduced by Angistum, a glass technologist. The industry faced a boom after the 2nd world war. The main products are glass bangles, scientific equipment of glass and other decorative items like a chandelier, beads, showpiece, crockery etc. All these products are shipped in all the parts of the country. After some time miniature bulbs are being produced and the largest bulb manufacturing factory in Asia was set up in Shikohabad, which supplied bulbs in the entire country. Two units were set up for that manufacturing one in Firozabad and the other in Shikohabad (Hind lamps).

Other small scales industrial professions are Khadi, Engineering, Chemical, Handloom, Silk, Coir and Handicrafts. These industries get their funding from Panchayat, Industrial cooperative societies, registered establishment and private industrialists. As the city is a center of glass products. The export items consist of all products of industries established in the district. Import items include consumer goods like drugs, cotton and woolen clothes, soaps, fruits and edible items. As Firozabad is near to Agra it provides an opportunity to widen the business as Agra is a tourist hub and glass products become the attraction for them

The glass manufacturing business includes large companies, small companies and Gail units. Various glassware produced by these industries were bracelets, kada, kangans, vessels, jars, candlesticks, flower vases, decorative lights and more. Handicraft glass products and household glass products are the types of glass items produced in the glass companies of Firozabad. Show business uses natural gas as fuel. Glass blowing is done via pot heating and glass displaying is done via regenerative tank heating.

Glass industry units can be classified in 3 categories

1. **Household units:** these units are basically run by family members who use basic machines and tools to decorate and make various glass products. The strength of the units is basically 3 to 4 craftsperson per unit. These units are spread all over the city in a number of approx. 4000.

*Figure 21: Household units*

2. **Pot furnace based units:** There are almost 130 to 140 pot based furnace setup. Bangle production is the main production from pot furnace. It require 70-100 people on daily basis mix of permanent and daily wages workers who produce unfinished bangles which are later send for joining and decoration units.

*Figure 22: Pot furnace*

3. **Tank furnace based units:** These are larger than pot furnace based units. Products which are manufactured are tableware, containers and scientific items (relatively larger products). There are almost 40 to 50 type of tank furnace based setups. It require 100-150 people which are majorly contract based for a longer period of time.

*Figure 23: Tank Furnace*

## 2.2.1 Stakeholders

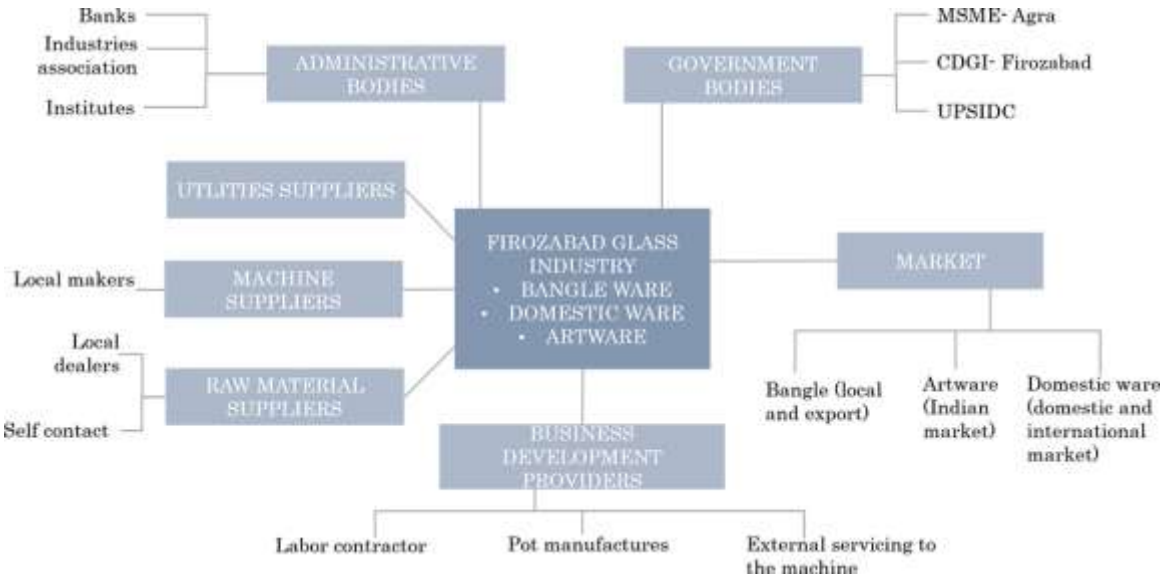


*Figure 24: Types and sub categories of stakeholders*

**Government bodies:** MSME DI, Agra, District Industries Middle, UPSIDA and Uttar Pradesh Pollution Control Board are the key government institutions responsible for stimulating the development of glass enterprises in Firozabad and ensuring that the industry meets contamination control standards. These bodies are responsible for implementing and executing various central and state plans.

**Business development providers:** A number of business development vendors can also be seen in Firozabad meeting the furnace planning and construction needs of these clusters. In addition to these cookware and stove manufacturers, there are many temporary workers available who can help glass units get contract workers on demand.

**Raw material suppliers**: Local merchants and wholesalers supply raw materials such as quartz sand, soda ash, calcium carbonate and other chemicals and dyes to Firozabad glass factories. The fiery pop residue comes mainly from Gujarat while the silica sand comes from Rajasthan. Chemicals and pigments are often imported from the international market. Some large containers and cutlery units also get the raw materials directly from the essential supplier.

**Machine suppliers:** Machines and tools for manufacturing goods are exported directly from suppliers across country or local suppliers in the city.

**Utilities suppliers:** basic utilities like cleaning staff and pantry staff are supplied from within the city.

**Administrative bodies:** The nationalised banks within the clusters meet the majority of cluster financing needs. Almost all of the major nationalised banks have branch offices in Firozabad and provide financing to the cluster unit.

## 2.3 HISTORY

### 2.3.1 History of glass around world

Harappa: In 3000BC evidences of beads and bangles were found.

Egypt and Eastern Mesopotamia: In 2500BC evidence of blue colored glass in lumps was found.

Mesopotamia: In 1600BC earliest glass manmade vessels were found during early Bronze Age.

China: In 550BC Chinese made glass out of rocks containing quartz and it was established that glass of indigenous manufacture was in use.

Babylon: In 250BC glassmakers developed new technique that molten glass can be blown into new shapes which made glass vessels production easy.

Phoenicia: In 50BC they used glass to create art.

Europe: In 100AD expansion of art of glassmaking in Roman Empire and spread throughout Europe.

Europe and UK: From 900 to 1000 stained glass flourished.

Sussex, England: In 1226 Broad sheet glass was producing.

Venice: In 1271 Venice had become the major center for making glass.
France: In 1330 glassmakers produced crown glass in Rouen.

Netherlands: In 1590 glass telescope and microscope lenses started to manufacture.

Virginia: In 1608 American's first glass house was found by settlers in Jamestown.

London: In 1620 blown plate glass was first manufactured.

London: In 1678 crown glass was produced.

France: In 1688 polished plate glass was first produced.

British: In 1847 James Hartley introduced rolled plate glass used commonly in design of extensive glass roof like for railways.

France: In 1903 Edouard Benedictus invented laminated glass.

Belgium: In 1913 flat drawn sheet technique were first introduced.

Uk: In 1938 Pilkington a Japanese based company incorporated double grinding process

US: In 1950 Ford established a glass research center as glass science became major research discipline

Around the world: Till 2012 a new type of ultra-thin glass has been developed which can wrap around devices and is as thin as sheet of paper.

## 2.3.2 History of glass in India

There are mention of glass specimens (beads, bangles, vessels and miscellaneous objects) are at places like

**Hastinapur** - 11th to 15th century. Colourful opaque and translucent glass.

**Rajghat**- 6th to 5th century B.C. Polychrome glasses.

**Patna**- 6th century B.C. to 17th century A.D. Glass beads.

**Kumrahar**- 2nd century B.C. to 18th century A.D. Variety of glass objects translucent and opaque.

**Antichak**- 1300-1500 A.D. Green glass.

**Eran**- 16th century to 18th century A.D. Glass bangles.

**Sirpur** (glassmaking centre)- Variety of bangles, thick rods of 2-3 cms, brandy and amber coloured glass was made for bracelets and base plates on which dull opaque green and blue colour design were made. Dark leafy green, amber, purple and translucent green were the major colours used for making bangles and bracelets.

**Maheshwar and Navdatoli**- c. A.D. 100-500. Glass beads, bangles (polychrome and monochrome, discs, seals, pieces and slags etc., in many shapes.

**Nasik**- 500B.C. to 1875 A.D. Glass beads, bangles, rings and other miscellaneous objects. Green, blue and white is most found colour there.

**Kolhapur** (glassmaking centre) - 1435 A.D. to 1518 A.D. Beads, bangles and rings in different shape and sizes.

**Nevasa** (centre of glass industry) - 1700 A.D. Beads and bangles in many colors like green, blue, yellow and red.

**Kancipuram**- Medieval period. Beads and bangles.

**Ahmednagar**- 1590 A.D. Green and bluish glass flasks with some bowls and wine-flask.

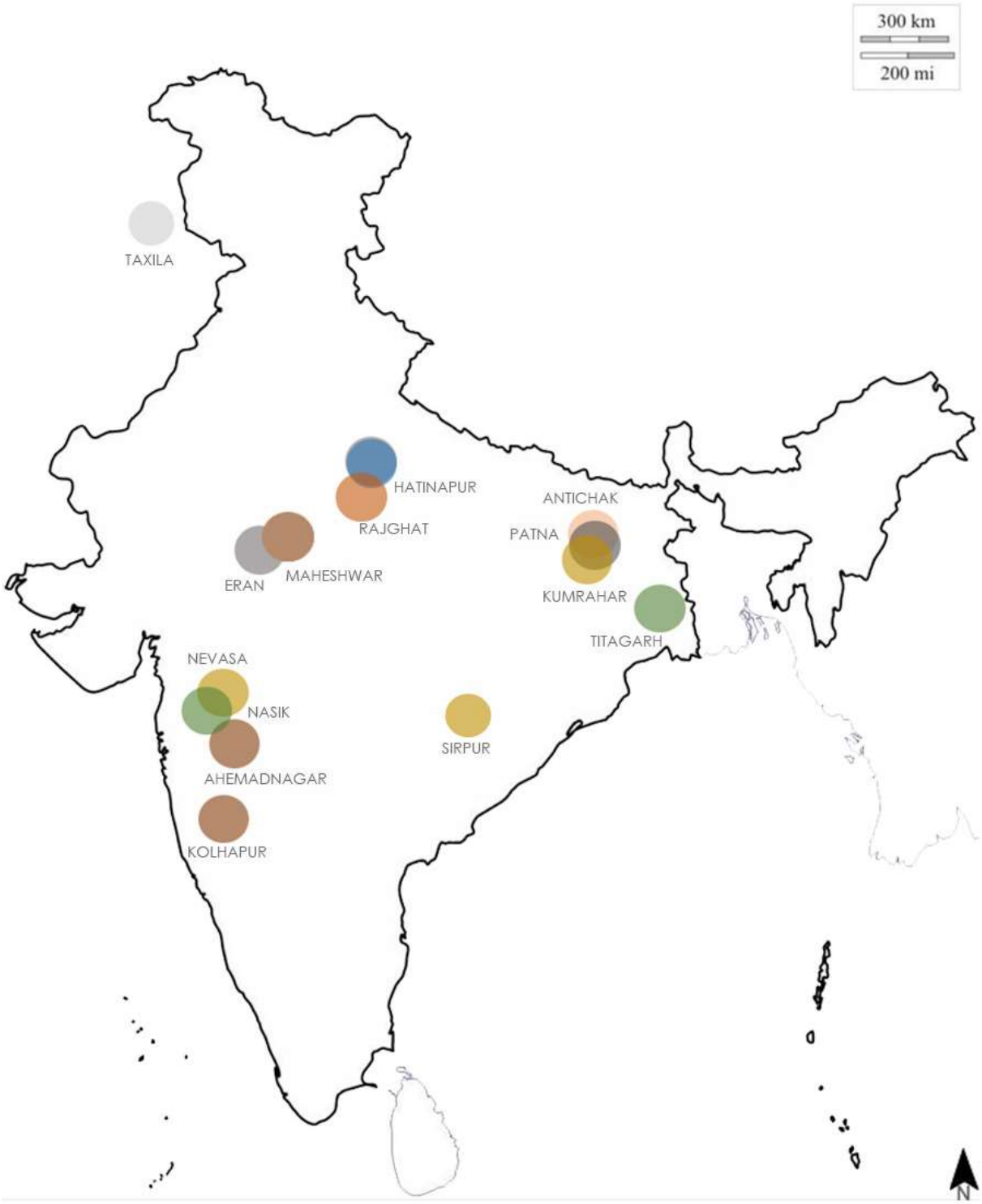



*Figure 25: Map marked with all the locations*

## 2.3.3 History of Firozabad

### Firozabad before 16th century

Firozabad was a combined land of 7 villages which were Rasoolpur, Mohammad Gazamalpur, Sukhmalpur, Datauji, Akbarabad, Pempur and Jahanpur. The glass was then produced by locally available sand called 'reh'. For which they first dig a pit of approx 3feet and fill it water then the water is left for evaporation which gives a matter in a crystalised form which is then melted in locally made bhatti called 'bhainsa bhatti'[3]. The glass obtained from that was used to make bangles called *kadechhal ki chudi*[4]. These bangles were made by fixing the axe and drawing wires and making spirals on the handle of the axe after cooling down the spirals they were cut and join on the burners. The major manufacturer of glass involves bangles.

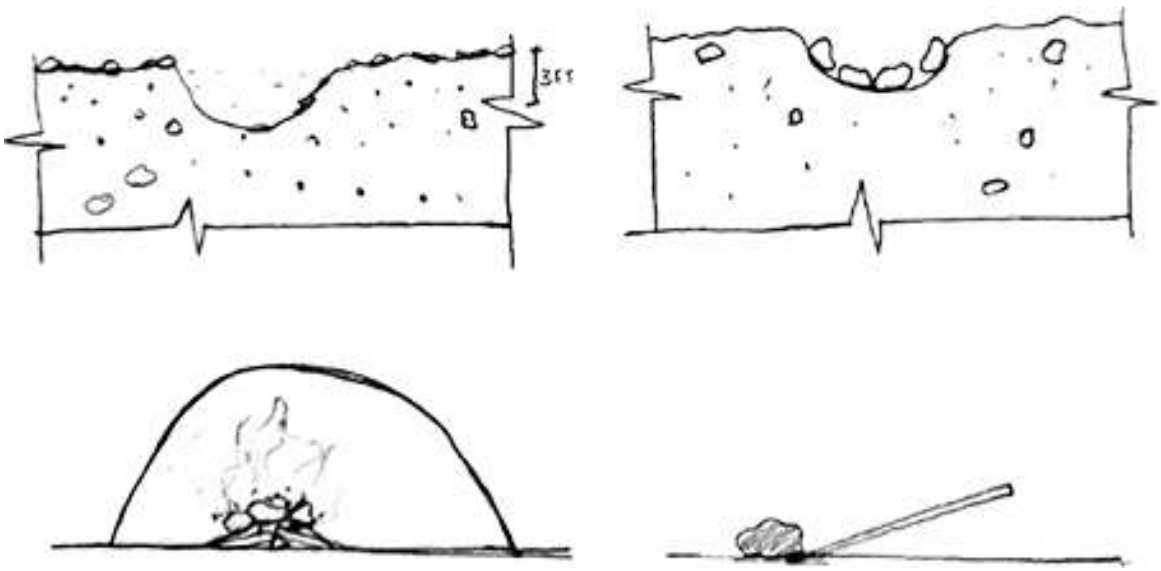


*Figure 26: Process of making glass*

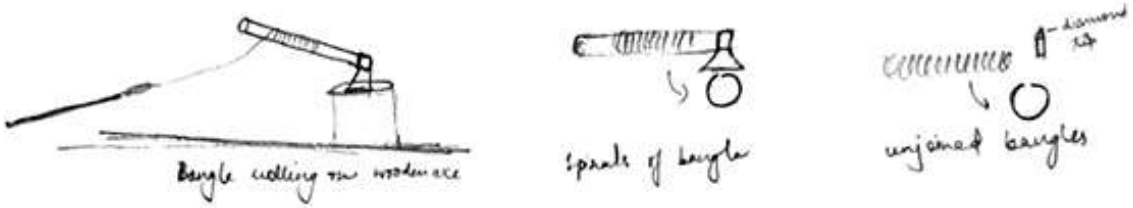


*Figure 27: Process of making bangles*

**Firozabad in 16th and 17th century**

[3] Bhainsa Bhatti: homemade kiln to mix and milt glass components
[4] kadechhal ki chudi: bangle made of mixed components (raw material)

Firozabad was barren land until Akbar reign. Akbar started to rule Agra from year 1556 to 1605.5 He was a Muslim ruler whose ruling territory involved Fatehpur Sikri, Edmatpur, Firozabad, Farah, Jalalabad, Fareednagar, Talihar, Akbarpur, Jalalpur, Kisanpur, Mughalsarai and Islamabad Nagar.

It was when Raja Todarmal in 1566 who was minister in Akbar's court travelled to Gaya for religious purpose and while returning he was clean shaved and stayed in Asifabad (small village) where he was looted by residents of the place as they could not recognize him. When he returned to Agra he informed same to King Akbar he then sent one of his trusted servant (mansabdar) Firoz Shah who destroyed Asifabad. Later some villagers gathered and plead to Firoz and explain their state of living with no food or homes he then decided to develop Firozabad on barren land. This land was part of villages whose evidence could not be found today. Those villages were then known as Rasoolpur, Md. Gajmalpur, Mizamabad, Datauji, Akbarabad and Raipura. Firozabad is mentioned in Akbar's boundary of rule in Agra. Before Akbar Babur had visited the area but name of Chandwar could be found in his autobiography "Tujka Babri" not Firozabad so this became more evident that Firozabad only existed after Babur. The mark of Firoz Shah being in Firozabad is Tomb of Firoz Shah where his remains are grounded. The agriculture could flourish in the region easily because of availability of water from the river Yamuna. The development of small residences were done with major economical source of agriculture. After the demise of Firoz Shah in 17th century his tomb was made in memory of all the work he had done and name Firozabad was marked as permanent name of the place.

Sher Shah Suri rebuilt the Grand Trunk Road in the 16th century, which ran from Sonargaon in Bengal to Lahore in Punjab and then to Multan. It was built to facilitate exchanges between cities. Agra was connected to Sonargaon to the east and Multan to the north and west via Lahore and Delhi, while another road connected the capital with Borhanpur to the south and Jodhpur to the southwest. These roads eased communication, aided trade and commerce, and allowed armies to be dispatched quickly from one location to

another. The road also aided the Sultan in keeping a robust spy apparatus in place and establishing efficiency postal department. During the colonial period, the road was upgraded and extended up to Peshawar, and it was dubbed Grand Trunk Road. This road, presently known as National Highway 2, runs through Firozabad. Uttarapatha was the name given to the Grand Trunk Road in ancient India (means northern route).


*Figure 28: Grand trunk road from Kabul to Kolkata* (Firozabad marked with circle)

**Firozabad in 18th century**

In 1737 when Firozabad had been developed enough, a part of it was looted and burnt by a part of Bajirao Peshwa's army who were crossing the region. During Scindia's reign in Gwalior in 18th century his trusted fellow D Vayan came to city and started Neel (flower use to colour clothes) farming which had been in region for quite a long time.

**Firozabad in 19th century**

During the rule of Britishers a resident of Firozabad Chaubeyji helped British army and East India Company in many ways for which he got rewarded 10acre of land in East of Firozabad signed by Sd. R. Canyngham (then collector). In 1833 Firozabad was taken into the territorial boundary of Agra.

Railway was introduced in India in 1853 when first train travelled for 34kms from Bori Bunder (Bombay) and Thane. Firozabad was industrial hub since a long

time and after a time water transportation became very difficult that's when in year 1862 railway introduced in Firozabad and very first train travelled between stations of Tundla and Shikohabad. In year 1863 it expand to Tundla to Aligarh and growing since. The station also had a massive store area where imported items use to store before it came into market. In year 1868 firozabad had its first Nagar palika.

*Figure 29: Railway storage from 19th century*

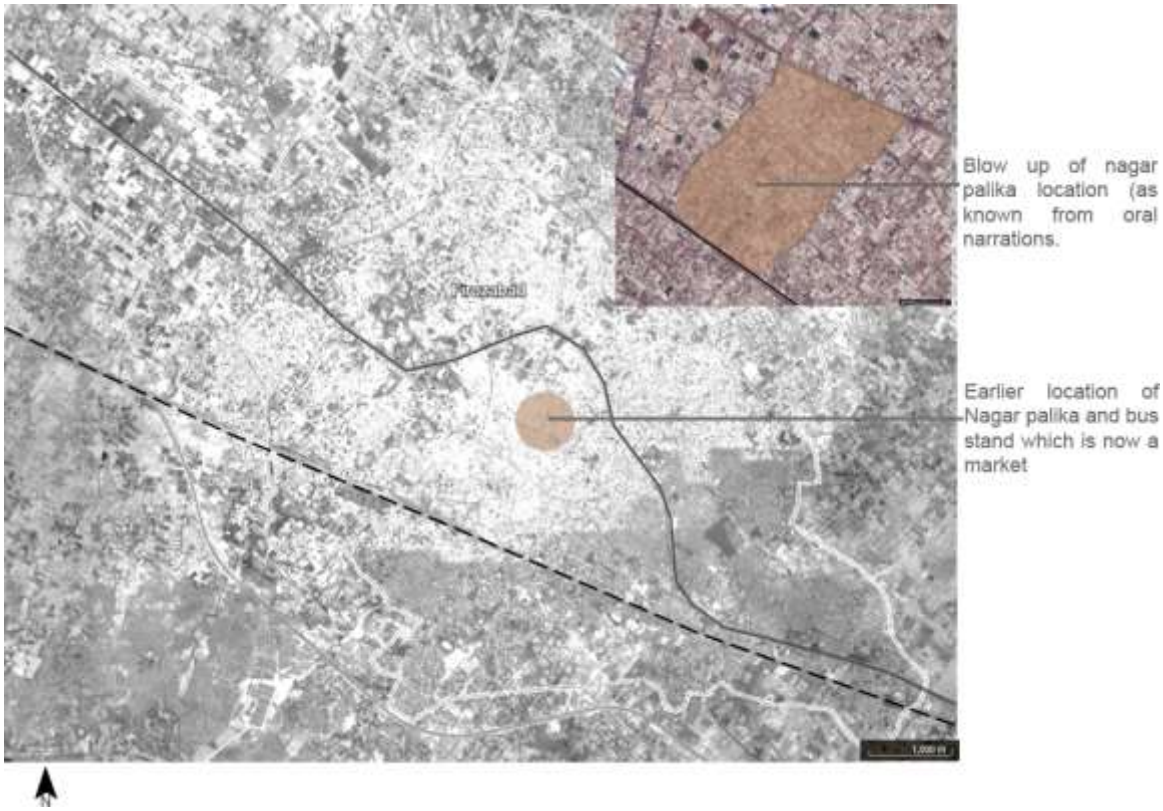



*Figure 30: Nagar palika earlier location*

**Firozabad in 20th century**

Before year 1920 Firozabad was into the farming, import and export of bamboo and neel. After 1920 glass came to Firozabad. Firstly final products were

imported later some labor class clan started collecting broken glass and started melting it into their homes and made bangles out of it which was easiest to cast and later it gave shape to town and started to be known as Suhag Nagari and its connection to Agra which is a tourist hub made these items flourish and grow till now. Firozabad was counted as tehsil under the district of Agra until 5th Feb 1989 when it is announced a separate district with Firozabad, Jasrana, Shikohabad, Tundla and Sirsaganj tehsil Agra.

There had been some known writers from Firozabad which gain popularity nationally and internationally. Those writers are Shree Brahm Gulal ji, Bodha Kavi, Kavi Tikaram, Shreethar Pathak, Shree Satyanatayan Kaviratha, Pd. Banarasidas Chaturvedi, Shree Brijmohan Bhatnagar, Shree Ratan Lal Bansal, Shree Phool Singh Sharma, Shree Umesh Joshi, Pranav (pen name), Shree Ram Prakash Jain, Mir Akbar Ali, Munshi Jagan Kishor, Hazrat Mirza, Hakeen Nausa, Shree Anjum Ansari and Shree Mathura Prasad.

**Human settlements in Firozabad**

Human settlement is a group of homes of various types and sizes where people live. People may build houses and other structures for this purpose, and control a place or place as their basis for economic support. As a result, the housing settlement process involves the mobilization of people and the allocation of land as a resource base. The size and type of accommodation varies. They vary in size from hamlet to large cities. The economic character and social structure of settlements change as they grow in size, as well as their ecosystem and technology. Residences may be small and spacious, or they may be large and closed together. Villages have vacancies for young people focusing on agriculture or other basic activities. Urban settlements, on the other hand, are smaller but larger settlements focused on secondary and tertiary education. Administrative cities and towns, industrial cities, Transport cities, commercial cities, mining towns, towns of Garrisson Cantonment, educational cities, religious and cultural cities, and tourist cities of all kinds of Indian cities and towns.

Firozabad had developed in parts. It was agricultural land at first. Later when people started settling in the town it wasn’t a planned manner. Big houses with

narrow lanes with close neighborhood concept due to which people felt safe. People started settling as per their caste and culture. There are three colonies which are developed when Pakistanis returned they settled their. Punjabi hindu settled in a common area and named it Arya Nagar and Punjabi Sikhs settled in area and named it Nai Basti and some sindhies settled in Mahaveer nagar.

Some colonies developed for Kanjar tribe and they settled in three parts of the city and named them as Kanjar house, Giihara Adivasi Nagar and company bagh. During colonial authority, the Kanjar tribe was labelled as a criminal tribe. By prostituting their women and engaging in a number of other unlawful and illicit activities, the Kanjars developed a bad reputation among their peers. By choosing to worship Bhavani and the goddess Prabha, they have gained a poor reputation in God's sight. They also use the abilities of Syaanaa, a "protector-exorcist," to keep evil spirits at bay, and pay honour to their ancestors through prayer and the use of alcoholic beverages on a regular basis.6 People from nearby villages saw opportunity to grow in Firozabad hence migrated to different areas as per their comfort. Yadavs came later and settled in two colonies names them Kotla muhala and Yadav nagar.

When schools, colleges and institutes opened government made a labor colony which include people from service sector like hospitals, school, market and parks. The first planned colony is Vaibav Nagar with all the facilities within like water, electricity and wide enough roads and planned plot area. Seeing positive response from this colony other colonies like suresh nagar, ganesh nagar, jain nagar, monapuram and gopal nagar were developed. Total of 41 colonies were settled on the names based on religion or name of some important person.7

Population count of the city had seen a good rise over years in 1847 (11782), in 1853 (12674), 1865 (13163), 1872 (14255), 1881 (16023) area was 766 acre, 1891 (112153), 1901 (15849) and now 2818698 and area 583662.9 acre.8

[6] Joshua Project, 2021.
[7] Anil Yadav, 2001
[8] Tehsil, Firozabad

Apart from Firoz Shah there were other people who played major role in evolution of city. Those important people are:

- Chaubey Radhamohan who had lands in east of Firozabad. In remembrance of him Mahula Chauvana (area gifted to him by British officers) and chaubeyji ka bagh were made.
- Thakur Radheylal JI was one of the zamindaars, installed some green spaces and later became the member of Nagarpalika and work in favor of city.
- Seth Amrit Lal ji also known as Raniwala parivaar. He was follower of Jainism and his main inputs were in business sector. Raniwala ki jeen (jain temple) is still present.
- Seth Ramchandra Kanhaiyalal was marwadi businessman who had contacts from Khurja and Calcutta whch helped a lot in the economic growth of town. He also established a degree college in 1919 known as SRK Degree College which got established over time but original structure can also be witnessed. He also established Madha Glass work factory which became the reason for employment. Dwarkadhish temple was also constructed under his supervision, as he was follower of Krishna ji. The biggest festival of the town Ramleela was originally his idea and it is celebrated today also and the ground associated with the festival is called Ramleela ground.
- Seth Chadamilal Jain started biggest glass work factory in 1928 which got recognition across globe. He later started a trust on his name Shree Chadamilal Jain Trust for betterment of the city. He wanted to create a religious culture in city for that he acted upon to make a Jain temple in white marble in 1976. The temple has 7’ seating position Mahaveer statue and 47’ Bahubali statue in standing position which was marvel of that time. Temple also have *dharamshala* which is open for everyone to stay and rest and the beautiful water structure and landscape adds a beauty in the whole temple compound. He also contributed in opening a hospital and college (Chadamilal Jain Degree College). A clinic for free medication and checkup was also opened which is run by his heirs now also.

- Some other contributors were Babu Rai Kishor ji and Vohre Ghasiram ji.

Firozabad had diversity of religions which are Hindu, Jains, Muslims, Sikhs and Christians (very less in number). Some important religious structures included for Hindus Hanuman mandir, Radha Krishna Mandir (1900), Dwarikadish mandir, Hundawala mandir, Bihariji mandir, Satya Narayan mandir, Dauji mandir, Govardhan Nath mandir and Shri Ram Chandra mandir. For Jains Attawala mandir, Chandraprabhu mandir, Bada mandir (adinath), Katra mandir (chandraprabhu), Chapeti mandir (adinath), Chadami lal Jain mandir (mahaveer), Swetambar Jain mandir and Raniwala mandir. For Sikhs there is one Gurudwara at station road. For Muslims there are Idgah, Tomb of Firozshah, Jama Masjid, Sufi sahib ki mazaar, Shahi Masjid and post office Masjid

## 2.4 ANCIENT TECHNIQUE OF MAKING GLASS

There are a variety of tools and techniques used in glassmaking. Techniques of the preparation are modelling, moulding, blowing, annealing etc. The steps of making glass are:

### Raw material

Some raw material used can be divided into two parts, fundamental constitutes and colouring agent with miscellaneous additions. The fundamental constitutes comprise of the most commonly used in glass soda, lime and silica which is later moulded. For colouring glass appropriate metallic oxides were used in combination with fundamental constitutes. To remove any tinge from glass colouring agent like manganese dioxide, nickel oxide and selenium are used which produce a complementary colour.

### Chemical analysis

The presence of lead oxide and barium oxide is found in many glasses. The presence of lead gives rise to the formation of crystal glass and barium which imparts glass of high resistance to heat. The presence of $SnO_2$ and $Sb_2O_3$ in some specimen from Taxila suggests that Indian glassworkers were also aware of the use of these chemicals as an pacifying agent.

### Furnace, oven

The glass was made in an open kiln which was usually a circular oven of 2'-6' in diameter with 1'-7' in-depth and is made of burnt clay. The surface of the oven is plastered with mud. The solid fuel was used in the oven and clay pots were used for melting.

### Glass pots and muffles

It is coated with a mixture of sand and clay and these pots were used for melting glass. This plate was mainly used to seal up the furnace. Same plates in cement are still used in many parts of the country. It is a thin pottery plate that is 4.17in. In diameter and 02.in. in thickness. When assumed closely this was verified that laterite clay was used to make them and felt like a stone-like body.

### Modelling

In this process, glass is fused in clay and then allowed to cool down later defective parts were removed and chipped off. After many processes, the surface is smoothened and the inner clay mould is then removed. This technique was a fail for large vessels.

### Moulding

This technique was long known as clay and metal go through the same stage, which was later adopted for glass. During the glass it was noted when cooled down it took the shape of the vessel it was kept in then this technique started which came out to be no different from metal and clay.

### Blowing

This was the next development in the field of glassmaking. In this process, liquid glass is blown in the mould to take a shape later free blowing style took place. It was a natural process. Later mould and shaped glass liquid are fumed in heat and pressure.

### Inference

The city's craft work has received little attention in literature. When it comes to the glass industry, a global description of the bangle production process, child labour, pollution, and health hazards have all been discussed. Nothing supports the story of a craftsman and an artisan, or how industries and artisans are interdependent on one another. Almost all the articles mentions artisans or craftsmen as labourers. The art behind curating the products are not touched any literature.

# CHAPTER 3. THEORITICAL FRAMEWORK

## 3.1 INDUSTRIAL HERITAGE

Our cultural heritage includes industrial heritage. It depicts the evolution of industrial technology, changing production processes, and working conditions, as well as aiding our understanding of society's history and growth in general.

The industrial heritage includes not only remnants of the Industrial Revolution, but also traditional precursors from previous centuries, reflecting increased technical specialization, increased production capacity, as well as distribution and consumption beyond local markets, all of which are characteristics of the rise of industrialization. It also includes the social and spatial archaeology of workers' and landlords' apartments, villages, schools, churches and chapels. In the face of deindustrialization, industrial heritage also includes the planning, policymaking and rehabilitation needed to manage these relics.

The earliest intact industrial heritage in Estonia and Latvia dates from the 18th century, when the two republics were under Russian rule and the privileged Baltic German aristocracy controlled important industries and land holdings. The right to participate in commerce belonged to the manor lords in the countryside, and the guilds and businesses in the towns.

Historic factories, water towers, mills, trains, lighthouses, and other buildings from that era, as well as historic papers, are examples of industrial legacy today. Industrial history tourism is becoming more popular, and it's a great way to preserve and showcase ancient manufacturing facilities, equipment, and skills.

## 3.2 TRADITIONAL CRAFT

Traditional crafts are perhaps the most obvious expression of intangible heritage. On the other hand, the 2003 Convention covers more skills and knowledge required for crafts than crafts themselves. Instead of focusing on the conservation of handicrafts, conservation work should encourage artisans to continue to produce handicrafts and pass on their skills and knowledge to others, especially the community. Traditional handicrafts,

costumes and jewellery, costumes and accessories for holidays and performing arts, storage containers, storage items, transportation and protection, arts and crafts, musical instruments and household items, entertainment and reading toys. Many items, such as those made for holiday ceremonies, are used only for a limited period of time, while others are passed down from generation to generation. Craft skills range from delicate and delicate tasks, such as making paper candles, to making sturdy baskets or thick blankets.

As with other forms of intangible cultural heritage, globalization poses great challenges to the preservation of traditional crafts. Whether it is a large multinational corporation or a local industry, production can often meet basic needs in exchange for lower goods or services and production costs, manual production. Many craftsmen are struggling to adapt to today's competitive environment. Environmental and climatic pressures also affect traditional crafts, as deforestation and land reclamation reduce the availability of important natural resources. Large-scale expansions, whether or not traditional crafts are produced, can have a negative impact on the environment. Adolescents in the community find the long apprenticeship required to learn many traditional crafts too difficult and prefer to work in a factory or industry that does not require labour and offers high wages. Many craft traditions contain "trade secrets" that cannot be taught to strangers, but if relatives or community members are not interested in learning, sharing knowledge with strangers is unconventional and can be lost. As with other types of intangible cultural heritage, the purpose of conservation is to pass on to future generations the knowledge and skills associated with traditional crafts, ensuring that the craftsman continues in the community, ensures the survival of its creators and demonstrates creativity.

Many craft traditions have long-standing training and apprenticeship systems. Providing financial incentives for students and teachers to make education more attractive to both parties can be a proven way to strengthen and strengthen these systems. Local and traditional craft markets are consolidating and new markets are emerging. In response to urbanization and industrialization, many people around the world

appreciate crafts that offer a gentle alternative to the many "high-tech" items that dominate global consumer cultures, infused with the knowledge and cultural values accumulated by artisans.

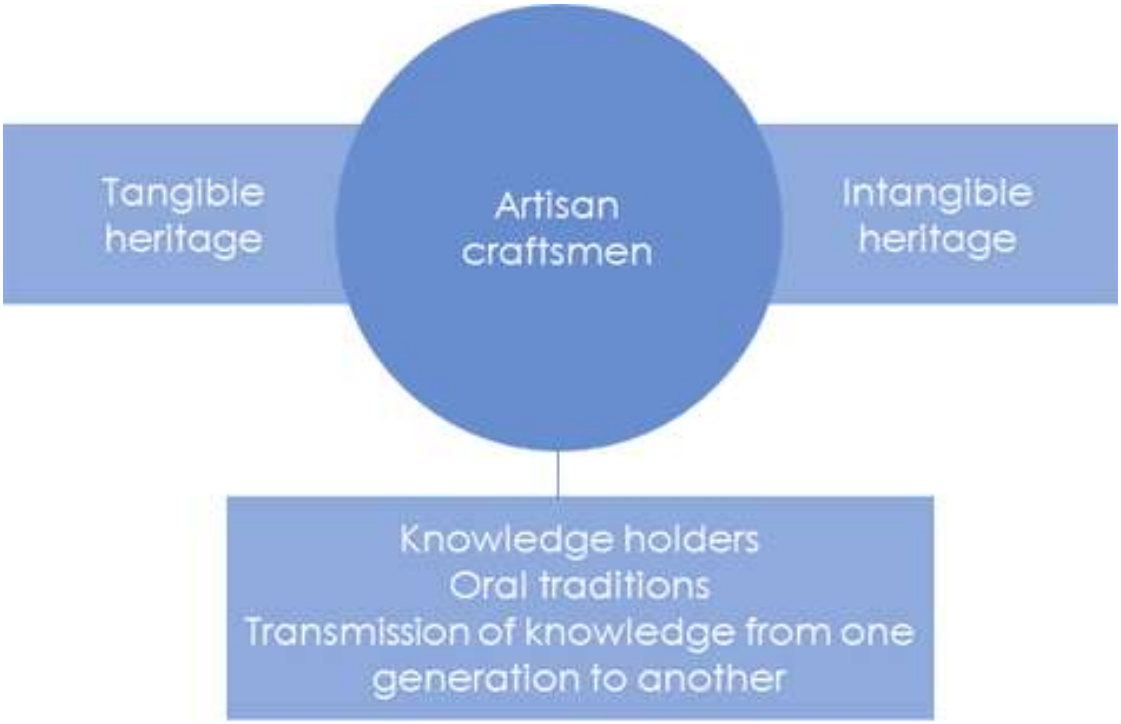



*Figure 31: Relationship between artisan and craftsmen with their knowledge*

## 3.3 CASE STUDY


Figure 88: Location of Venice, Italy on world map

Venetian glass is a glass factory made in Venice from the 13th century to the present day. The guild of Venetian glassblowers dates from 1224, but the oldest surviving examples date from the middle of the 15th century. Consequently, the

early history of Venetian glass is largely speculative. The greenhouse above the lagoon is said to have been moved to Murano (see) and has remained there ever since. In 1204 the Crusaders conquered Constantinople, and in 1453 the Ottoman Empire brought a wave of Byzantine glassmakers to Venice. Thus, Venetian glass, like many other artefacts in the city, belongs to the city of trade decline in the sixteenth century, not a world power. The efforts of the fifteenth century focused on the development of crystal-clear glass, which resembled the shape of the crystal. In the 16th century, the smoky natural shades of all raw metal glass were dominant in the methods of staining and discolouring transparent glass. Enamel and gold plating were also popular methods. These secrets were kept strictly, and the fugitives were severely punished. The 16th century vases were made using the millefiori technique, an ancient method of gluing different coloured glass rods to form tiny beads like many coloured flowers in one piece. A method used to imitate agate, marble and other stones, and milk, usually a white opaque glass rod, is inserted into the body of a glass vessel and poured. Diamond engraving became possible in the 16th century, when the quality of glass improved. In the 16th and 17th centuries, glass was the cornerstone of Venetian glassmakers. A distinctive feature of Venetians is that, while processing complex teeth with tools such as pliers, glass is still flexible. The symmetrical "wings" widened on both sides, sometimes decorated with animals or masks, and the glass was completely prominent, completely unsuitable for tassels. This glass, together with another plate with a reflective bowl, is known as a bouquet ("floral arrangement").

Despite restrictions on labour migration, many Venetian glassmakers defected, notably to Altar near Genoa. The jealously guarded techniques became widely known, and from the 16th century various countries, including France, Germany, England and the Netherlands, created their own versions of Venetian glass types, called "mode Venetian".

Although competition from other countries, especially Bohemia, reduced the prestige of eighteenth-century Venetian glass, seventeenth-century variants, mirrors and beads were still produced. In addition to the reproduction of older species, in the nineteenth century they received little

attention. Older methods, such as dairy products, continued to be used in the 20th century to make tasteless glass, but some good examples, such as the simple obelisk and hourglass, were made in 1961. Growing the species in the twentieth century the seventeenth century continues.

Invented by Murano glassblowers, the sparkling clear glass known as “cristello” has today become the model for crystal. The glass trade was so important to the economy that families of glassblowers were allowed to marry into nobility, and their products were so valuable that their trade secrets were protected by the death penalty. The kilns used by the original glass families still produce glass masterpieces today.

**Technique of making Murano glass products**

Murano glass is made with simple raw materials like soda ash, lime and potash which are melted in kiln at the temperature of 1500 degree Celsius so that it can be moulded in any shape hence turns into molten. Then it is bring out with the help of rod and shapes are given using different tools like pliers, scissors and wooden shovel. Then air is blown in a glass object to give it a shape and process is called glass blowing. Now the colouring is achieved by adding various colours like adding golden and silver colour in glass mixture for that royal look in the products, zinc for white colour, cobalt for blue colour, manganese for violet colour and many other minerals. Once the product is ready it is sent to “tempera” for cooling, the process is annealing to ensure any breaking defects. Some techniques to make Murano glass products are:

Millefirori AKA Murrine

The word means “many flowers”. It is one of the ancient techniques where they mix glass pieces together to make it into a pattern and later put them together for heating as a final product.

Avventurina

Metals particles are added to make a clear or yellow brown glass for a sparkling appearance of the product.

Sommerso

This a glass with layers. One coloured glass layer is put on another colour glass to create a pattern multiple shades on glass products.

Cristallo

It was introduced by Angelo Barovier a master in Venetian glass who invented colourless glass products around 15th century and this made it to the revolution I glass making.

Filigrana, Zanfirico, Reticello

It was a difficult technique introduced around 15th century where coloured glass rods were covered with white colour to create a geometrical symmetric designs.

Chalcedony

This looks like polychromatic veins running through the product. This was made to resemble the earthy look of natural stones such as chalcedony, agate and malachite.

Bullicante

It is a glass decorated with regular pattern of equally distributed air bubbles some larger or smaller. This technique was popular in around 1950's.

Fenicio

This technique is also called Phoenician which used to produce festooned motifs. This was done in the end of 17th century.

Lattimo

Latte means milk. This technique was used to produce opaque white glass which gave the look of porcelain. It was introduced in 14th century. This was mainly used for enamel decoration.

Gold and Silver leaf

The golden sheet of 24 karat and silver .925 amount were added to glass mixture to crate sheets which gave sparkling appearance and looked rich.

Chandelier making

The making of glass chandeliers were invented I 17th century. They used ancient technique of glass making and they are still most desired.

Lamp work and beads

This started in 14th century. There are three types of beads chevron or rosetta, lampworked or lume beads and seed beads or conteria.

**Speciality of Murano Glass**

**1. It has unrivalled craftsmanship.**

Murano glass comes in a variety of shapes and sizes, ranging from relatively simple shapes to impossibly delicate and complex constructions. According to

Mann, it is united by one common trait: excellence. Murano artisans shared "a desire to be at the pinnacle of their field or skill set," he told Artnet News.

Murano's long and rich glassmaking history, which dates back to the Renaissance on Murano and to antiquity when Italy was part of the Roman Empire, adds to its distinctiveness. According to Diane Wright, senior curator of glass and contemporary craft at the Toledo Museum of Art, the region's high-quality materials "resulted in the creation of some of the most elegantly designed and expertly made glass found throughout Western Europe." "This glass was sold and admired around the world from the moment it was produced," she said.

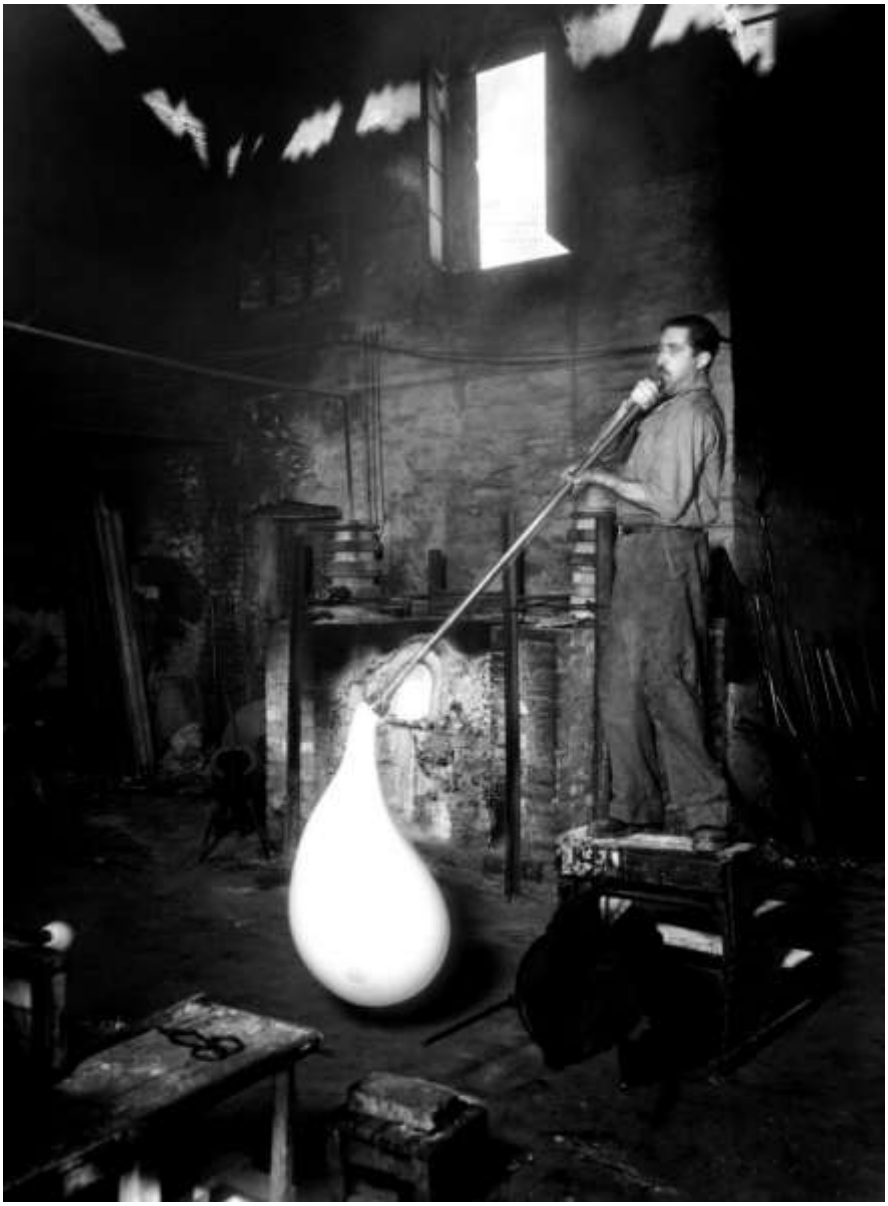


*Figure 32: Making of Venetian glass*

Source: artnet

**2. It's a Little Suspicious**

Murano is surrounded by an otherworldly aura. Because glassmaking was not (and still isn't) intuitive, the story of Italian glass production was both compelling and mysterious to American buyers. "Unlike painting or drawing, it is more complex in terms of material and involves equipment and skills that require a little more explanation," Mann explained. Even when one understands how glass is made, many people see "a little bit of magic or sorcery going on."

**4. It Served as Currency**

While fine-art, blown Murano glass absorbed much of the island's reputation among Grand Tour visitors, Murano's glass beads should not be overlooked. When one-off luxury glass revenue ebbed and flowed, they were Venice's bread and butter. According to Mann, more than half of Murano's glass workers made beads. (Beads, mosaics, and blown glass are all separate processes that take place in different furnaces and factories.)

Last year, ground-breaking research discovered Venetian glass beads in Alaska decades before Christopher Columbus' voyage, making them the earliest European objects discovered on the continent. Murano beads, however, have a dark history beneath their gleaming exterior. Scholars call them "trade beads" because they were traded in large quantities in Africa, India, and China, as well as with Native Americans in North America. Beads were exchanged for enslaved people, gold, and gems in transactions that were frequently exploitative for those on the receiving end of the transaction (not to mention those traded).

*Figure 33: Flag beads*
Source: artnet

**5. It Wasn't Just a Male Sport**

Despite the fact that men worked in the Murano factories amid the heat and flames, women were heavily involved in the production of the beads. "Beadmaking was a multi-step process, with some steps taking place outside of factory settings, given that some tasks—sorting and stringing—could be performed at home," Mann explained. The ability of bead production to incorporate a larger workforce benefited Venice's economy, providing secondary income to individual households.

5. It also influenced other artists.

When Italy gained independence in the 1860s and its glass furnaces resumed full operation, American tourists began to notice Murano. Artists were among the most enthusiastic early visitors to the island. John Singer Sargent, James Abbott McNeill Whistler, and others shared their Venetian experiences with the American public, including glassmaking, and 19th-century Americans admired Murano glass in their homes, offices, and world fairs.

Murano's influence can be seen in the techniques and styles of many successful American artists today (think: Dale Chihuly, Josiah McElheny, Fred Wilson). "This

demonstrates the interconnectedness of artistic movements as well as the importance of global experiences in fostering creativity," Wright said.


*Figure 34: American artist and magic of Murano*

Source: artnet

**6. It Was Not Always Popular**

Murano glass has fallen out of favour in recent decades. Collectors and museums alike have preferred more streamlined, traditionally modernist forms over ornate glass since the 1920s and 1930s. "The pieces are no longer on display in many institutions," Mann said. "In a sense, we were discovering or cataloguing objects that had probably not been on display at those institutions—including the Smithsonian—for a half-century or more."

*Figure 35: Fish and Eel Vase (ca. 1890)*
Source: artnet

### 7. It exemplified "Art for the Sake of Art"

The concept of art for the sake of art was prevalent in the late nineteenth century, and it extended to Murano glass. The Fish and Eel Vase (circa 1890) in SAAM's exhibition is a shining example of useless beauty. "It's surprisingly not utilitarian,"

Mann said, despite the name. The complex object, which according to SAAM's website has no historical precedent, appears to defy gravity. "There was definitely a premium placed on delicacy, fragility, and complexity, which was promoting a specific set of ideals in line with the aesthetic movement," Mann said.

Many Murano pieces are so delicate that many have been lost to history. Mann noted that after the great 1906 earthquake "tremendously injured" Stanford University's collection, the Salviati Company of Murano glassmakers donated objects to the university's museum to replace those that were lost.

*Figure 36: Venetian glass worker*

Source: artnet

**8. It has travelled through time and space.**

Mann sees a "web of lines" connecting contemporary glass collectors to late 19th and early 20th century glassmakers that spans the globe and stretches back in time. Many pieces from that era replicated forms popular in the Renaissance or ancient Rome, so the objects themselves have a connection to the distant past. A copy of the Renaissance "Campanile" beaker (circa 1912) was discovered broken in St. Mark's Square in Venice after the bell tower (campanile) fell in 1902.

# CHAPTER 4. CONTEXTUAL STUDY

## 4.1 COMMUNITY

The glassmakers of Firozabad explain how their collective subjectivity, their artisanal consciousness, has been shaped by their relationship to glass, the production tool and its evolution, and the social and political context of the city. Labour in factories is generally controlled and recruited according to the *thekedari* system: skilled and trustworthy workers are given the opportunity to recruit their teams from their relatives, from the labour market of the city or from surrounding villages. In the bracelet industry in particular, there are hardly any qualified managers and few engineers in the large automated factories. Skilled workers, often from the *Sheeshgarh*[9] community, also serve as overseers and overseers, controlling production and even inventing new batches of chemicals or as designers of bracelets and glass designs. With the exception of a few engineers and executives of large companies, traders and, of course, industrialists, almost all the inhabitants of Firozabad are members of the glass working class. Their social status among the working classes of Firozabad is determined by their level of education.

[9] Sheeshgarh: Artisan community

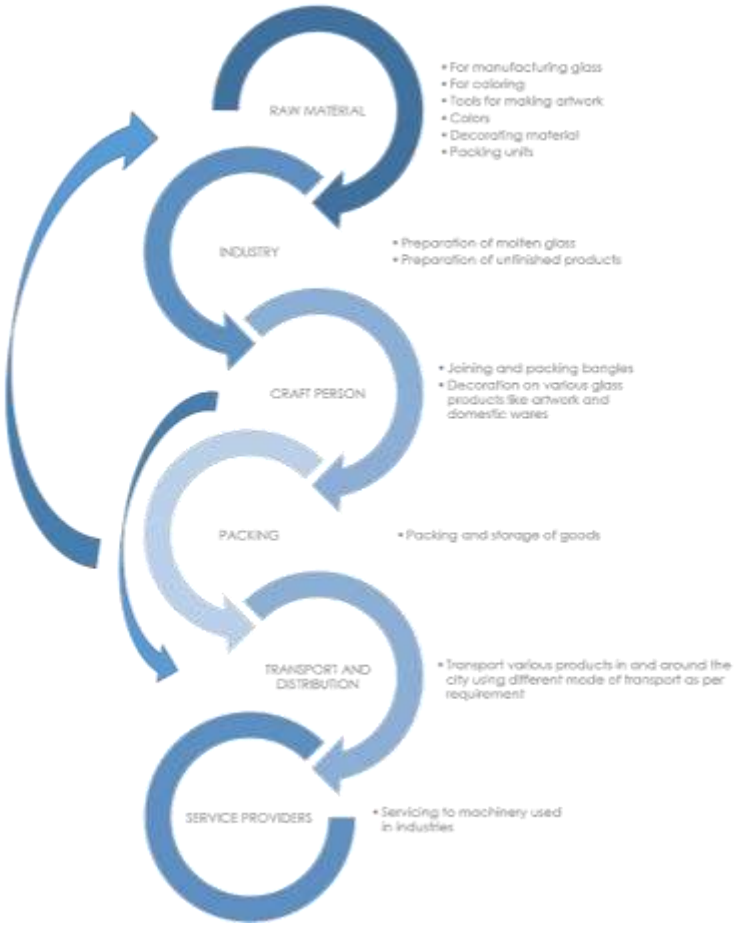



*Figure 37: Framework of Firozabad Glass industry*

Firozabad glass industry framework involves six processes.

**Raw material:**

The raw material for every kind of industry is procured from the market as per the requirement and availability. Some takes it from local suppliers and some directly contact the manufactures. Raw material for industries like manufacturing industry glass's raw material is needed and tools for making glass items are also needed. For decoration industries paints and painting tools are required. For bangle industry different tools and decorating raw materials are needed. For art ware borosil rods are needed. Industries also need broken glass to make glass which are procured from later processes.

**Industry:**

Industry produce molten glass and produce unfinished products for decoration industry which decorate the product or to the craftsperson.

**Craft person:**

A craft person decorate the unfinished good received from the industry at household setups like bangles or hand painting.

From procuring raw material craft person directly produce art wares. From these setups broken glass pieces are sent to industries or raw material suppliers.

**Packaging:**

All the products are sent to packaging units for unharmed packing of the product as per its design and requirement.

**Transport and distribution:**

Middle man and transporters make distribution of the products possible in the city and outside of the city. Various transportation mediums are used. Art ware akers directly send their products to transporters.

**Service providers:**

These are people involved in servicing of locally made machinery and tools. Service providers involve cleaning and cooking staffs in various setups.

**Artisan's learnings**

In order to learn, master Indians must connect with "Masters" (Masters) who develop unequal sponsorship relationships, which are common in the skilled sector of the informal work sector. It could be the teacher's field or it could be a relative. Identification in the workplace can refer to general contradictions in working conditions, regardless of whether the body belongs to a company or a particular profession.

Their mohala (neighborhood) is densely populated by small glass carving workshops and there are close ties between the workshop owners and those who cannot afford a gas burner, forcing them to pay for other artisanal palaces to make their glassware, gas and raw material costs. As a result, most of these warehouses were open 24 hours a day, 7 days a week. Women work from home in the craft business. Communities of practice become instruments of solidarity, mobilization and protection of collective interests in professional styles and activities.

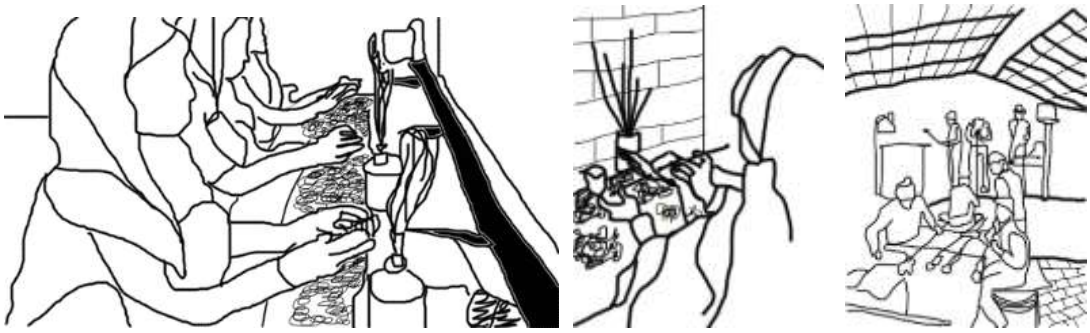


*Figure 38: Women working in their homes and a regular industrial setup*

| | |
|---|---|
| Gundivala | One who takes molten glass out of pot furnace |
| Bhattivala | Who color the molten glass for bangles |
| Sikaia | One who reheat the molted glass |
| Pattivala | Who takes care of the reheating oven |
| Tarvala | Who draw glass wire from molten glass |
| Tora vala | Who cut and pack bangles and process is called chaklai |
| Judaiya | Who join bangles over burners |
| Zarivala | Person in charge for decoration of the bangles |

*Figure 39: Basic terminologies used in bangle industry*

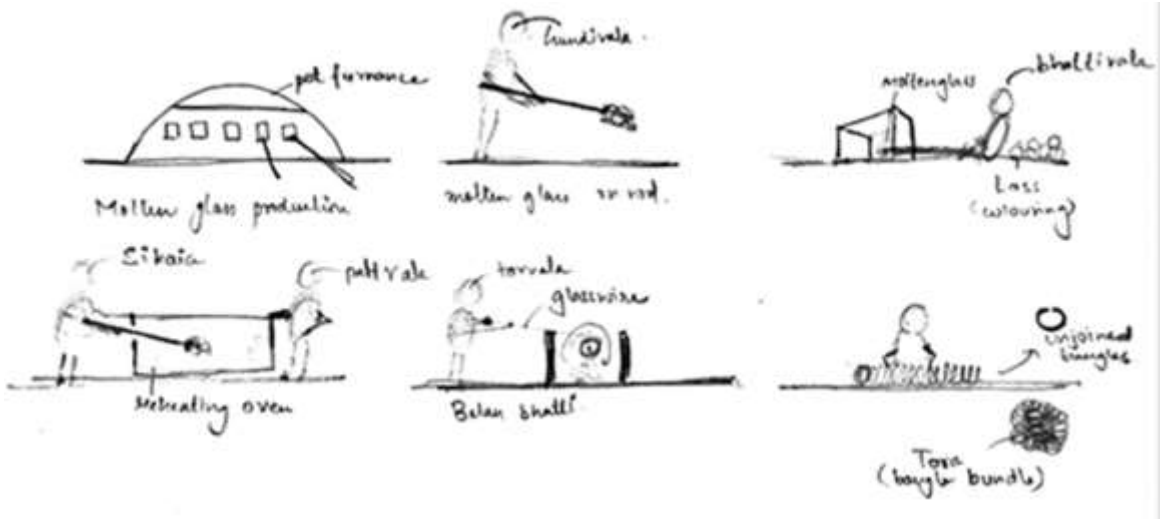



*Figure 40: Figure depicting the process of bangle industry*

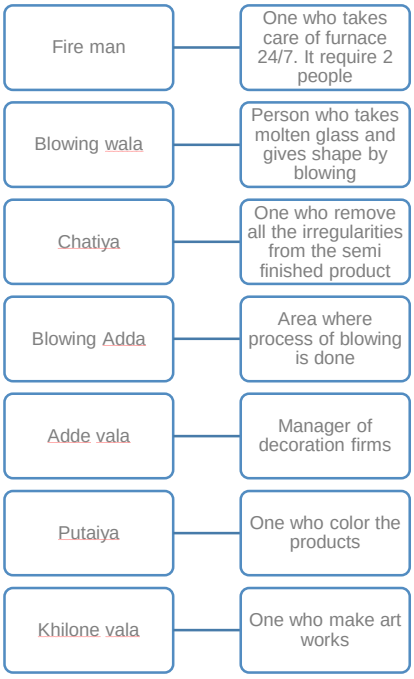



*Figure 41: Basic terminologies in glass industry*

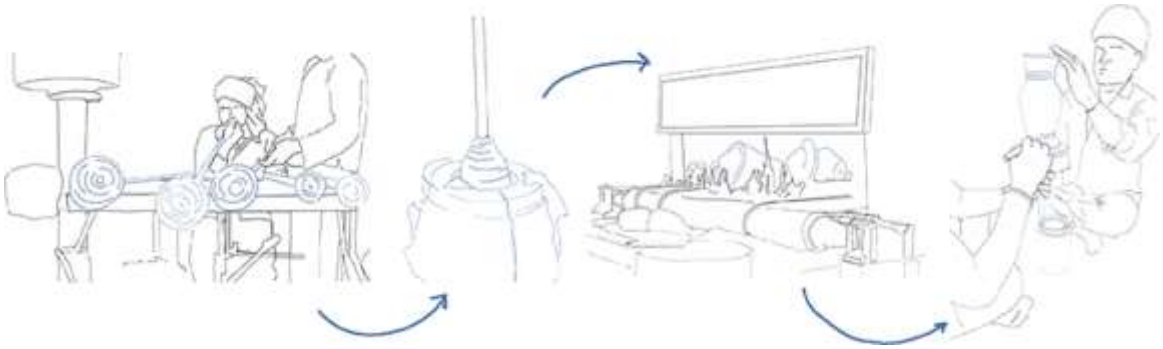


*Figure 42: Process of manufacturing glass products*

## 4.2 SOCIO ECONOMIC

Firozabad is the 38th most populous area in the state. The proportion of the urban population of the region is 33.4%, while the urban area of the state is 22.3%. The population density in Firozabad is 1038 people per square kilometre, which is higher than the national average of 829 people per square kilometre. The literacy rate in Firozabad is 71.9%, which is 67.7% higher than the national average. There are 414,266 households in the area, which represents 1.2% of the state-level households. The average number of households in the area is 6.0.

Firozabad have 2 auditorium/community halls for social gatherings. There are 25 nationalized banks, 4 private commercial, 2 co-operative and 2 number of agricultural credit societies.

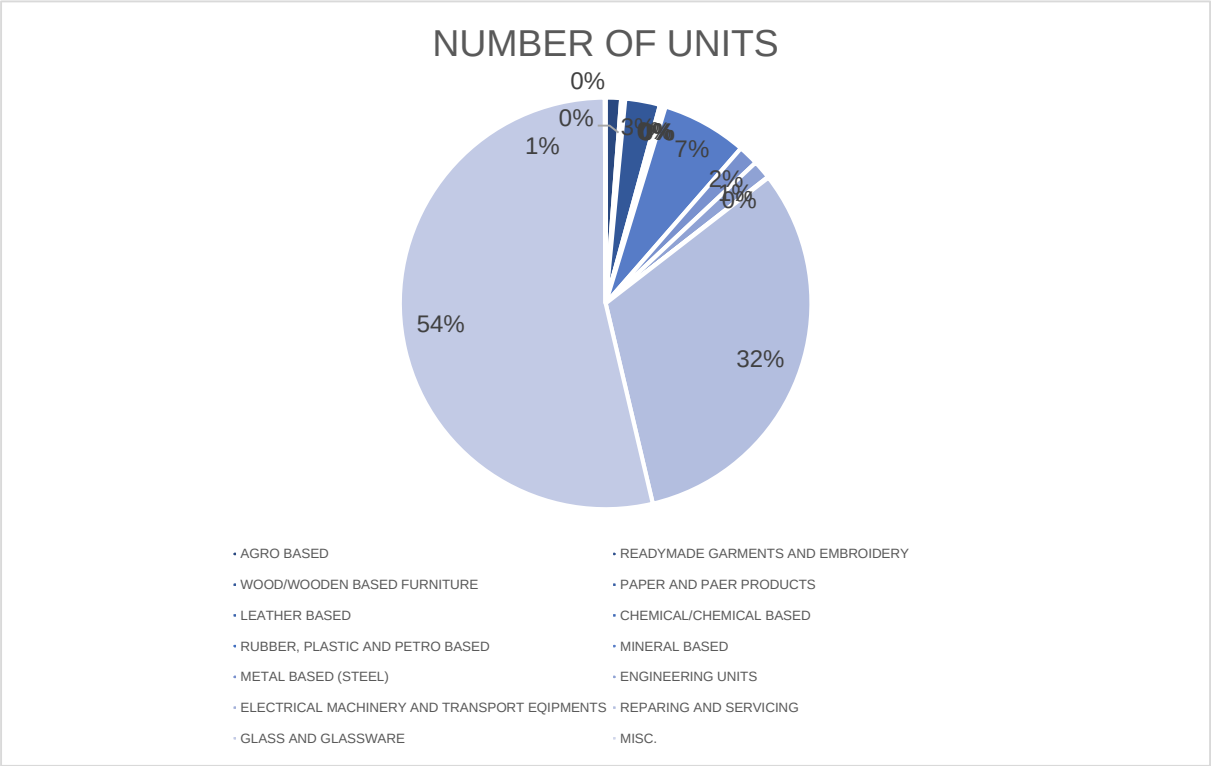



*Figure 43: Number and type of units working in Firozabad*

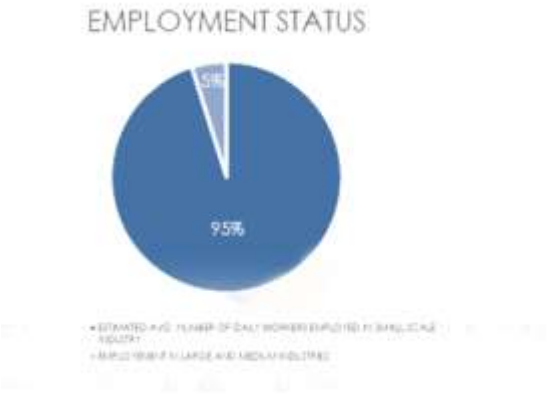



*Figure 44: Employment status of population of Firozabad*

| FURNACE TYPE | COAL FIRED | NATURAL GASS FIRED |
|---|---|---|
| POT FURNACE | 54 | 57 |
| TANK FURNACE | 1 | 18 |

*Table 2: Type of furnace use in glass industry*

70 per cent of the total glass production in the unorganised sector in India is contributed by Firozabad glass industry, which is India's biggest glass cluster (as per reports by ASSOHAM)

More workers are employed in small scale industry rather than large industries.

From various employment areas maximum are employed in bangle industry and related works.

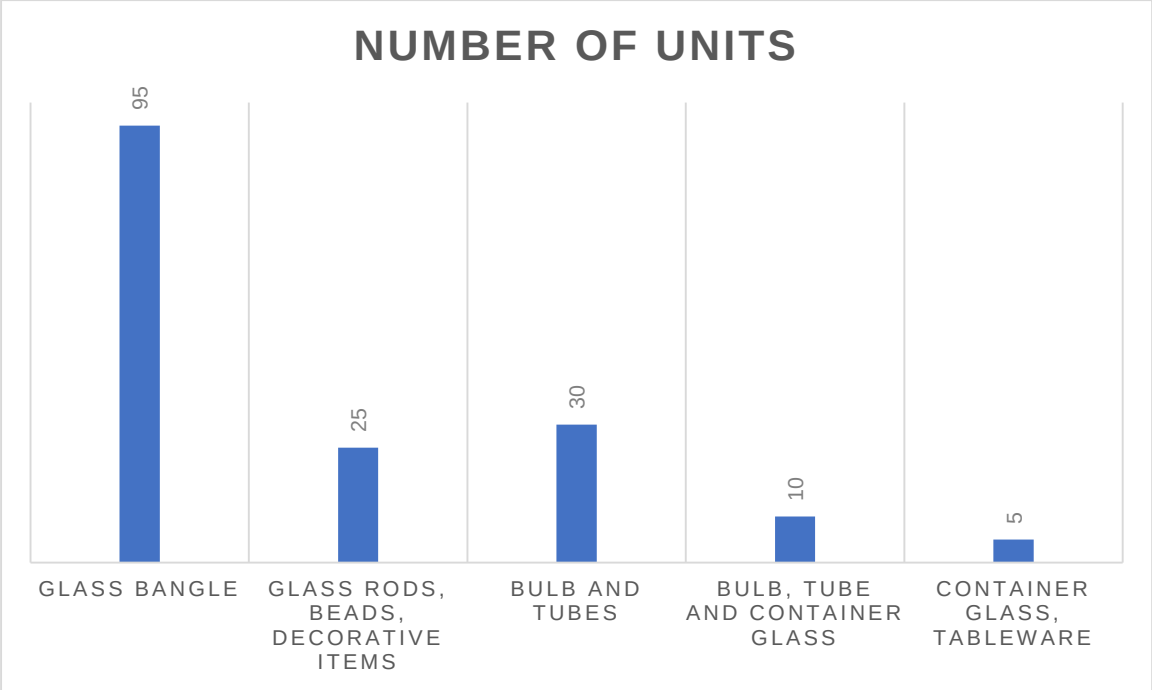



*Figure 45: Number and type of units working in glass industry*

## 4.3 RAW MATERIAL

Local dealers and wholesalers supply raw materials such as silica sand, soda ash, calcium carbonate, and other chemicals and pigments to glass manufacturing units in Firozabad. Soda ash is primarily sourced from Gujarat, and silica sand is primarily sourced from Rajasthan. Few huge containers and silverware units to get raw material straightforwardly from the primary provider

Raw materials required are:

Broken Glass (Collect from local traders): Broken glass from all the sectors are collected and reused to make new product. It helps to maintain a proper mixture of glass.

Silica: It is sand like in appearance and is best component for manufacturing glass alone. Its melting point is around 1700 degree Celsius which is expensive to maintain. So to reduce the melting point various other raw material is used.

Soda Ash: To reduce the melting point of silica soda ash is added. It is added as 25% of soda ash to silica which reduces the melting point to 850 degree Celsius.

Calcium: It is known as lime. Adding lime (calcium oxide or CaO), brought by the limestone, makes the glass soluble again, but too much makes a glass susceptible to devitrification - the precipitation of crystalline phases at certain temperature ranges. The ideal composition is about 75% silica, 10% lime and 15% soda.

Moulds: The dye (mould) used for moulding has been imported from Gujrat (Rajkot) and, Uttar Pradesh (Aligarh) where it is manufactured in CNC (computer numerical control) machines.


*Figure 46: Map showing the locations from where raw materials are procured*

## 4.4 INDUSTRY

An industry is a term used to describe a group of businesses or organizations that produce or supply goods, services, or revenue. In economics, industries are divided into main, upper, upper, and quaternary categories; secondary industries are further subdivided into complex and complex phases.

**Primary industries:** Agriculture, forestry, fishing, mining, quarrying, and mineral exploitation are all part of the economy. It can be divided into two types: the

genetic industry, which includes the production of immature products that can be developed by human involvement in the production process, and the extraction industry, which includes the production of limited quantities that cannot be completed by farming.

**Secondary industries:** The industry, also known as the manufacturing industry, (1) processes raw materials delivered by key industries into consumer goods, (2) continues to process goods that have been converted into second-party products, or (3) builds larger consumer goods. Energy-producing enterprises (e.g., hydroelectric industries) and the construction sector are examples of secondary industries.

**Tertiary industries:** This broad sector, commonly known as the service industry, includes industries that provide intangible services or profits or that generate revenue while not producing material goods. This sector includes both commercial and government businesses.

**Quaternary industries:** The Quaternary industry, a branch of the higher education industry that is often classified as a separate sector, is concerned with knowledge-oriented or knowledge-based products and services. It, like the higher education sector, is made up of a combination of private and public initiatives.

From earlier discussion it can be inferred that Firozabad glass industry is secondary type of industry which has impacted many lives in the city. Due to rise in demand of glass many people started to settle in Firozabad as it was new concept in the area and was in great demand. Due to availability of resources and trade routes via water (earlier) and rail (later) made incoming and outgoing of the goods easier. The connectivity of the city to Agra made the locally made glass bangles have a name in market as Agra is a tourist hub. The city had grew from a barren land to a developing district whose major credit goes to glass industry.

Firozabad is the centre of many glass processing industries and one of the most important producers and exporters of glass. Firozabad's glass industry accounts for 70% of India's total unstructured glass production. Firozabad has about 4,000-5,000 industrial and domestic units and is estimated to employ more

than 500,000 people. The industrial glass installations in the region are distributed throughout the region and can be divided into three main categories: household, pot based type and tank type oven.

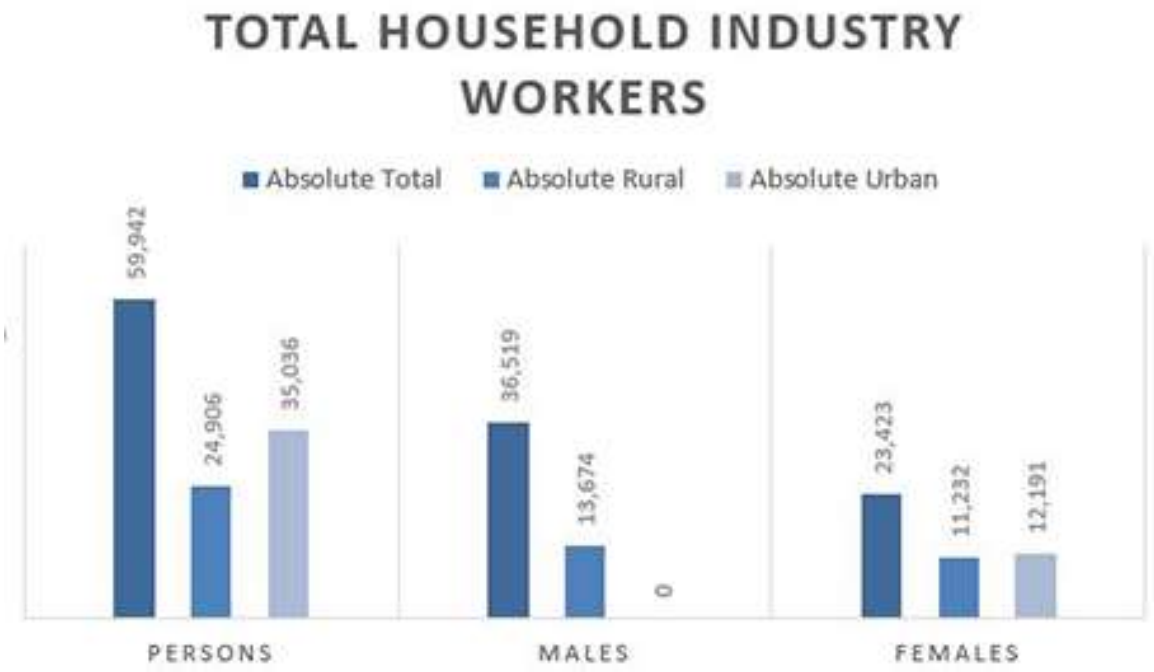



*Figure 47: Total number of people working in household industry*

# CHAPTER 5. SITE DOCUMENTATION

### Documentation technique

Documentation is a shred of evidence or reference of any research work. Without documentation, you can never prove what you want to tell in your research study. It`s a documentary proving your statements.

Documentation involves many processes from site selection, observation and collecting data via surveys and site visits. Technology nowadays plays an important role while documenting. For collecting videos and pictures, we need cameras, for filling out forms we need google forms or printed forms, for recording audios we need audio tape recorders and for compilation laptops or pcs.

For my thesis, various documentation processes and techniques are involved. Initially, various site visits were done based on literature review and basic interviews with some locals to make sure which is closest to practising traditional methods to prepare glass products.

For documenting the domestic glassware industry I visited Advance glassworks where I documented the process with the help of pictures, videos and notes and to understand the same interviewed some related stakeholders present on the site from where they directed towards the further industries and process where I documented the further processes of preparing a domestic ware.

For the marriage ware industry which is spread all over the city, it was difficult to mark areas where it is practised then I zoom down to areas where it is pejoratively practised and selected a site from them. The documentation is done with the help of pictures, videos and interviews. From industry setup and to following the process I came to the home-based setup of joining, decorating and packaging units. All of the documentation and site visits are done in chronological order of tasks performed to understand it better and avoid mixing of the documentation of the site work.

For art ware documentation an area is selected where it is majorly practised and the process is documented with the help of videos, pictures and interviews.

Proper documentation helps us to understand and analyse our research area. From documentation, we can come down to observations and a framework for working further in the research.

### Survey Methods

The survey data is defined as the outcome data collected from a sample of respondents who conducted the survey. This data is complete information

collected from target audiences on a specific research topic. There are many methods used in data collection and statistical analysis.

Various methods are used to collect feedback and ideas from the samples people are looking for. While conducting research, researchers selected multiple sources to collect data such as online surveys, telephone surveys, face-to-face surveys, and more. The method of collecting research data determines the sample of people to be reached. Required number of survey responses.

The survey involves various processes like in-person interviews, on-site interviews and interviews on the telephone.

In-person interview:

These interviews involve one on one conversations on a specific topic. It is also the most effective way of bringing out information from people regarding your subject. This type of interview might give you the information you lack in the literature review.

In my survey, in-person interviews involve many people who are categorised as industrial-based people, household type-based people, and the typical crowd who notice the industry from near spaces and give insights into how it works and its condition of working.

On-site interview:

These interviews involve all types of the crowd as all types of artisans and workers. These interviews helped me understand the industry of glass at a micro-level. How the works are done, who performs what, why they are involved in the industry and how it is growing or demining.

Interviews on telephones:

People who are not available during the site survey are connected through calls like authors of some local publications, and some journalists who might have needed information.

For the site visit, I have selected three products to understand the process and craft involved. First is the domestic ware industry which involves the manufacturing of products like flower vases, jugs, glasses etc.

## 5.1 Domestic ware

Site 1 is a manufacturing unit Advance glass, where unfinished glass products are made using the glass blowing and moulding technique. The glass is produced in a tank furnace. Later it is sent to decoration and packaging units which is site 2 and 3 where the products are coloured either by spray gun or hand painting. Then the products are packed carefully and sent to transporters and the local retail market.

The reason to study these sites is that it is one of the oldest practising industries in the region.

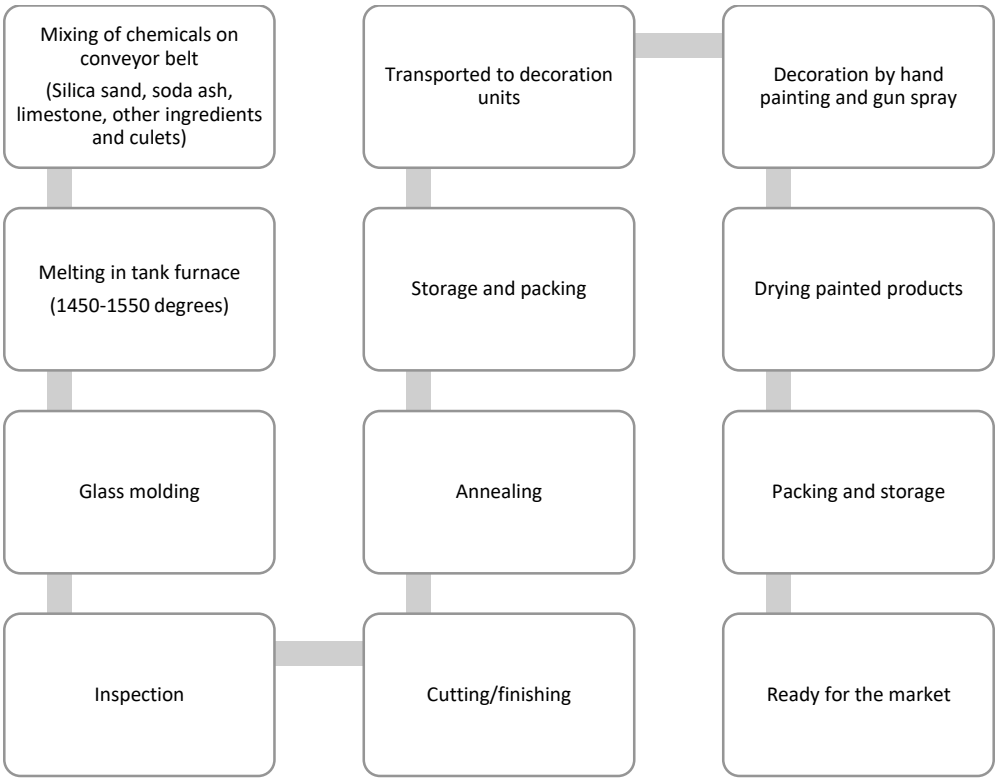



*Figure 48: Process of manufacturing domestic wares*

Process of manufacturing domestic wares involves various stages

1. **Mixing of chemicals on conveyor belt:** The glass production batch includes raw materials such as quartz sand, sodium carbonate, calcium carbonate and curette (recycled glass). The composition of the raw materials may vary depending on the type of product. The materials can be prepared manually or automatically (measurement and mixing). Small tank ovens are usually manually operated, while large tank ovens are mechanized. Belt conveyor systems are used to transport materials.
2. **Melting in tank furnace:** Tank ovens are used to continuously melt the glass at the end of cooking. The most energy consuming in tank ovens is thermal melting. Most large installations use tank furnaces from refractory blocks. Electroformed refractory zirconium blocks are used in direct contact with molten glass. Sillimanite blocks are used in different areas with high temperatures. The melting point of the glass is maintained at 1450 ° C. The molten glass is passed through a

"refining zone" to remove air bubbles. After the feeder is removed from the chamber, the melt is poured and formed.

3. **Glass molding:** Glass melt is used to make a variety of glass products in automatic presses or blowing machines. Mouth blowing is also practised in some of the units for specialised glass products. Electricity is primarily used to power pneumatic systems in press machines and compressors.
4. **Inspection:** Checking of unfinished products are done after molding for any deformation inshapes if it is good to o for further steps or have to be rejected there only.
5. **Cutting and finishing:** Adding or removing of elements takes place at this step.
6. **Annealing:** Stress will be introduced into the glass products as a result of the shaping and forming operations. These strains must be removed from glass products to prevent them from becoming brittle. The annealing process removes this stress from the products by gradually heating, soaking, and cooling them.
7. **Finishing:** After annealing, the glass products are sent to be finished, which includes cleaning, grinding, polishing, cutting, painting, and grading. The final products are packed after a defect inspection. Electrical energy is used in a variety of finishing operations.
8. **Storage and packaging:** After finishing the products are sent for packaging for further demads of the market some people directly takes from here and some are sent to decoration units.
9. **Decoration:** There are two types of decoration units one is hand painted and other are screen printing. Depending upon the demand the products are transported. All the transportations are done by local vendors by auto, e-rickshaw and tempos.
10. **Packing and storage:** After decoration packing and storing of products are done in warehouses where raw material for packing are supplied and manufactured by local dealers and these are stored in those warehouses.
11. **Transportation:** After packing these products are transported to other cities via different transportation houses by trucks via national highway 2 which passes through the city and connects it well to other cities.

The areas are marked on the map the industrial area and labour colony areas are oldest areas for industries. The areas marked in circle are upcoming industries zones they are district jail and UPSIDC. These industrial areas includes manufacturing and decoration units. From here products reach to either local

retail market which is situated at SN (Sarojini Naidu) road and transportation hubs which are mainly located along NH2 in areas like Usaini, bypass and raja ka taal. The three studied sites are also marked.

*Figure 49: Network map of domestic ware industry*

These are the three sites which are further studied for site understanding and they are marked as per its location and the lines show the procession of the glass production. They are even marked in number of chronology of their works.

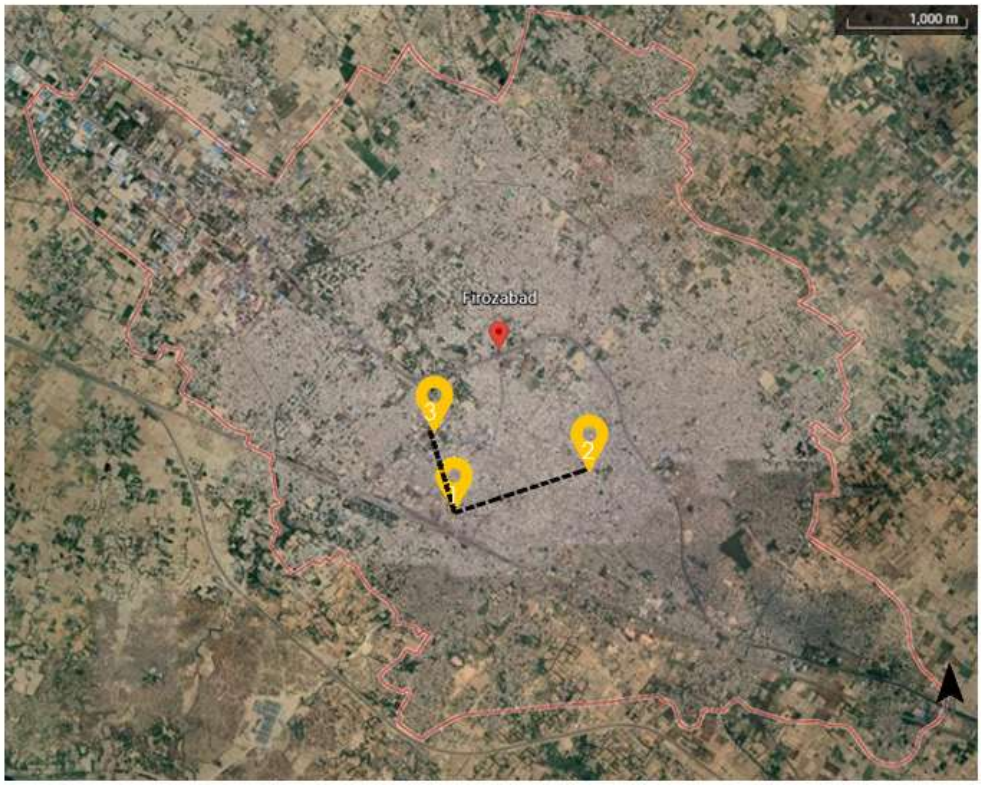



*Figure 50: Activity and location map of domestic ware industry*

### 5.1.1 Site 1: Advance Glass Works (1968)

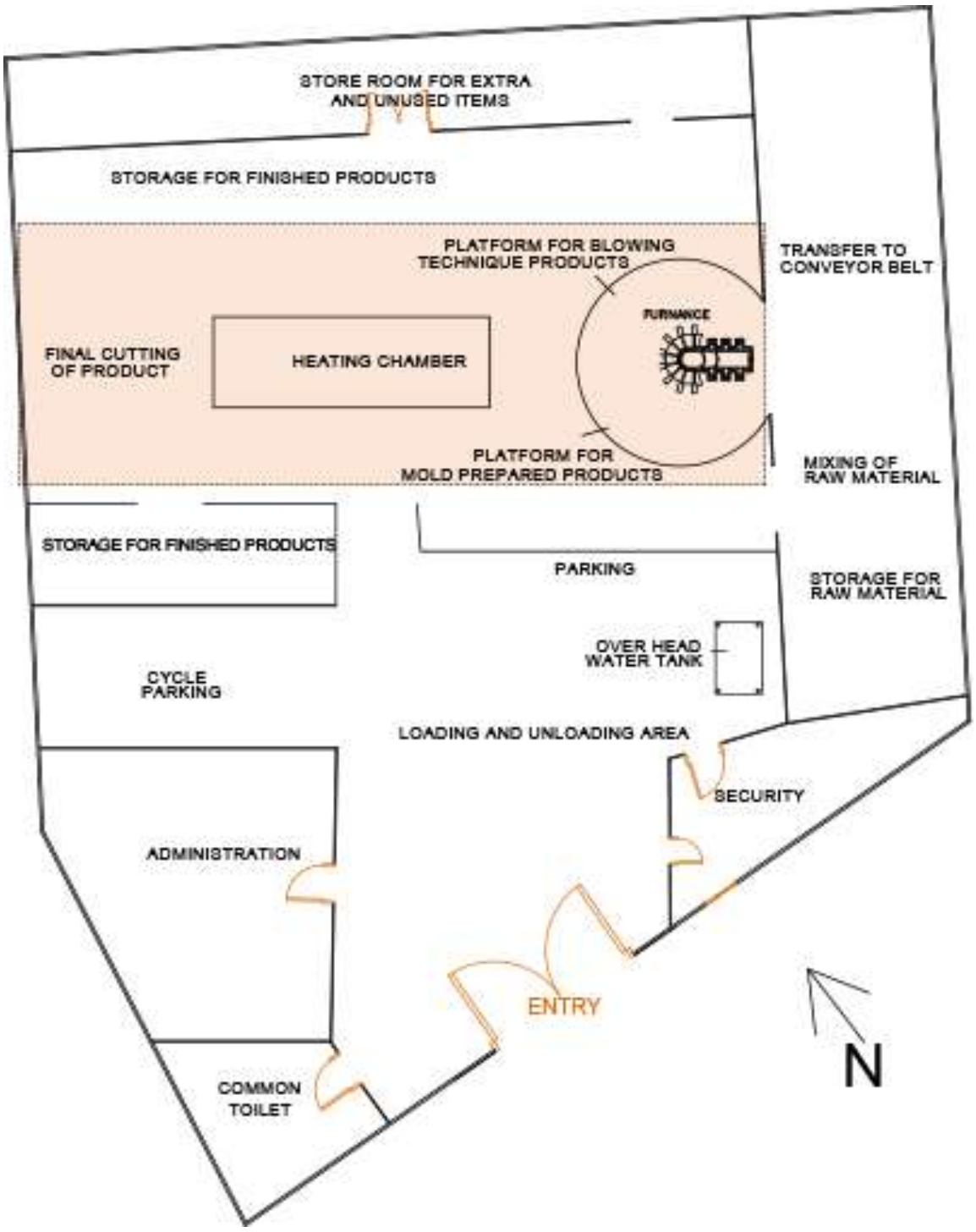



*Figure 51: Plan of site 1 DW*

This is a basic plan of a glass manufacturing unit. Coloured area shows where artisans work. The busiest area is platform near the furnace where glass blowing, glass moulding and finishing touches are done.

The table below shows the process with its pictures from the site and shows the tools required for the same process.

*Table 3: process of site 1 (DW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Mixing of raw material |  |  |
| Grinding on conveyor belt |  |  |
| Raw material from conveyor belt to furnace |  | |
| Molten glass from furnace |  |  |
| Molten glass transferred to molds |  |  |
| Annealing (cooling and further heating for strengthening of the product) |  | |
| Cutting and finishing |  |  |
| Finished product stocked and ready for transport |  | |

### 5.1.2 Site 2 (decoration and packaging)

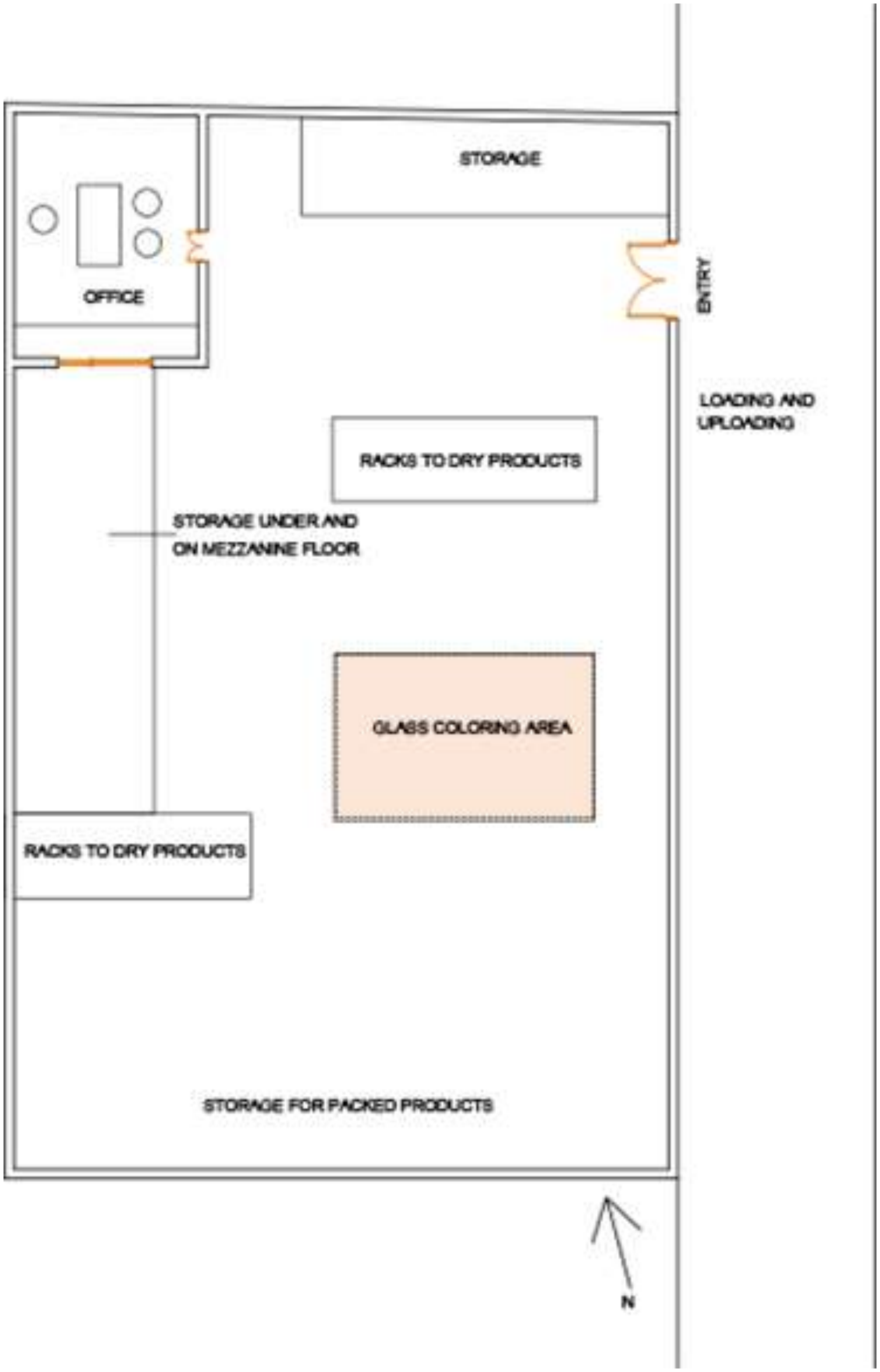



*Figure 52: Plan of site 2 DW*

This decoration unit is mainly focused on hand painting. The coloured area shows the artisan's working area.

*Table 4: process of site 2 (DW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Preparation of color |  |  |
| Coloring the clear glass product with various designs |  |  |
| Drying of prepared product |  | |
| Packing and storage of final product |  |  |

The table shows the process and tools required in the process.

### 5.1.3 Site 3 (decoration and packaging)

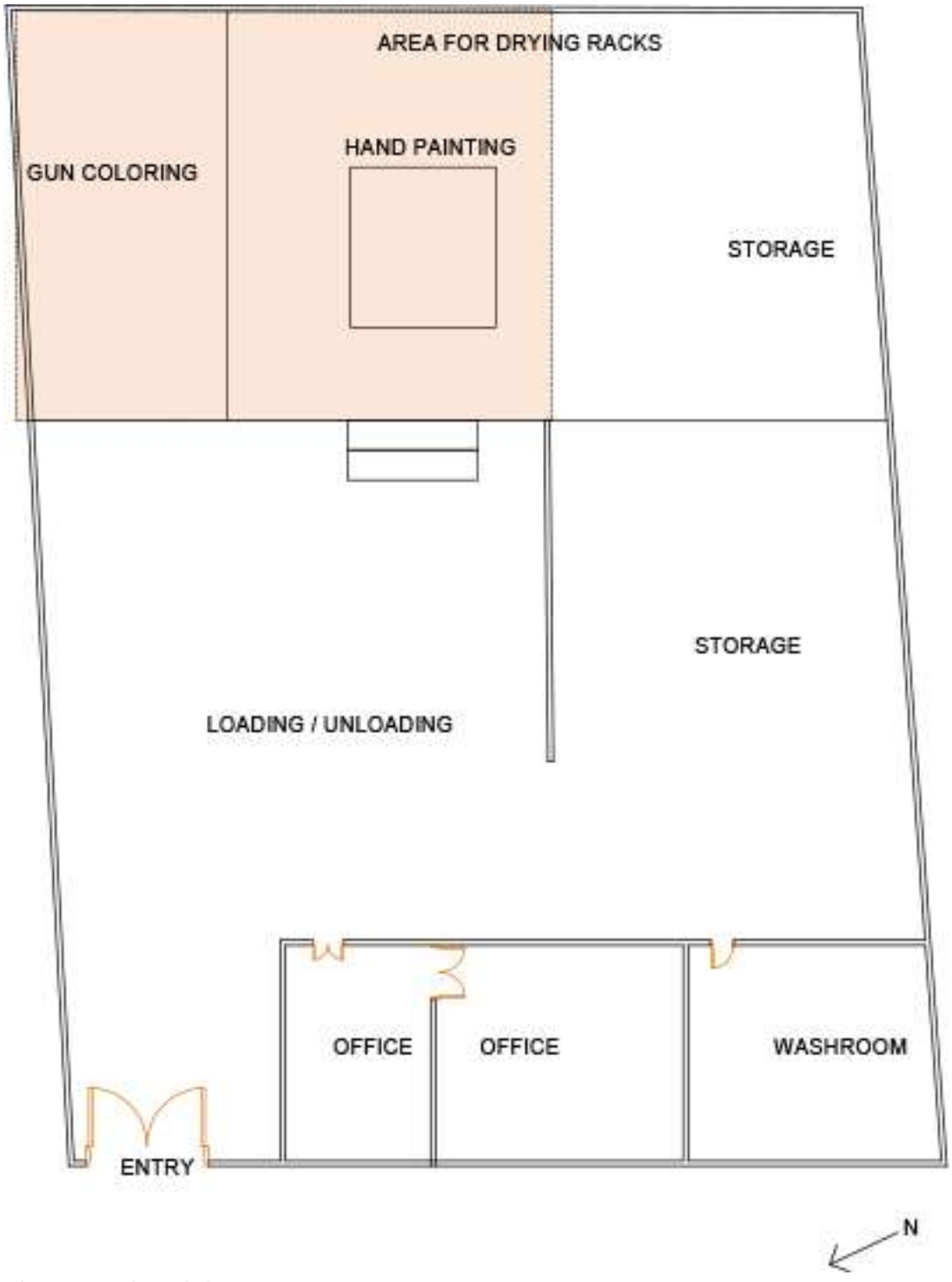



*Figure 53: Plan of site 3 DW*

The coloured area in this plan of this decoration unit shows the area of artisan's. The decoration process involve gun spray painting and hand painting.

*Table 5: process of site 3 (DW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Unpacking and preparation of clear glass |  | A cloth to clean the surface and a basket to make a batch ready for coloring |
| Gun spray paiting to prepare the surface for further hand paiting |  |  |
| Hand painting |  |  |
| Drying of prepared products |  |  |
| Final product |  | |
| Packing and storage of final product |  |  |

The table shows the process and relevant pictures from the site with tools required in that process.

**Observations**

From site1:

All the raw material is imported it's the skill which is keeping the tradition alive in the region.
The artisans work in harmony with each other.
It is a combination of permanent and daily wages for workers hired by the manager of the factory.
The artisans are well versed in the type of work they are doing despite the lack of cleaning and lack of lighting in the working area.
Despite low wages, artisans are continuing working as this is the knowledge they had been transferred.
From site 2 and 3:
Decoration on glass product do not require big setup as manufacturing unit.
The artisans do the painting sitting on the ground. The drying and packaging unit require bigger spaces as per the capacity of the factory.

## 5.2 Marriage ware

Second is the bangle ware industry which involves the manufacturing of products like bangles, *kadas* and *kangans*. To understand the process and craft involved study of 5 sites was needed. From manufacturing the unfinished bangles to packaging. units.

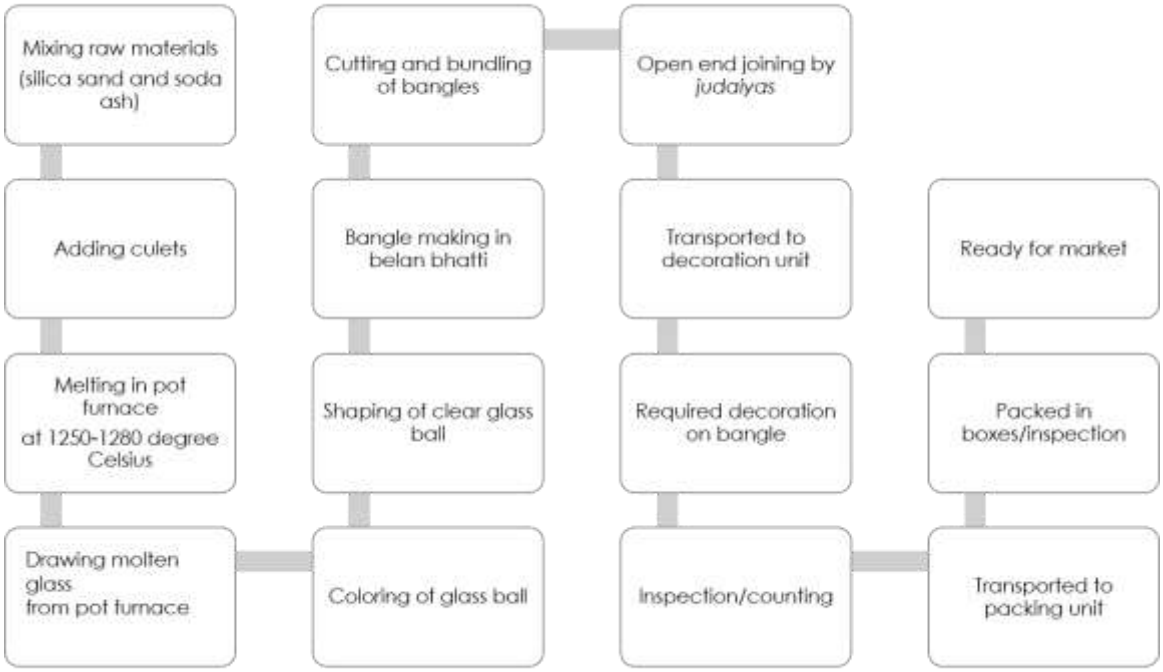



*Figure 54: Process of manufacturing marriage wares*

Process of manufacturing marriage wares involves various stages

1. **Mixing raw material:** Raw materials such as silica sand and soda ash make up the batch charge for glass production. The raw materials are

sieved, weighed, and mixed in the specified proportions. The composition required for transparent glass pots differs from that required for coloured glass pots.

2. **Adding culets:** The recycled glass is mixed to maintain the same quality.

3. **Melting in pot furnac**e: In an open pot oven, the charge is melted in glass in open pots. Depending on the production capacity, the number of pots in an oven varies between 10 and 12. The preheated pots are arranged around the perimeter of the oven. The charge enters the vessels through the openings in the surrounding wall of the furnace for each vessel. Pots filled with raw material are heated to the desired temperature of 1250-1280 degrees Celsius, with a total melting time of 20-22 hours. Each pot is fed three times in succession after the previous feed material has been melted in a routine melting operation to reach its molten glass holding capacity. After the first filling, the volume of the charge decreases as it melts and it is recharged after about 8 hours. As the volume decreases with melting, the pot is filled approximately 5 hours after the previous filling. The third filling takes place approximately 3 hours after the second filling. The raw material and colouring composition of a batch affects the quality and color of the glass melted in a crucible.

4. **Drawing molten glass from furnace:** To determine whether melt glass is ready for bangle production, its quality is visually inspected. This is accomplished by inserting a "mild steel" (MS) rod into the pot through the charging door. When the molten glass is ready, MS rods are used to extract it. These rods are 10-18 mm in diameter and 2.5 metres in length. The ends of these rods have a small notch to aid in the lifting of molten glass.

5. **Colouring of glass ball:** The colouring of glass ball using local colour called *laad*[10] which is looks like a coloured stone used to colour that glass ball.

6. **Shaping of glass ball:** The worker (the maker of wars) uses a model to give the glass sphere the desired shape (the shape of a cube). The rod is transferred to a paint station and applied to a glass ball where the molten colour is formed. The paint is usually applied on all three sides. After applying the colour, turn the stick over in the boiler and immerse it in a glass bowl of the same colour. This synthetic glass ball is called a loop. The war maker returns the glass ball to change its shape.

[10] Laad: locally available colour use to colour molten glass of bangle preparation

7. **Bangle making:** The bangle-making furnace (belan bhatti) has a rotating shaft with a lead screw that is driven in such a way that it can move both linearly forward and rotaryly along the same axis at the same time. The shaft can be rotated manually or with a motor. As the belan rotates, the lead screw slowly emerges. When the reheated glass loom comes into contact with the rotating shaft, it spirals around it.

8. **Cutting and bundling:** The spiral glass is cut in one plane with a diamond tip cutter to make round bangles. Following this, the bangles are counted and strung together to form a group of 320 pieces, also known as one toda[11]. This is the finished product of the bangle making pot furnace unit, which has been sent for finishing.

9. **Open end joining:** After packing unfinished bangles they are sent to home based set where *judaiyas*[12] join bangles over gas burners burner connected to gas cylinders. People of any age are involved. These work also involve working women.

10. **Chaklai:** After joining bangles are packed in a distinct manner called *chaklai*[13] and person doing that is called *chaklaiyas.*

11. **Decoration:** Person who paints is called *putaiya*[14]. Various decoration procedures are followed like zariwork which is done by *zariwalas*[15] it's basically glitter work on bangles. These are also done in homebased setups.

12. **Transportation:** Transportation within the city is done on carts called *thelas*[16] and outside the city is done via trucks by NH2.

The areas are marked on the map the industrial area and labour colony areas are oldest areas for industries. The areas marked in circle are upcoming industries zones they are district jail and UPSIDC. These industrial areas includes manufacturing units. From here products reach homebased setup majorly situated in *suhag*[17] *nagar* and labour colony. From these units these are sent to packaging units and later to retail market. The major hub for bangle markets are *boran gali* market and sadar bazaar market. Although the business is spread in whole city but the major areas are marked in the map.

[11] Toda: bunch of 320 number of bangles

[12] Judaiyas: person involve in joining bangles
[13] Chaklai: process of packing bangles
[14] Putaiya: The person who color the products
[15] Zariwala: Person who do glittery work on bangles
[16] Thelas: These are carts on four wheels and wooden planks joined
[17] Suhag: it means married

*Figure 55: Network map of marriage ware industry*

The map shows location of all the documented sites and arrows shows the flow of process involve and interconnection between the sites. They are even marked in number of chronology of their works.


*Figure 56: Activity and location map of marriage ware industry*

### 5.2.1 Site 1 Durgesh glass (1970)

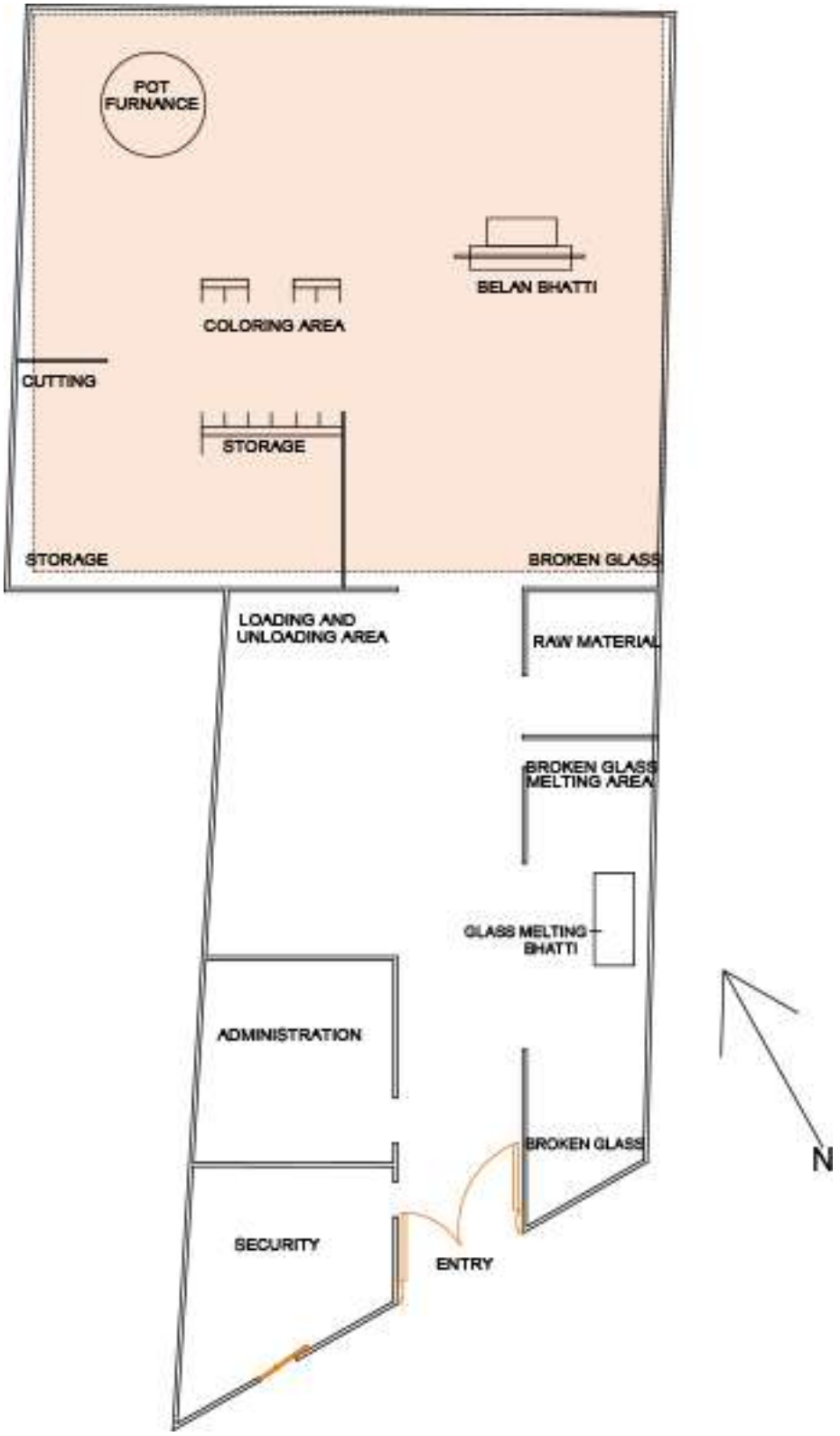



*Figure 57: Plan of site 1 MW*

This is a basic setup for a bangle manufacturing unit with a pot furnace, colouring area, *belan bhatti* area and storage for broken glass.

*Table 6: process of site 1 (MW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Melting raw material in pot furnace |  | |
| Drawing molten glass from furnace |  |  |
| Coloring the molten glass |  |  |
| Bangle in belan bhatti |  |  |
| Cutting of spiral bangles |  |  |
| Packing and storing bangles |  |  |

### 5.2.2 Site 2: Household setup of joining bangles

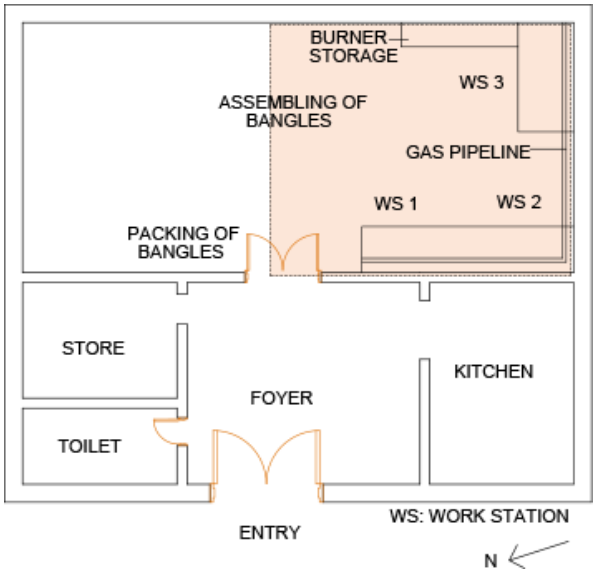



*Figure 58: Plan of site 2 MW*

This site have 3 artisans for *juda*i work and 1 manger who manages products between artisans and industry. He look after all the works done and also provide space and raw material required. It is home based setup.

*Table 7: process of site 2 (MW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Unpacking of bangles |  | |
| Judai of bangles |  |  |
| Chatai (checking) of bangles |  | |
| Final packing of bangles (kalai) |  |  |

### 5.2.3 Site 3 bangle colouring unit

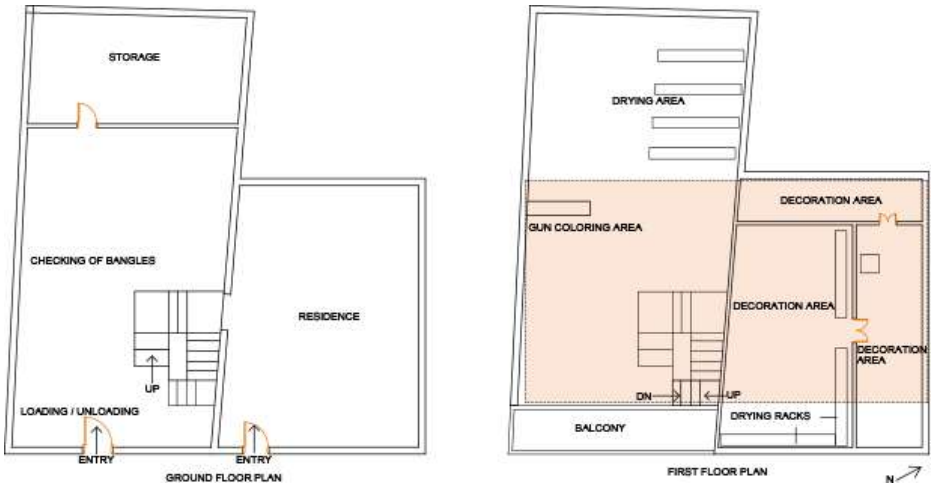
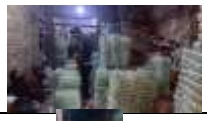



*Figure 59: Plan of site 3 MW*

This is a decoration unit setup in a residential area. It have variety of decorating technique like spray gun, *zari* work and velvet work. The coloured area defines the area where artisans work.

*Table 8: process of site 3 (MW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Storage and checking of bangles |  | |
| Color preparation |  |  |
| Spray gun paint on bangles |  |  |
| Drying bangles |  |  |
| Bangle decorations |  |  |
| Drying bangles before packing |  |  |
| Inspection and packing of final products |  |  |

### 5.2.4 Site 4 bangle colouring unit

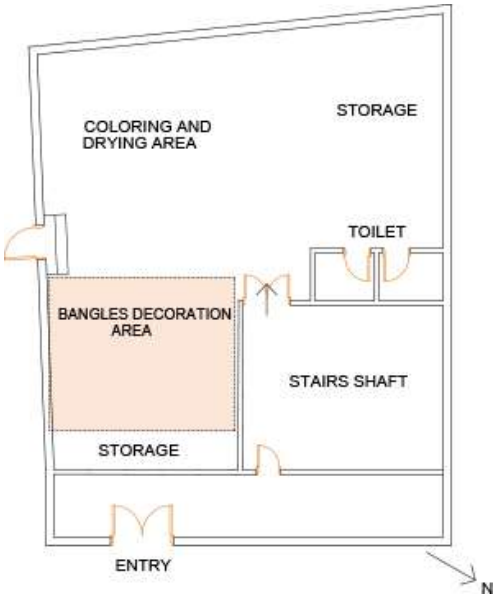



*Figure 60: Plan of site 4 MW*

This was also home based setup where women of the houses were involved in decorating bangles with hand painting and male of the house are involved in trading and monetary part of the business.

*Table 9: process of site 4 (MW)*

| Process name | Related picture | Tools required |
|---|---|---|
| Assembling bangles for coloring |  | |
| Gun spray paint on bangles |  |  |
| Decoration on bangles |  |  |
| Drying the bangles |  | |

### 5.2.5 Site 5 packaging unit of bangles

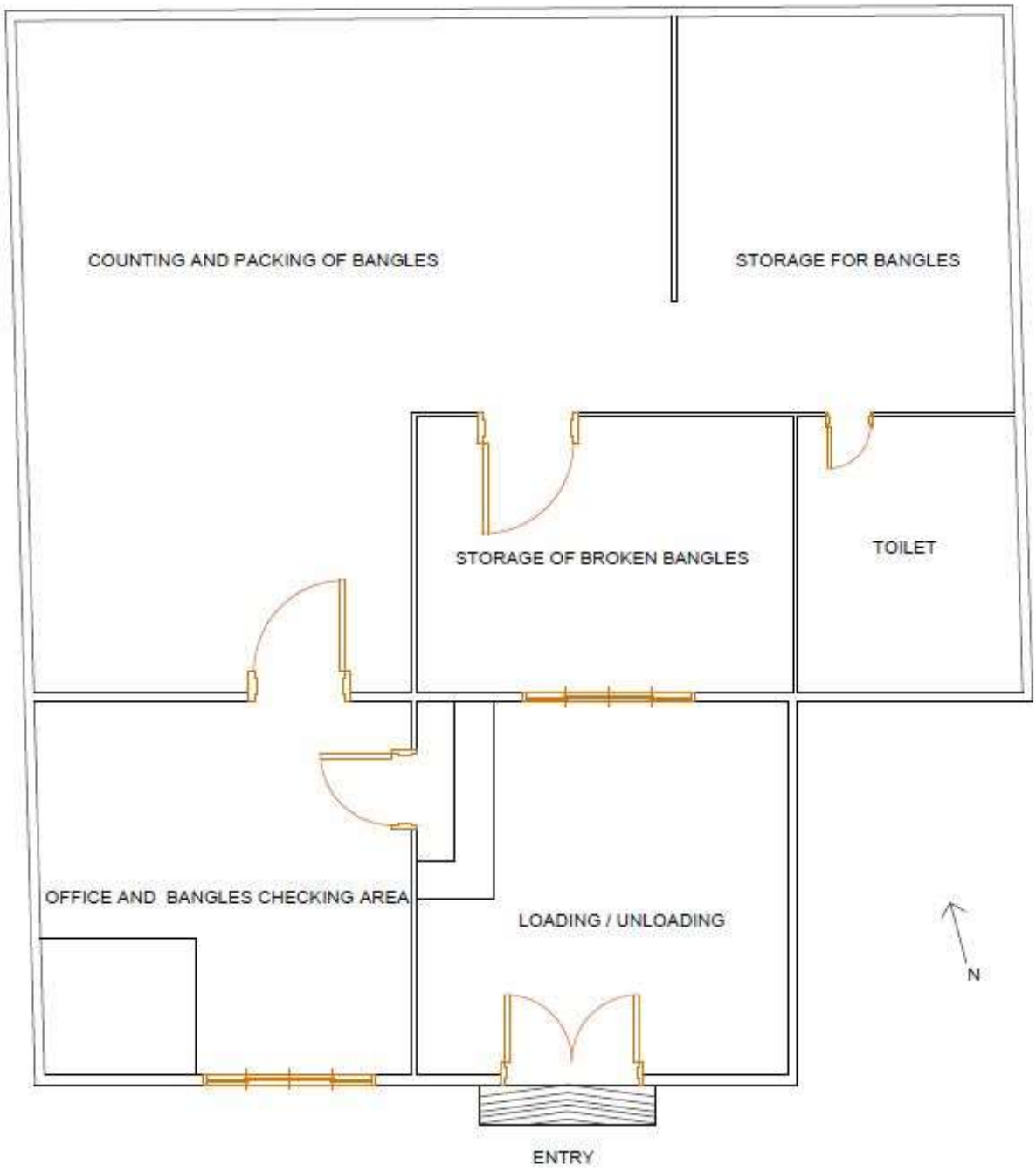



*Figure 61: Plan of site 5 MW*

This is a home based setup in residential area and is the last stop for bangles before entering retail market. The final touches and packaging are done at this unit.

*Table 10: process of site 5 (MW)*

| Process name | Related picture |
|---|---|
| Storage of bangles |  |
| Checking and counting of bangles |  |
| Final touches to the bangles |  |
| *Dabba* (box) packing in group of 24 and 12 |  |

**Observation**

Site 1: Bangle manufacturing is the oldest traditional skill in the city.
320 bangles are packed in the bundle which is called tora locally.
Site 2: The workers who do the joining of bangles are called judaiyas and the process is called judai. It is done on kerosene lamps and workers of all age groups are involved. It is mainly done in small household setups where the whole family is involved in the process.
Site 3: The whole colouring unit is set up on the first floor of the residence.
Inspection for broken bangle and quality of colouring is done frequently.
From here bangles are packed and sent to packaging units.
All the transportation of the bangles is by hand pullers called thela.
Site 4: It is a home based decoration unit where all the family members and neighbours were involved.
Raw material like paint and brushes were need to complete the process.
Site 5: This was a packaging unit which bring product to the market.
The bangles are packed in group of 12 and 24 numbers depending upon the requirement.
The broken glass from the site is sent to industrial setup for recycling purpose.

## 5.3 Art ware

Third is the art ware industry which involves the manufacturing of product like show pieces. To understand the process and craft involved study of site was needed. From manufacturing and transportation.

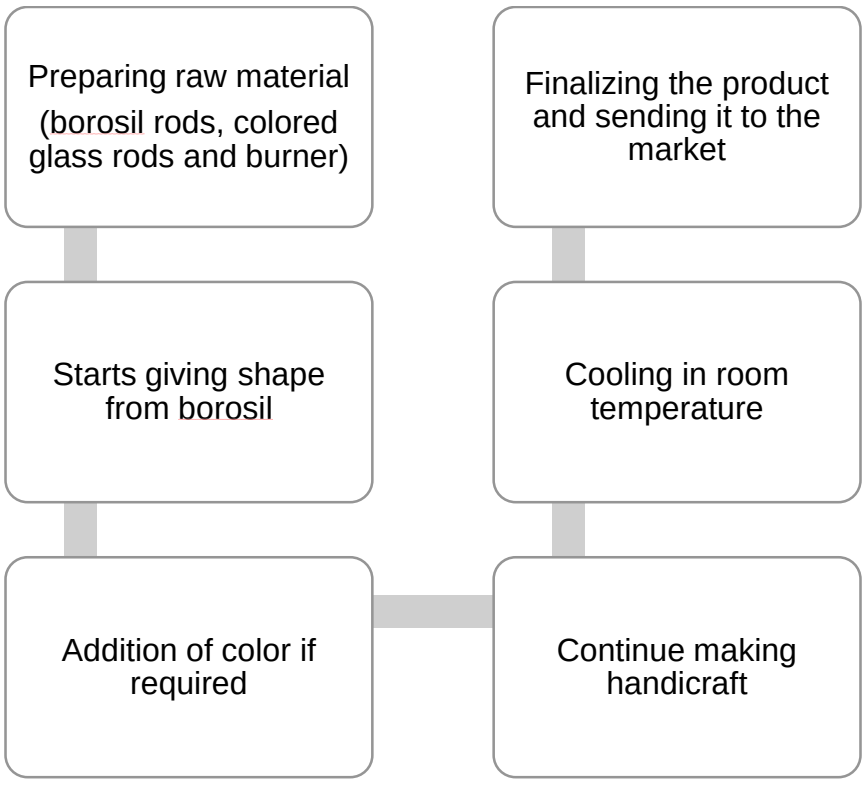


*Figure 62: Process of making artware*

Process of manufacturing art wares involves various stages

1. **Preparing raw material:** raw material required to make art ware are borosil rods and burners. Borosil rods are readily available in the market which can be procured from local suppliers.
2. **Starts giving shape:** From borosil rods on a burner the artisans starts giving desired shape from the rods.
3. **Addition of colours:** If required colours are given over burners from coloured glass rods to the sculpture.
4. **Cooling:** These are cooled down in room temperature.
5. **Finalizing and transportation:** Finalizing the desired design either mixing it with other small elements or making a base for it the product gest finalized and gets transported to transportation hubs in autos duly packed by the artisan and it's family.

The art ware manufacturing is a house based setup and involves contribution of whole family.

The areas marked homebased setup majorly situated in *suhag*[18] *nagar* and labour colony. From these units these are sent to packaging units and later to retail market. The major hub for retailing of these products is SN (Sarojini Naidu) road. For transportation to other cities it is sent to transportation hubs situtated along NH2 in areas marked as Usaini, Bypaas and Rajaka taal. Although the business is spread in whole city but the major areas are marked in the map.

[18] Suhag: it means married

*Figure 63: Network map of art ware makers*

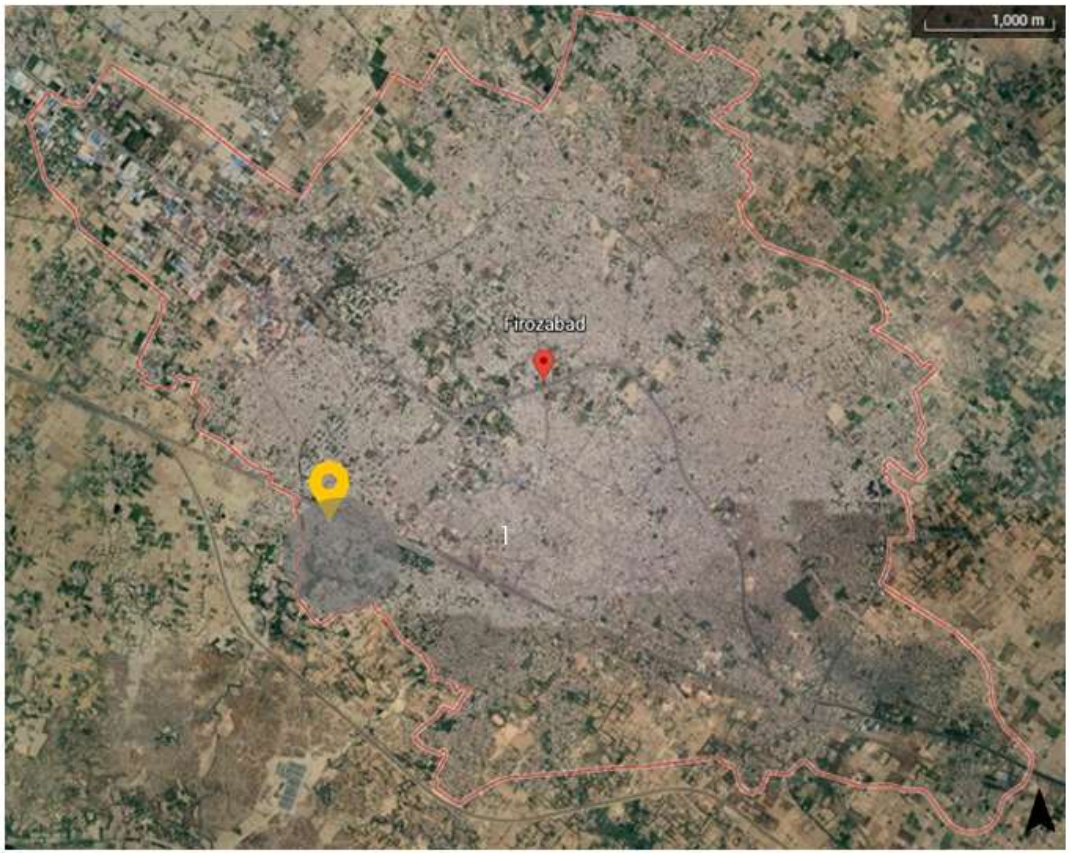



*Figure 64: Location map of art ware makers*

### 5.3.1 Site visit

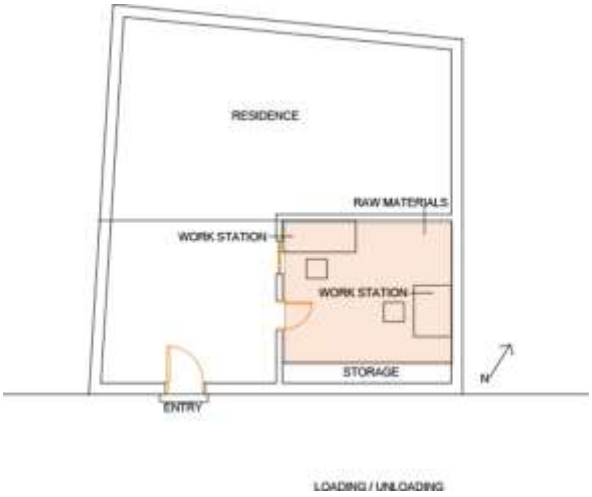



*Figure 65: Plan of site AW*

This is a residential setup. Where visitors are allowed till workshop not in the residence as a part of the site. It is just a room where 2 artisans can work. In this workshop male and female both members were involved in making art ware items.

*Table 11: process of site 1 (AW)*

| Process name | Required pictures | Tools |
|---|---|---|
| Preparation of raw materials |  |  |
| Start shaping from borosil rods on burner |  |  |
| Addition of colors |  |  |
| Continue producing the design |  | |
| Cooling in room temperature |  | |

| | | |
|---|---|---|
| Finalizing the product |  | |

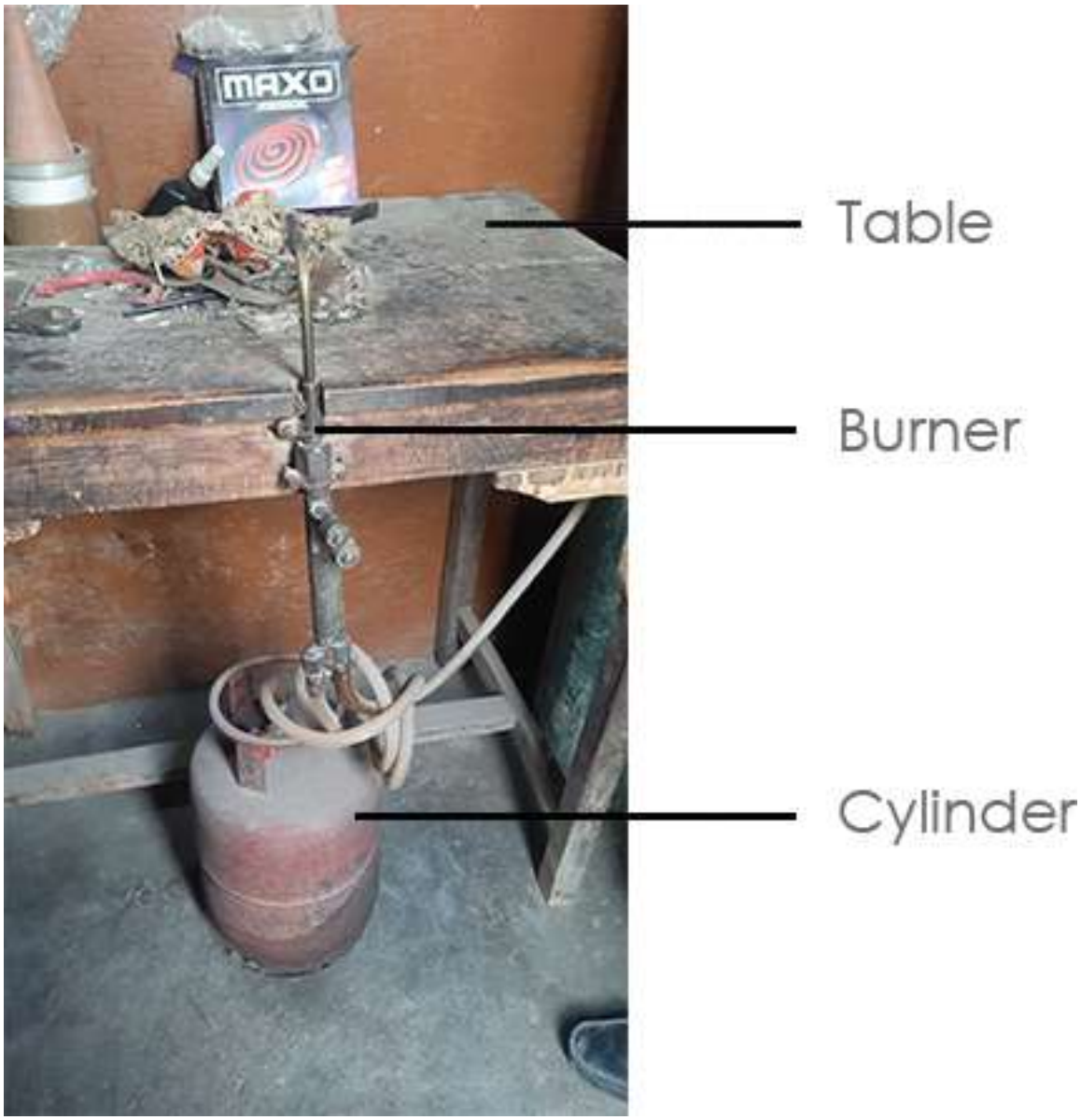



*Figure 66: Basic setup for making art wares*

**Observation**

The main artisan works with whole family including his wife and children.
He is in the profession since 35years and taught the skill form his elder brother who learned it from an artisan from Mumbai.
The locality is involved in art ware work in their households.
The setup do not require large space or many tools.
Borosil the key material is imported from Mumbai, rest gas cylinders and colored glass rods are available locally.

A table and chair is required to make these art ware.
Transportation of these art ware is through road.
There was no proper storage of finished products.

While doing various site visits some historical evidences were noted and recorded.

## 5.4 HISTORICAL EVIDENCES IN FIROZABAD

The structures of the Firozabad which are architectural marvels are majorly *havellis* and institutes. These *havellis* and institutes dates back to 1919 starting from SRK College.

**Shri Ram Chandra Kanhaiyalal College (SRK College)** was established in 1919 for better educational environment in city. Some of the highlighting features of the structure are onion dome, octagonal dome chattri, semicircular arch, arched corridor, jallies, spandrel[19], finial[20], lotus decoration, decorative spires, dado detailing and rich landscape points out towards Islamic architecture influence.

*Figure 67: Shri Ram Chandra Kanhaiyalal College*

### *Havellis* in 1920s

**Residence of Mushtaq Ali Khan** was built before 90years ago (around 1920s). He was a glass factory owner and at that time family size was 80-90 people now it house 25-30 people. It has burial of original owner in their residence compound and situated in *purani mandi*. With detailed rock cut exterior with floral detailing, semicircular arches, glass beading used in interior arches, German tiles and wooden batten roof are some features of this residence.

[19] Spandrel: Between one sides of an arch's outer curve, a wall, and the ceiling or framework, there is an approximately triangular void.
[20] Finial: a decoration at the object's top, end, or corner.


*Figure 68: Residence of Mushtaq Ali Khan*

**Rambabu ji ki *havelli*** was built around 100years back. Any evident history could not be found due to change in ownership. It is now used as residence purpose. Original owner could not be traced as this property was bought by Rambabu ji long back and after his demise there is no one who might know about it. It is a marvel covered in detailed rock cut exterior and some other features are chatrris, symmetry in elevation, pointed arches, use of German tiles and beautiful landscape. Slight changes had been made to original structure mainly in interior.



*Figure 69: Residence of Rambabuji*

***Havelli* in 1939**

**Residence of Mehboob Ali Khan** which was made for residence purpose in 1939. Now two families reside in this house with some part of the house locked up. This residence have burial of Mehboob Ali Khan in their compound. It is called Shauqat Manzil now. It is built in area of 1.5hectare and situated in purani mandi. Detailed rock cut exterior is common but some add on features are like multifoliated arch, detailed gates and detailed railing extending till balcony ceiling supported on parapets and brackets.



*Figure 70: Residence of Mehboob Ali Khan*

*Havelli* in 1947

**Residence of Late. Shree Gopi Nath Aggarwal Jain (Raja**). It was made for the purpose of residence in 1947 now it serve the motive of residence and some area is on rent for shops. It is 100'X100' property. No changes had been made in exterior only interiors had been changed as per usage. Mosaic[21] stairs detailed and decorative rock cut exterior, semicircular arches, jallis in railing and lotus detailing are attraction of the structure. A stone locally called laal pathar was used in construction (not to be confused with sandstone).


*Figure 71: Residence of Gopi Nath Agrawal*

**Residence of Chadamilal Jain** has two parts and built with rock cut detailing in columns, railing and decorative places like entrance and mosaic art. A whole wall is covered in mosaic making it felt like a painting. Now is used as packaging unit and conference and a little part for residence purpose.

[21] Mosaic: In art, mosaic refers to the ornamentation of a surface with designs made out of closely spaced, usually multicolored small bits of stone, mineral, glass, tile, or shell.

*Figure 72: Residence of Chadamilal Jain*

**Hospital in 1951**

**Ram Labhaya Arora memorial** was built in 1952 by Ramji Arora for betterment of citizens and it is built in mosaic art and railing jaali which is still in working condition for free for under privileged crowd.

*Figure 73: Ram Labhaya Arora memorial*

The most important and earliest built structure **Tomb of Firoz Shah** built in 16$^{th}$ century is still standing strong along with some changes in the original structures but some original features can be traced like octagonal plan, symmetry in elevation, Islamic furnishings, dome on supported pendentives, arches, niches, sandstone brackets and parapets, sandstone *jaali, chattri* and designing features.

Construction technique used in tomb are a plinth of 560mm of stone is made over it lakhori brick structure covered in lime mortar whose thickness is 1090mm. On the series of arches dome is places on pendentives. Use of sandstone material is visible in elevation like parapet, brackets and *jaali*. Octagonal sandstone *chattris* can be seen with the series of arches and columns fitted with each other. Parapets are supported with sandstone brackets. Niches and arches can be seen on elevation of the tomb as non-load bearing members.

Inference of the tomb are

- All the elements are from Islamic architecture. Adding architectural value.

- Features resemble earlier built structures nearby like in Agra and Delhi.
- It comes under religious psychology structure creating religious value.
- It is of utmost importance to people with all the emotional values attached.
- None of the neem tree is cut down all are well maintained hence adding ecological value.
- The structure showcases the values from 16th century also it house the tomb of firoz shah the founder of the city hence adding evidential value.
- The tomb is burial place of Firoz shah the founder of the place and is used as mausoleum hence it has functional value

*Figure 74: Tomb of firoz Shah*

From architectural study detailed rock cut elevations, arches, use of German tiles, influence of Islamic architecture and mosaic were common in the areas. Mosaic art had place in every element from floor, wall art and domes. It was done with several materials like stone and glass. All of this architecture is diminishing due to lack of care and maintenance over time. Hence Firozabad is lot more then glass industries like heritage value and its evolution journey which no one recognize and value now. Glass is part of Firozabad and a major one which also need all the respect due to it’s undervalue over years.

# CHAPTER 6. OBSERVATION

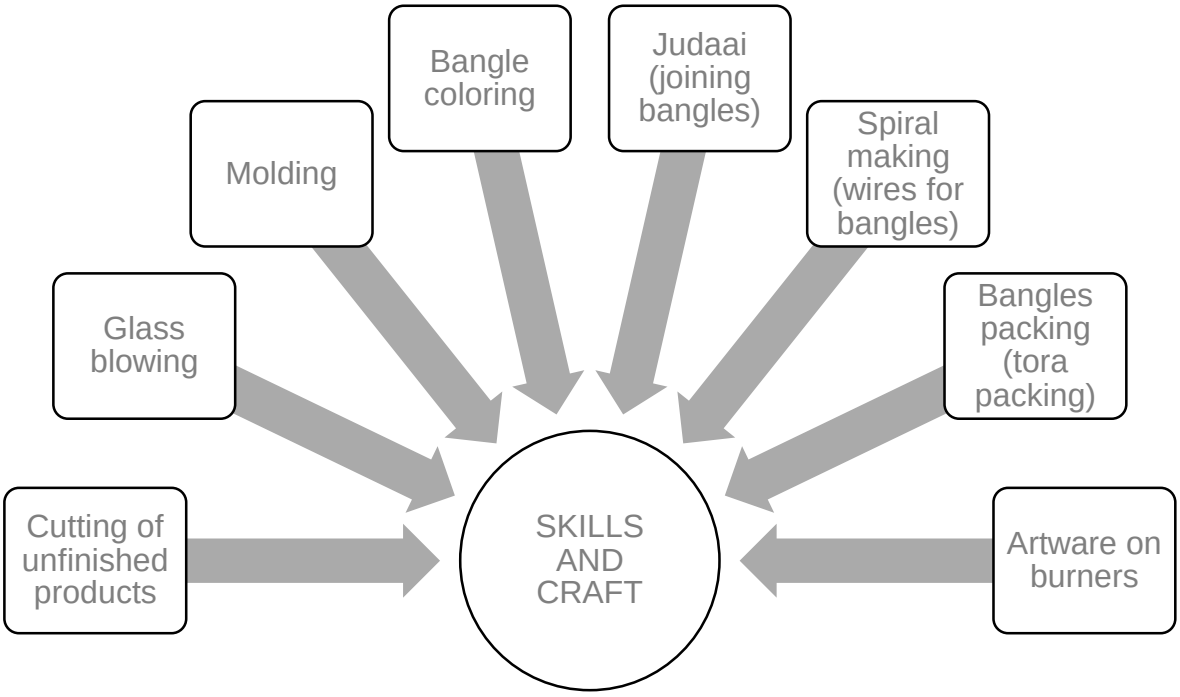



*Figure 75: List of skills and crafts noted from site visits in glass industry*

*Figure 76: Cutting and finishing of glass products*

*Figure 77: Glass blowing and moulding*

*Figure 78: Bangle colouring and judai*

*Figure 79: Spirals making*

*Figure 80: Bangle packing*

*Figure 81: Art ware making*

Industries are heavily depended on artisans for finished products and artisans on industry for unfinished products. But there are some gaps noted in existing system.

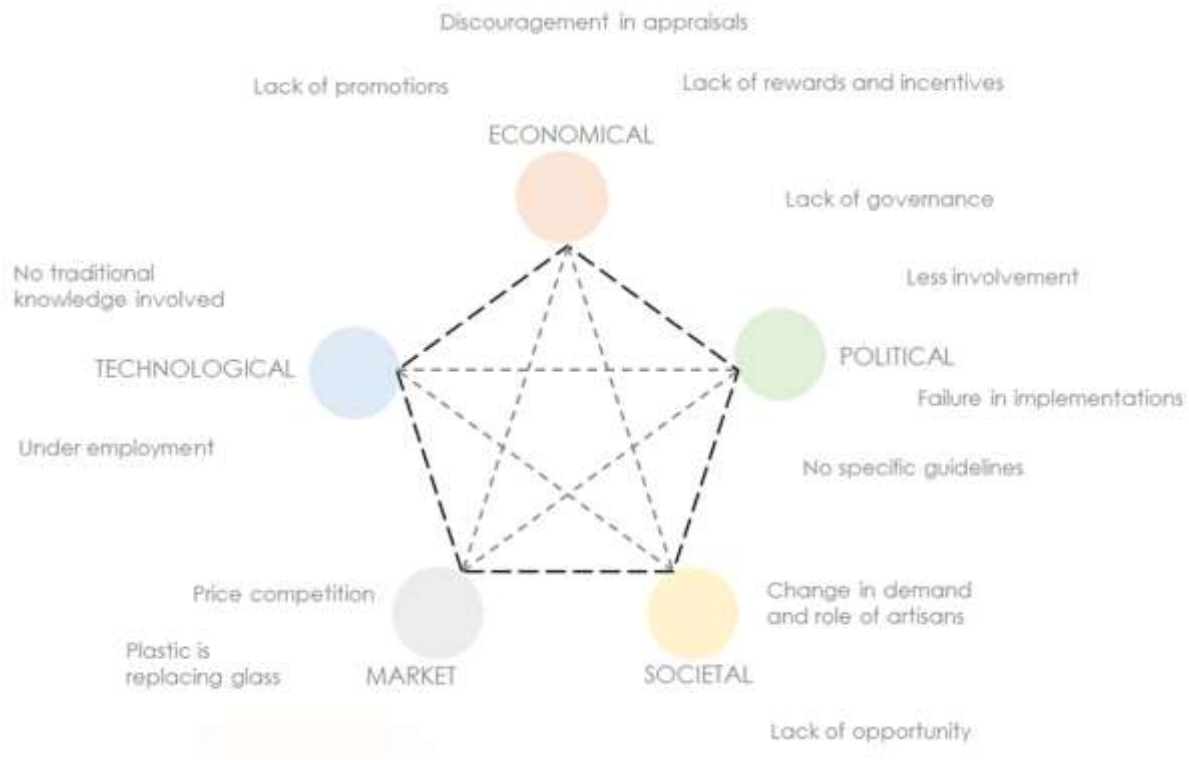



*Figure 82: Gaps in the existing system*

**Economical**

- Lack of rewards and incentives

There is no proper incentives other than daily wages for workers.

- Discouragement in appraisals

While appraisals no proper appreciation/acknowledgement of work.

- Lack of promotions

There are no promotions, an artisan can be doing same work for years and there would not be any promotions or acknowledgement

**Political**

- Lack of governance

No proper government body takes care of glass cluster

- Less involvement

Political parties lack in involvement for any help for the community

- Failure in implementations

- No specific guidelines

**Societal**

- Change in demand and role of artisans

-Change in architecture, material and techniques

- Lack of opportunity

-Opportunities are lacking for artisans to showcase their knowledge and skill

**Market**

- Plastic is replacing glass

-Plastic is involved in the process of packaging and also replacing glass. Being a non-sustainable material it is replacing glass which effects the market of glass.

- Price competition

-The products are available in every price from highest to lowest

# CHAPTER 7. ANALYSIS

The importance of these associations and craft centres depends on improving production. Along with technology, technology contributes not only to the formation and transfer of these cultures to other communities, but also to the formation of a major part of the public consciousness of belonging to a community with a craft-type relationship. Although it is the only industry in which artisans can work, it is a low-skilled, labour-intensive industry that relies mainly on skilled workers to organize production processes. It is the only skill you acquire as you get older. In this case, machine assistants are not recommended, because the industry does not allow artisans to make finished products with machines (e.g. Jewish work on bracelets, decoration of various products, management of works of art, etc.). Different from time to time you may have machines that help you get the job done, but you don't get it done.

Spatial analysis:

Industries- Lack of facilities like no resting space, lack of lighting, in bangle industries the order of the work is not arranged in a spatial manner and there is no proper standards of working spaces.

Household setups: No furniture for decoration setups, no proper working environment they just work in their homes, and lack of storage spaces.

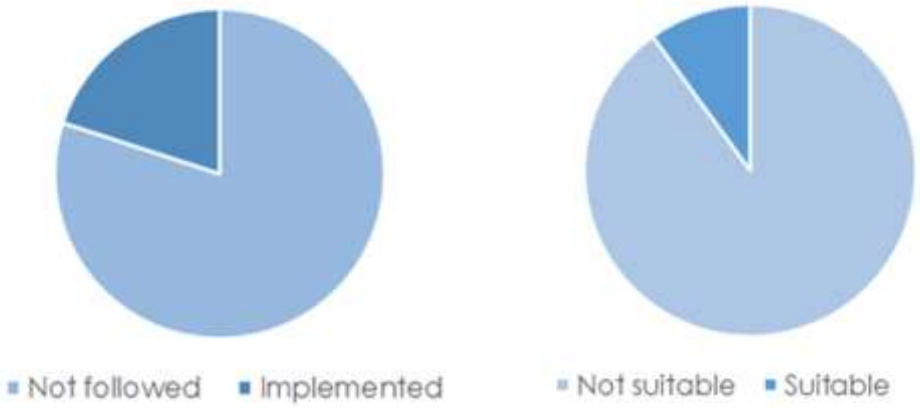



*Figure 83: Rules followed or not pie chart and working condition suitable or not suitable chart*

*Figure 84: Working conditions in industries and household setups*

# CHAPTER 8. RECOMMENDATORY FRAMEWORK

### Approach to conservation

To protect and manage existing skill in a sustainable manner considering all parameters.

To extend and build upon a knowledge with the existing information for its successful implementation.

Approach to understand these skills present today for its betterment and learning experience for future.

### Documentation and recognition

Preparing database of the traditional knowledge system. A proper database for all the traditional knowledge system city is offering and better documentation on promoting art not only the drawbacks of the industry.

Understand the values and significance. The value and significance of the industry is high which is understood by the statement that Firozabad is glass city of India which needs to be acknowledge at first.

### Participation and involvement

Interaction and collaborations between the artisans of similar interests which helps enhance knowledge. For example artisans of Venice, as we know city of Venice is facing problems due to rise of water and the artisans are suffering too we can propose an exchange program among artisans which will help uplift both the arts and artisans.

Provision to improve incentives and appreciation of the craft and work. Appreciation of artwork is needed for better performance and motivation.

### Strategies

Suitable working condition for men and women.

To sustain their livelihood with increase in income and readily approachable market by everyone.

Support of legislations and implementations which helps enrich economic status.

Some incentives and fixed pay scale won't affect anyone so for betterment and sustainable future of the industry this is hence needed

**Approach**

Motivate coming generations by small talks, lectures and seminars for sustainable future of craft. Many youth is shifting to metro cities for better job opportunities. It is important for them to realize the potential and strength of the industry and also motivate them to contribute in the same. As they are the holders of future they should be acknowledged at various levels.

Artisans, craftsmen and industry experts as co participants in shaping the future practices. Communication and connection among all is necessary as network might get interrupted due to which information is wrongly transferred.

*Figure 85: Interaction session for youth to encourage*

*Figure 86: Seminars and meetings to uplift the industry*

**Action**

To increase awareness improve safety and security for the artisans by providing necessary facilities. Safety in manufacturing units and some incentives if something gets wrong. Some safe environment for women workers can be introduced so they can shift from their homes to working units.

Updating information about schemes, incentives through different mediums for more participation. The information about the same should be published in local newspapers and advertisement need to be localized as not everyone have internet access.

Provide guidelines for all the categories of works. These guidelines will help in uplifting some of the areas of the industry.

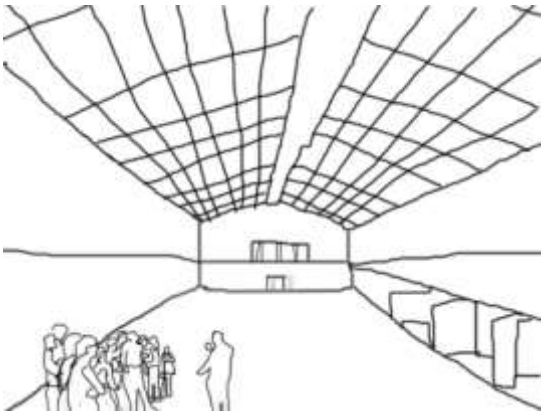


*Figure 87: Visitor management during working hours*

# CHAPTER 9. BIBLIOGRAPHY

Mamata Chaudhuri 1980, infinity foundation, The technique of glass making in India, available from: https://www.infinityfoundation.com/mandala/t_rv/t_rv_agraw_glass_frameset.htm

Kailash Kumar 1980, shodhganga, Prospects and problems of glass industry in India, Available from: Shodhganga

Toshiyuki Kono 2009, research gate, Intangible Cultural Heritage and Intellectual Property: Communities, Cultural Diversity and Sustainable Development, Available from: research gate

Government of Uttar Pradesh, District Firozabad, *History,* Available from: https://firozabad.nic.in/history/

Anil Yadav 2001, *Urban History of Firozabad*, Firozabad

District census handbook, 2011, *Firozabad edition*, Available from: https://cdn.s3waas.gov.in/s3a4a042cf4fd6bfb47701cbc8a1653ada/uploads/2018/07/2018072949.pdf.

Banglapedia, 30August2021 (edited), *Grand Trunk Road,* Available from: https://en.banglapedia.org/index.php?title=Grand_Trunk_Road

National center for design product and development, 14june2012, *Product development program for export on glass at Firozabad*, Available from: issue.com

Rahul Garg 2014, Industrial Relations in the Glass Industry of U P, Available at: Shodhganga

Gunjan Sharma 2017, the socio-economic plight of artisans in the bangle industry - a comparative study of north india firozabad (glass bangle) and south india hyderabad (lac bangle), Available at: academia.com

Anushruti Singh 2018, Glass apart: the story of 200 year old Firozabad's glass industry, Available at: Firozabad online.in

UNESCO 2020, UNESCO Creative Cities Network for sustainable development, Available at: UNESCO website

Working the flame 2020, List of glass blowing tools, Available at: working the flame website

Teri University 2016, FIELD VISIT REPORT ON BANGLE FACTORY, FIROZABAD, UTTAR PRADESH, INDIA, Available at: Teri website

TERI supported by the Swiss Agency for Development and Cooperation (SDC) 2015, Cluster Profile Firozabad glass industries, Available at: SDC website

Sakshi Gambhir 2010, Glass Work of Firozabad, Available at: Dspace

Nasiruddin 2012, Assessing the Impact of Local Socio-Cultural Milieu on Social Upgrading and Challenges to Inclusive Development of Glassware Cluster Firozabad, Available at: http://www.dcmsme.gov.in/tcsp/Program%20Overview/Firozabad_V1.pdf

Arnaud Kaba in collaboration with Shankare Gowda 2021, OF GLASS, SKILLS AND LIFE: CRAFT CONSCIOUSNESS AMONG FIROZABAD'S

GLASSWORKERS, Available at: https://hal.archives-ouvertes.fr/hal-03206522/document
Pankaj Goyal 2003, Story of Glass in India & the World, Available at: https://www.infinityfoundation.com/mandala/t_es/t_es_goyal_glass_frameset.htm
UNESCO 2003, Traditional craftsmanship, Available at: UNESCO website

Field interview
Aggrawal, N. (2021, November 05). Management comittee Chandwar. (Author, Interviewer)
Agrawal, J. L. (2021, november 02). Journalist. (Author, Interviewer)
Jain, D. (2021, October 13). Resident since 1951. (Author, Interviewer)
Jain, M. (2021, October 10). Grandson of Chadamilal Jain. (Author, Interviewer)
Jain, P. (2021, October 20). Resident and caretaker of Chandwar properties. (Author, Interviewer)
Jain, Y. p. (2021, November 02). Management comittee Chandwar. (Author, Interviewer)
Yadav, A. (2021, October 10). PHD on Urban history of Firozabad. (Author, Interviewer)
Md., S. (2021, october 10). Worker in bangle industry. (Author, Interviewer)

## Glossary

- Mansabdar: Means servant in royal Mughal court
- Bagh: Means a park where people of every religion, caste or age can come.
- Bhainsa Bhatti: homemade kiln to mix and milt glass components
- kadechhal ki chudi: bangle made of mixed components (raw material)
- Laad: locally available colour use to colour molten glass of bangle preparation
- Sheeshgarh: Artisan community
- Belan Bhatti: furnace used to create spirals of bangles
- Toda: bunch of 320 number of bangles
- Judaiyas: person involve in joining bangles
- Chaklai: process of packing bangles
- Putaiya: The person who color the products
- Zariwala: Person who do glittery work on bangles
- Thelas: These are carts on four wheels and wooden planks joined
- Suhag: it means married
- Spandrel: Between one sides of an arch's outer curve, a wall, and the ceiling or framework, there is an approximately triangular void.
- Finial: a decoration at the object's top, end, or corner.
- Mosaic: In art, mosaic refers to the ornamentation of a surface with designs made out of closely spaced, usually multicolored small bits of stone, mineral, glass, tile, or shell.

# SHEETS

# INTRODUCTION TO THESIS

## AIM
Research journey of glass industry from craft to industrial heritage.

## OBJECTIVE
- To study the historic evolution of glass industry in India and Firozabad.
- To document craft of glass making and its various products.
- To identify traditional knowledge behind glass making.
- To study the interrelationship between craft, community and industries.
- Understanding the paradigm shift from craft to industries.

## SCOPE
The scope of the thesis is to study the Traditional knowledge system of making various glass products in Firozabad in the present context. Understanding the network and requirements of glass industry. Study of the community, process and spaces related to glass craft.

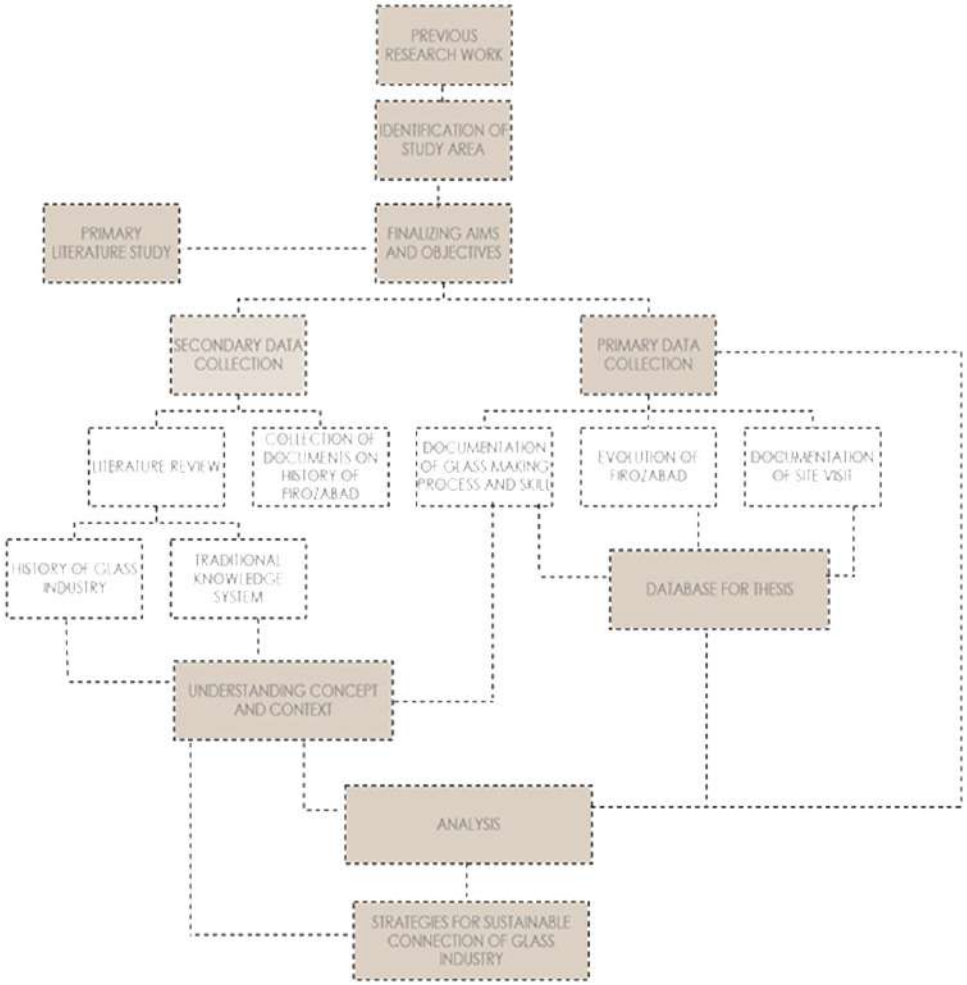
## LIMITATIONS
- The thesis will be limited to recommendatory framework no proposals will be suggested.
- There is no much literature material about craft and history of Firozabad.

## NEED OF THESIS
Firozabad glass work was a house hold work initially, the first industry setup happened in 1910 before that the glass work was done in houses and time unremembered. The skill and efforts of the labors had been passed to generation to generations. The detail study of interrelation between craft and industry is required to understand the future of glass making in Firozabad.

## THEORETICAL FRAMEWORK/APPROACH
- To study traditional glass making skill of Firozabad by various site studies.
- To study the historical evolution of glass in global, India and Firozabad timeline.
- Evolution of craft into full-fledged industry, which is a major economic asset to the city.

## EXPECTED OUTCOME
- Documentation of networks and connections of glass cluster via site study.
- Significance of glass industry in Firozabad as industrial heritage.
- Recommendatory framework of sustainable development of glass cluster of Firozabad.

## METHODOLOGY





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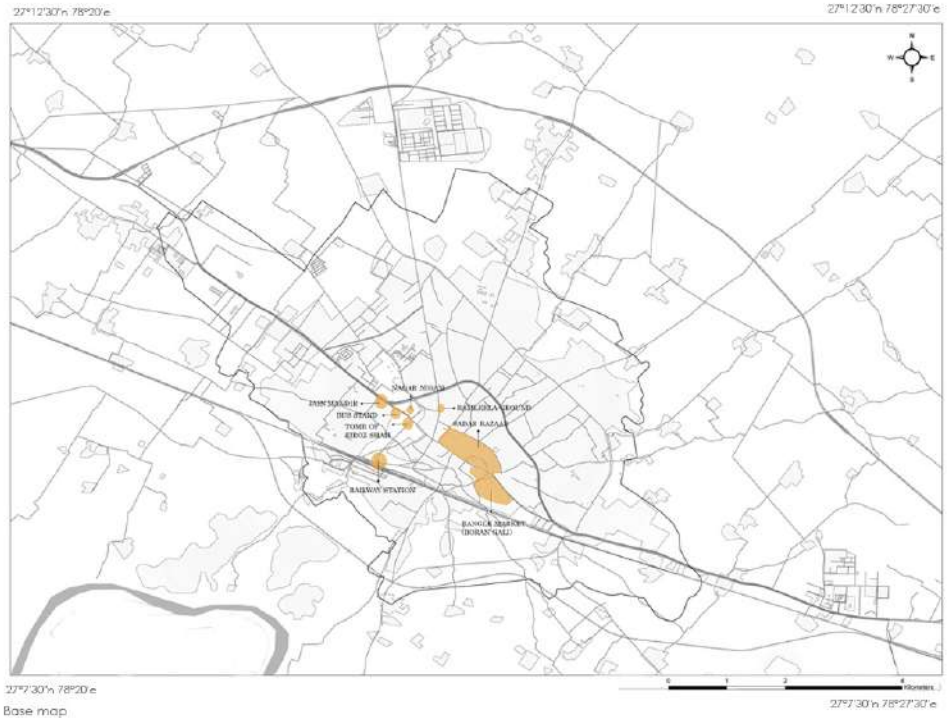
# GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

# INTRODUCTION TO SITE

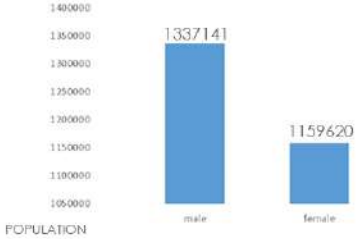


Base map

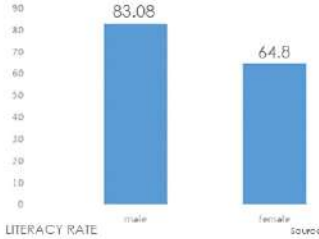
Firozabad is Uttar Pradesh's district headquarters. Firozabad district was established on 5Feb 1989. The industry of creating glass bangles is well-known in the city. The towns of Shikohabad and Tundla are located in the Firozabad district. Tundla is situated to the west and east of the city is Shikohabad. It shares a boundary with four districts Etah, Mainpuri, Etawah and Agra. Etah district in the north and Mainpuri and Etawah in the East. Glass bangles are the primary business in the area. The river Yamuna is in the southern direction of the district. The space of the locale is about 0.8% of the all-out space of U.P. Furthermore, the population is 1.1% of the all-out populace of U.P. Around 73.6% population is living in a rural territory. It has extreme winter and summer seasons. For the most part, an area is a plane and its slope is from northwest to south. National Highway 2 passes through the city.
The city is well connected with railway and bus services. Its proximity with Agra helps to florish glass business among tourists.


Location of Firozabad

## DEMOGRAPHICS



POPULATION



LITERACY RATE

Source: district census book

## INTRODUCTION TO GLASS INDUSTRY

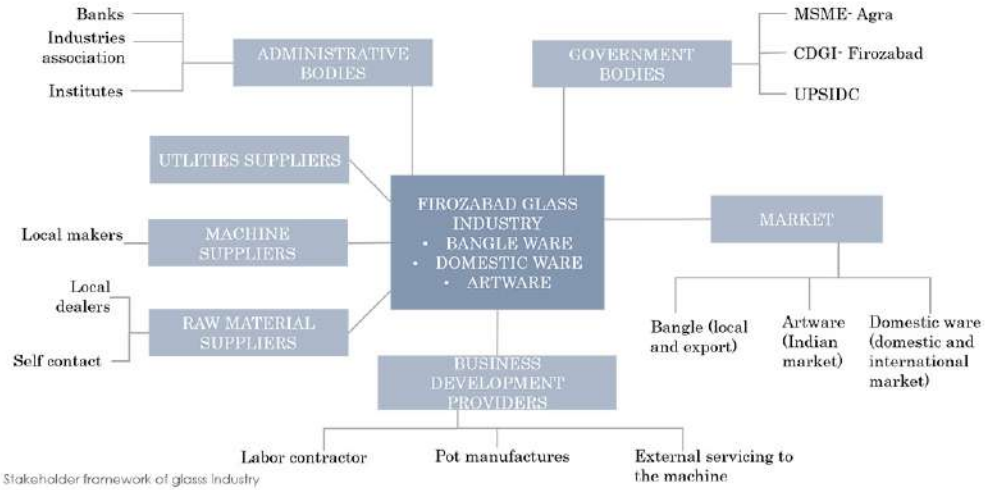
Firozabad city is also called the Glass City of India or the city of bangles. The city produces a multi-range of glass items and related items on shifted plans and styles to enhance the domestic and decoration collection. The city is one of the driving producers and exporters of glass; about 50% of the glass production is exported.
The glass manufacturing business comprises major businesses, little scale businesses and Gail units. Different glass items manufactured by these industries were bangles, kada, kangans, containers, glasses, candle stands, bloom vases, decorative lights and numerous more. Glass craftsmanship products and glass household products are the sorts of glass items fabricated in Firozabad glass businesses. The show businesses utilise natural gas as fuel. The glass blowing is done through a pot heater and glass displaying is done through a regenerative tank heater.


Source: aajtak
Bangle manufacturing


Glassware manufacturing


Source: Dcource
Factory


Source:Dcource
Glass artware manufacturing



Stakeholder framework of glass industry

## FESTIVALS AND SOCIAL GATHERING

A variety of religions can be seen in the city. Religions like Hindu, Muslim, jain, Arya, Christian, Sikh and Parsi. The population of Parsi's is almost extinct so is that of Christian. The majority of the people are from the Hindu, Muslim and jain communities.
Main social gathering events in the city are Moharam, Ramleela, Dushera, Holi, Mahadev, Ram Navami, Sawan mela, Jain mela, Diwali mela, Sufi ka mela
All these events are celebrated over the year. These events are mainly religion based but it had been witnessed that everyone despite any religion or community participates in every event with utmost respect and enthusiasm.


Source: aajtak
Ramleela mela


Source: aajtak
Jain mela


Moharam celebration

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# PHYSICAL FEATURES

## LOCATION

Firozabad location

Source:https://il.wp.com/ebook-pdf-download.com/wp-content/uploads/2021/07/Blank-Political-Map-of-India.gif?resize=719%2C837&ssl=1


Firozabad boundary

Source: Google earth

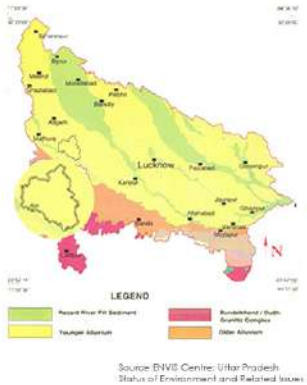
Firozabad lies on the south west end of Uttar Pradesh at 27 ° and 27 ° 24' (north) latitude and 77 °60' and 90 °4' (East) longitude. To the north lies the district Etah, in the east lies Etawah and Mainpuri. In the south there is river Yamuna and boundaries of Agra district and in the west it touches the boundaries of Agra district. It covers an area of 2407.0 Sq.km

Source:District census handbook


Firozabad toposheet 2011

Source: Survey of India

## GEOLOGY

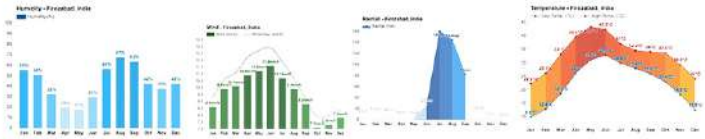



Source: ENVIS Centre: Uttar Pradesh
Status of Environment and Related Issues

The area has alluvial soil giving rise to agriculture in the region.
Soils of Firozabad are typical of those in the upper Gangetic alluvial plain. The diversity is mainly
Porosity and texture of alluvial soil provide good drainage and other conditions favorable for agriculture
Due to the influence of various drainage, canals and partially due to the presence of Yamuna river.
Alluvial soils remove sediments and nutrients flowing in the adjacent water. They can also remove other contaminants from rivers and improve water quality for downstream communities

Source: District census handbook
soil.org

## CLIMATE

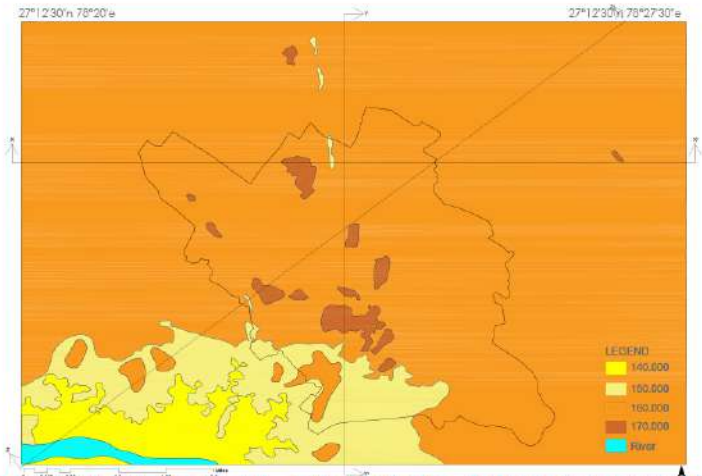


Source: Weather atlas

Maximum humidity recorded in the region is 67%. High humidity results in verrandha planning of the residences.
Highest wind rate which is 11.6km/hr. results in courtyard planning for better ventilations. In many residences these courtyards acts as working space for whole family.
Maximum rainfall is recorded in month of July which is 160mm. Due to not proper drainage in the area in rainy season water clog is the major issue.
The main sources of irrigation are government and private small irrigation system.
Maximum recorded temprature of the city is 43.3°C in the month of June. The artisans find it really difficult to work in this weather as the use of fire is involved in every stage.

Source:District census handbook

## CONTOUR MAP



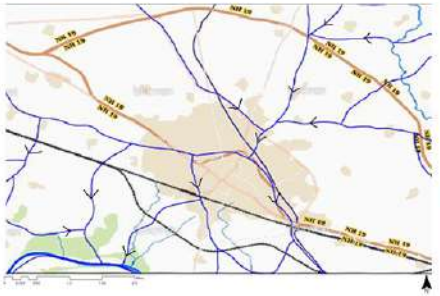

SECTION AT XX'

SECTION AT YY'

SECTION AT ZZ'

CONTOUR ANALYSIS
Contour range from 140 to 170m.
The major difference in the contour is visible near the river bank area.
The majority of the area is flat land making it feasible for built structures.
Flat land shows that contours had been altered as per the demand of the land.
Drainage is according to slope of terrain, the course being North- West to South-East.v

## WATERSHED MAP



WATERSHED MAP

Source: BHUVAN

WATERSHED MAP ANALYSIS
There are total of 18 watersheds.
The flow of the water is towards the river Yamuna as studied through contours of the area.
Majority of the area is flat land which lead to accumulation of rain water in certain areas within the city due to lack of slope.
Well irrigated by the river Yamuna and its tributaries.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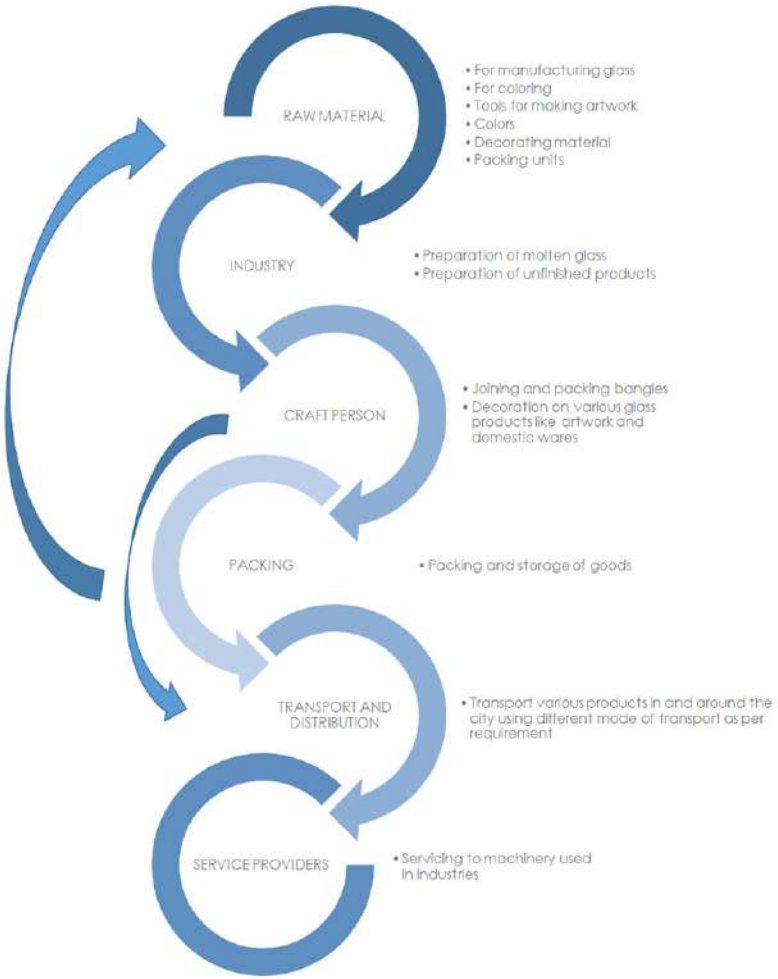
# COMMUNITY

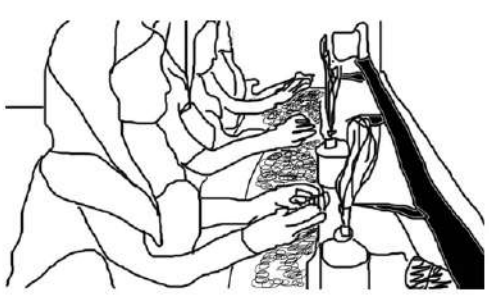
## ROLE OF COMMUNITY

Firozabad's glassworkers explains how their collective subjectivity, their craft consciousness has been shaped by their link to the glass, to the tool of production and its evolution, and by the city's social and political context.
In the factories, the workforce is normally monitored and recruited according to the thekedari system: skilled and trusted workers are given the possibility to recruit their teams among their relatives, from the city's labour market, or from the surrounding villages. There are almost no managers who have got a formal degree, especially in the bangles industry; and in the bigger automated factories, only a few engineers. It is the skilled workers, often from the Sheeshgarh community, who also do the jobs of overseer and supervisor to check the production, even invent new chemical batches, or of the specialists who design bangles and glass samples. Except for the very few engineers and managers who work in the big companies, the merchants, and of course the industrialists, almost all the inhabitants of Firozabad belong in some way to the glass working classes. Their social position within Firozabad's working classes is determined by their level of skills

To learn, a worker needs to be linked to a 'master' (Ustad) with whom he will develop an unequal relationship of patronage, which is typical of the skilled segments in India's informal working sector. That ustad can be someone from the feild or from the family.
The identities at work can be either linked to a common confrontation of the working conditions, to the belonging to a company, or to the belonging to a corpse possessing a certain craft.
Their *mohallah* (locality) is full of small glass-sculpors' workshops, and a strong solidarity can be noticed between workshop owners and those who can't afford to buy a gas-driven burner machine and thus must pay other craftsmen's sheds to work their glass, for the cost of gas and raw material. Therefore, many of these sheds used to work night and day almost every day. Women are employed in home based craft setups.
The community of practices becomes a tool of solidarity, of mobilization and defense of the collective interest around the way of life and the business implied by the craft.




Heirarchy of work in glass cluster



Women working in home based setups

A basic industrial setup

| | |
|---|---|
| Gundivala | One who takes molten glass out of pot furnace |
| Bhattivala | Who color the molten glass for bangles |
| Sikala | One who reheat the molted glass |
| Pattivala | Who takes care of the reheating oven |
| Tarvala | Who draw glass wire from molten glass |
| Tora vala | Who cut and pack bangles and process is called chaklai |
| Judaiya | Who join bangles over burners |
| Zarivala | Person in charge for decoration of the bangles |

Heirarchy of workers working in bangle making sector

| | |
|---|---|
| Fire man | One who takes care of furnace 24/7. It require 2 people |
| Blowing wala | Person who takes molten glass and gives shape by blowing |
| Chatiya | One who remove all the irregularities from the semi finished product |
| Blowing Adda | Area where process of blowing is done |
| Adde vala | Manager of decoration firms |
| Putaiya | One who color the products |
| Khilone vala | One who make art works |

Common terminologies in glass manufacturing industry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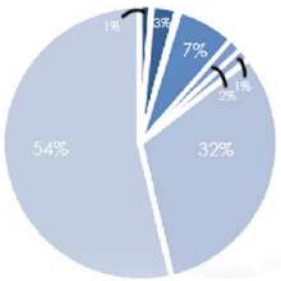
# SOCIO-ECONOMIC

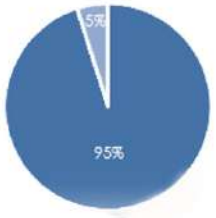
District Firozabad ranks 38th in terms of population in the state. The percentage share of urban population in the district is 33.4 percent as against 22.3 percent of the population in urban areas of the state. Firozabad district has population density of 1,038 persons per sq.km. which is more than the state average of 829 persons per sq. km. Firozabad district ranks 18th in literacy with 71.9 percent which is higher than the state average of 67.7 percent. There are 414,266 households in the district accounting for 1.2 percent of the total households in the state. The average size of households in the district is 6.0 persons.
Firozabad have 2 auditorium/community halls for social gatherings. There are 25 nationalized banks, 4 private commercial, 2 co-operative and 2 number of agricultural credit societies.

## NUMBER OF UNITS




- AGRO BASED
- READYMADE GARMENTS AND EMBROIDERY
- WOOD/WOODEN BASED FURNITURE
- PAPER AND PAER PRODUCTS
- LEATHER BASED
- CHEMICAL/CHEMICAL BASED
- RUBBER, PLASTIC AND PETRO BASED
- MINERAL BASED
- METAL BASED (STEEL)
- ENGINEERING UNITS
- ELECTRICAL MACHINERY AND TRANSPORT EQIPMENTS
- REPARING AND SERVICING
- GLASS AND GLASSWARE
- MISC.

## EMPLOYMENT STATUS

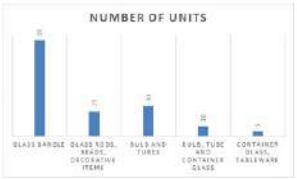



* ESTIMATED AVG. NUMBER OF DAILY WORKERS EMPLOYED IN SMALL SCALE INDUSTRY
* EMPLOYMENT IN LARGE AND MEDIUM INDUSTRIES

| Furnace type | Registered Units | Production (tonnes) | Value (crore) |
|---|---|---|---|
| POT FURNACE | 240 | 75000 | 150 |
| TANK FURNACE | 36 | 75000 | 120 |

Production and value statistics by UNIDO

70 per cent of the total glass production in the unorganised sector in India is contributed by Firozabad glass industry, which is India's biggest glass cluster (as per reports by ASSOHAM)




More workers are employed in small scale industry rather than large industries.
From various employment areas maximum are employed in bangle industry and related works.

**RAW MATERIAL**
Glass manufacturing units at Firozabad procure raw materials such as silica sand, soda ash, calcium carbonate and other chemicals and pigments from local dealers and wholesalers. Soda ash is primarily sourced from Gujrat and Silica sand from Rajasthan. Few huge containers and silverware units to get raw material straightforwardly from the primary provider
Raw materials required are:
Broken Glass (Collect from local traders)
Soda Ash
Silica
Calcium
The dye used for molding has been imported from Gujrat (Rajkot) and, Uttar Pradesh (Aligarh) where it is manufactured in CNC (computer numerical control) machines.

**INDUSTRY**
Firozabad is the central hub for many glass manufacturing industries and is one of the leading manufacturers and exporters of glass products. 70% of the total glass production in the unorganized sector in India is contributed by Firozabad glass industry.
It is estimated that Firozabad has close to 4000-5000 manufacturing and household units that generate employment for more than 5,00,000 people. The glass industrial units in the region are spread across different areas and can be broadly divided into 3 major categories which are household type, pot furnace type and tank furnace type of units.

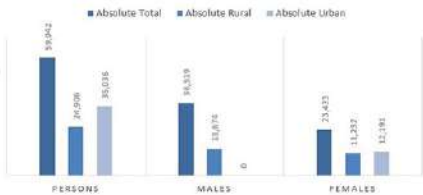

Source: Firozabad Glass Cluster Diagnostic Study Report

Tank furnace
Source: Firozabad Glass Cluster Diagnostic Study Report

Pot furnace
Source: Firozabad Glass Cluster Diagnostic Study Report

Household type
Source: hindustan times

## TOTAL HOUSEHOLD INDUSTRY WORKERS




Statistics for household workers
Source: district census report 2011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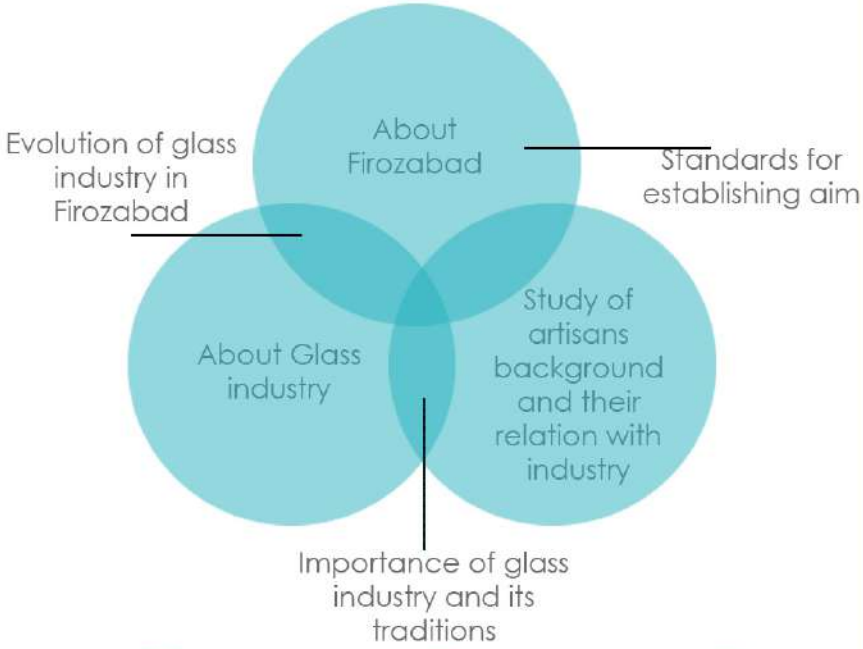
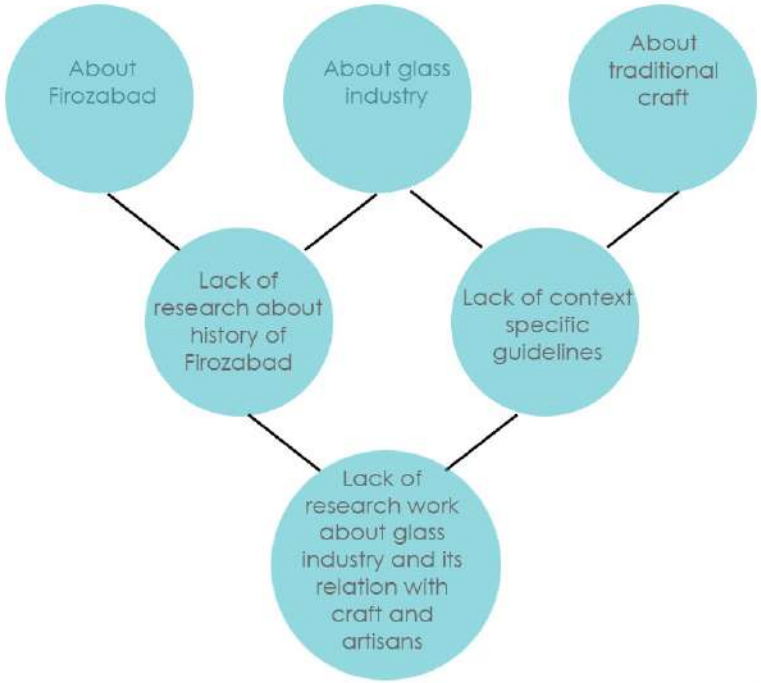
# LITERATURE REVIEW

| YEAR | NAME | AUTHOR | TYPE | THEME |
|---|---|---|---|---|
| 1966 | Firozabad ka pracheen itihas | Ratan Lal Bansal | Book | Detailed (assumed) history of firozabad |
| 1980 | The technique of glass making in India | Mamata Chaudhuri | PDF | History of glass making in India |
| 1980 | Prospects and problems of glass industry in India | Sharma Kailash Kumar | PDF | economical aspect of glass industry |
| 2001 | Urban history of firozabad | Anil Yadav | PHD thesis | Gave insight about industrial background of the city |
| 2009 | Intangible Cultural Heritage and Intellectual Property: Communities, Cultural Diversity and Sustainable Development | Toshiyuki Kono | Book | About ICH and its operational guidelines |
| 2011 | District census handbook 2011 | Directorate of census operation | PDF and book | Details about demographics and socio-economic data |
| 2012 | Product development program for export on glass at Firozabad | Santosh Shah | PDF | Document on glass industry of Firozabad |
| 2014 | Industrial Relations in the Glass Industry of U P | Garg, Rahul | PDF | Industrial relations with employees and modernisation |
| 2017 | the socio-economic plight of artisans in the bangle industry - a comparative study of north india firozabad (glass bangle) and south india hyderabad (lac bangle) | Gunjan Sharma | PDF | To study and compare the socio economic existence of artisans in both the industries |
| 2018 | Glass apart: the story of 200 year old Firozabad's glass industy | Anushruti Singh | Article | Glass industry of Firozabad and its working conditions |
| 2018 | traditional method of attar | Chandra Prabha | Thesis | Thesis on similar topic |
| 2019 | industrial heritage of central india | AJINKYA AVINASH VEKHANDE | Thesis | Thesis on similar topic |
| 2020 | UNESCO Creative Cities Network for sustainable developmen | UNESCO | PDF | Defines and explains UNESCO creative city network |
| 2020 | List of glass blowing tools | Working the flame | Article | Complete List of Glass Blowing Tools, Supplies & Their Uses |
| 2022 | Government of uttar pradesh | District administration | District website | About the city |
| 2016 | FIELD VISIT REPORT ON BANGLE FACTORY, FIROZABAD, UTTAR PRADESH, INDIA | Teri university | PDF | About bangle industry of Firozabad |
| 2015 | Cluster Profile Firozabad glass industries | TERI supported by the Swiss Agency for Development and Cooperation (SDC) | PDF | Overview on glass cluster of Firozabad |
| 2010 | Glass Work of Firozabad | Sakshi Gambhir | Available in Dsource | Document on process of making different glasswares |
| 2012 | Assessing the Impact of Local Socio-Cultural Milieu on Social Upgrading and Challenges to Inclusive Development of Glassware Cluster Firozabad | Nasiruddin | Research paper | Gve insight on social culture of glass industry of firozabad |
| 2021 | OF GLASS, SKILLS AND LIFE: CRAFT CONSCIOUSNESS AMONG FIROZABAD'S GLASSWORKERS | Arnaud Kaba in collaboration with Shankare Gowda | PDF | About work culture and skill of glass industry |
| 2003 | Story of Glass in India & the World | Pankaj Goyal | Online article | About the history of glass in India and world |

The craft work of the city has not received much attention in literature. When it comes to glass industry the global description of bangle production process, child labor, pollution and health hazards had been talked about. Nothing underpin the story of a craftsmen and artisans, and how industries and artisans are interdependent on each other.





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## GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

# HISTORY

## HISTORY OF GLASS IN INDIA

**1000 BC**
- HASTINAPUR
- GLASS BEADS WERE FOUND

**700-600 BC**
- TAXILA
- EARLIEST AUTHENTIC GLASS FOUND (BLACK AND BROWN COLORED GLASS BEADS) IN INDIA FROM TAXILA. FIRST GLASS MAKING SITE FOUND IN KOPIA

**100-500 AD**
- MAHESHWAR AND NAVDATOLI
- GLASS BEADS AND BANGLES

**11 TO 15 CENTURY**
- HASTINAPUR
- OPAQUE AND TRANSLUCENT GLASS BANGLES

**14 TO 16TH CENTURY**
- ANTICHAK
- GREEN GLASS

**14 TO 17 CENTURY**
- RAJGHAT
- POLYCHROME TYPE BANGLES

**16TH CENTURY**
- KOLHAPUR (GLASS MAKING CENTER): GOOD QUALITY OF GLASS WIRES, GLASS SLAGS, ASHES MIXED WITH LIME AND PARTS OF KILN WERE FOUND APART FROM THAT PRODUCTS LIKE BEADS, BANGLES AND RINGS WERE FOUND
- AHMEDNAGAR: GLASS FLASK

**16 TO 18TH CENTURY**
- ERAN
- RICH IN GLASS BANGLES

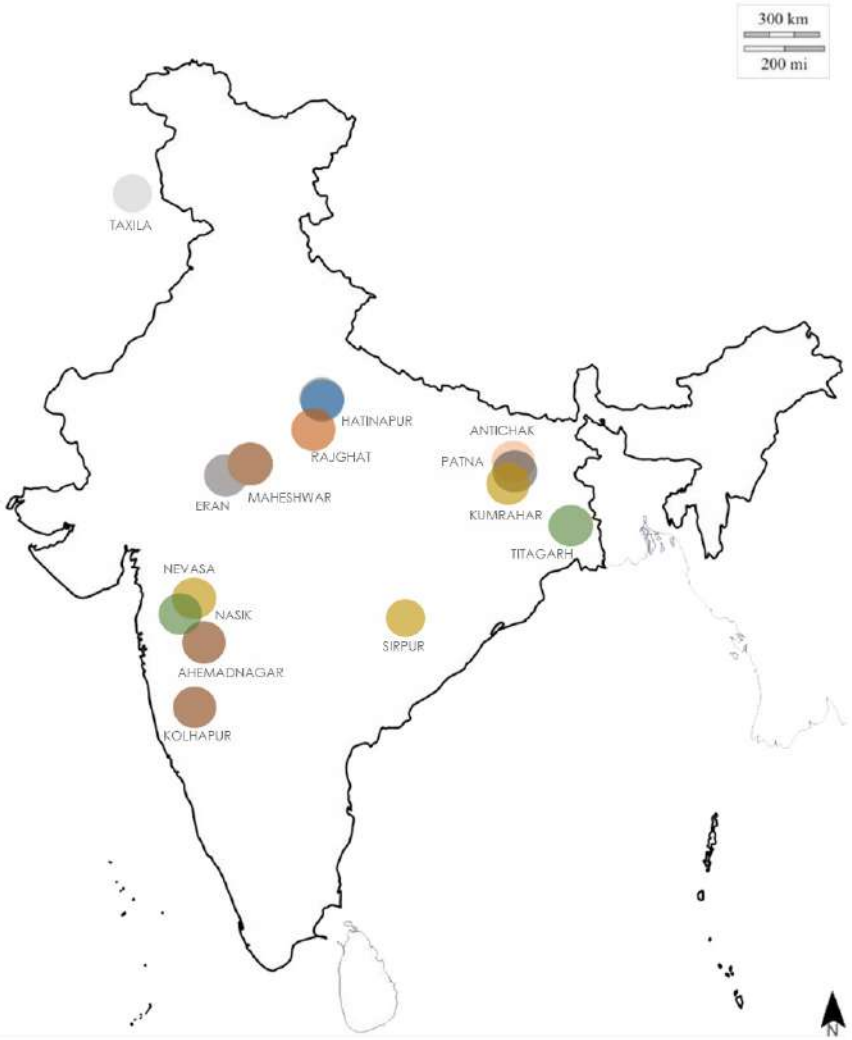
**17TH CENTURY**
- PATNA
- GLASS BEADS

**18TH CENTURY**
- KUMRAHAR: DIVERSE GLASS OBJECTS, TRANSLUCENT AND OPAQUE
- SIRPUR (GLASS MAKING CENTER): GLASS BRACELETS, BANGLES WITH MONOCHROME VAREITY AND BANGLES OF VARIOUS COLORS
- NEVASA (CENTER OF GLASS INDUSTRY): BEADS, BANGLES, RINGS, VESSELS AND SLAGS IN VARIOUS SHAPES AND COLOR

**19TH CENTURY**
- NASIK: BEADS, BANGLES, RINGS AND MISCELLANEOUS OBJECTS
- TITAGARH, WB: FIRST MODERN GLASS FACTORY ESTABLISHED IN INDIA CALLED 'THE PIONEER GLASS WORK'S IN TITAGHAR.

**20TH CENTURY**
- EXTENSIVE USE OF STAINED GLASS IN ARCHITECTURE, PUBLIC BUILDINGS, PRIVATE RESIDENCES (ART DECO & VICTORIAN STYLE) AND MANY MORE MODERNIZED STRUCTURES (LATE 20TH CENTURY).

**21ST CENTURY**
- USE OF CLEAR GLASS AS A MODERN CONTEMPORARY MATERIAL FOR AESTHETIC AS WELL AS STRUCTURAL PARTS OF BUILDINGS




Historic sites marked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# HISTORY

## HISTORY OF GLASS IN FIROZABAD

**BEFORE 16TH CENTURY**

- GLASS WAS MADE FROM LOCALLY AVAILABLE SAND CALLED *REH*
- MAJOR PRODUCT WAS BANGLE
- BEFORE THE NAME OF FIROZABAD IT WAS THE COMBINED LAND OF 7 VILLAGES WHICH WERE: RASOOLPUR, MOHAMMAD GAZAMALPUR, SUKHMALPUR, DATAUJI, AKHBARABAD, PEMPUR AND JAHANPUR

**16-17TH CENTURY**

- VARIOUS GLASS ITEMS LIKE JARS, CHANDELIERS, PERFUME BOTTLE WERE MANUFACTURED FOR ROYAL COURT
- FIROZABAD GOT ITS NAME FROM AKBAR'S MANSABDAR FIROZ SHAH (1566) WHO WAS THE FOUNDER OF THE TOWN AND TOMB OF FIROZ SHAH IS ALSO THERE
- GRAND TRUNK ROAD WAS CONSTRUCTED BY SHER SHAH SURI PASSING THROUGH FIROZABAD
- SADULLAH KHAN WAS DEAD IN 1655 TILL THEN FIROZABAD WAS IN DEVELOPING STAGE (as per Mathura gazetteer 1968)
- PERSIAN ARTISTS CAME AND SETUP A CENTER AT FIROZABAD

**18TH CENTURY**

- IN 1737 WHEN FIROZABAD HAD BEEN DEVELOPED ENOUGH, A PART OF IT WAS LOOTED AND BURNT BY A PART OF BAJIRAO PESHWA'S ARMY

**19TH CENTURY**

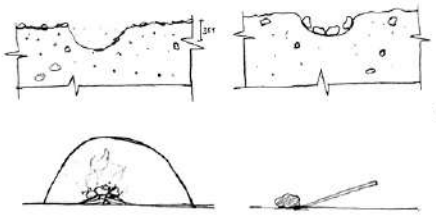
- FIROZABAD CAME UNDER THE TERRITORIAL BOUNDARY OF AGRA IN 1833
- RAILWAY WAS INTRODUCED IN 1862
- FIROZABAD HAD ITS FIRST NAGAR PALIKA
- IN 1989 IT WAS ANNOUCED A DISTRICT

**20TH CENTURY**

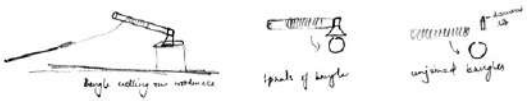
- LOOKING FOR THE DEMAND OF BANGLES A FACTORY WAS SETUP BY NANDRAM IN 1910
- MORE THAN 1000 FAMILIES WERE INVOLVED IN GLASS WORKS WEATHER IN HOUSES OR FACTORIES TILL 1924 (as learned from Anil Yadav sir)
- MAJOR RAW MATERIAL CAME FROM KOLKATA

**21ST CENTURY**

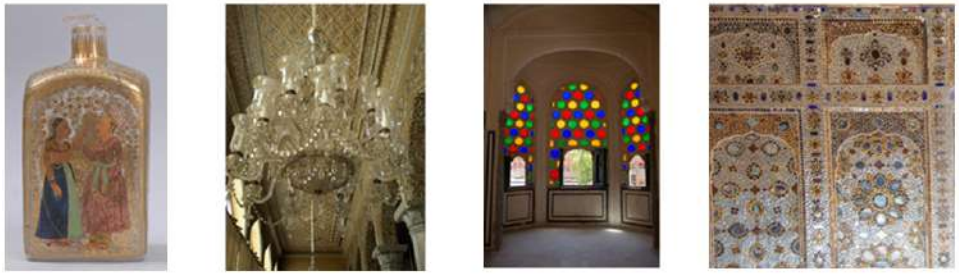
- NOW RAW MATERIAL IS TRANSPORTED FROM GUJRAT AND RAJASTHAN
- MANY GLASS PRODUCTS LIKE DOMESTIC WARE, ARTWARE, BANGLES AND HARWARE PRODUCTS ARE MANUFACTURED.



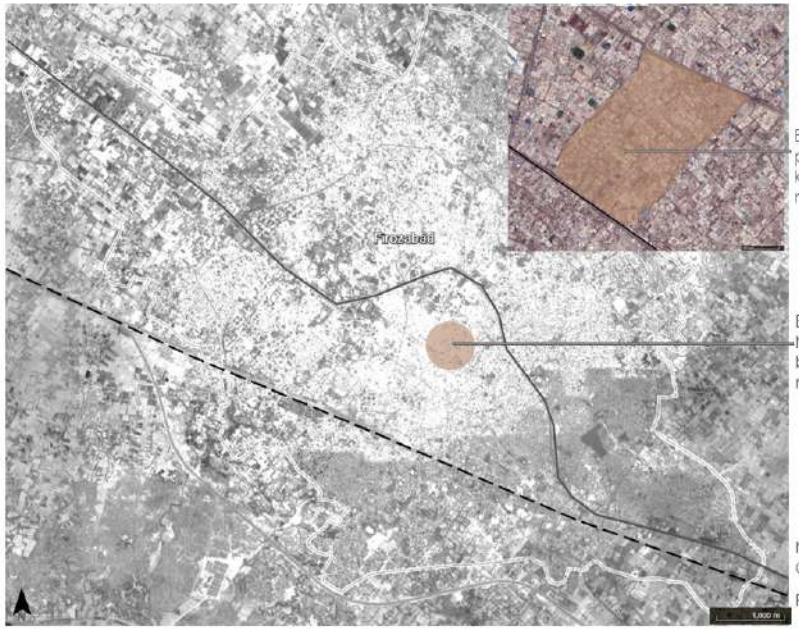
Technique of making glass



Technique of making bangles



Glass work in mughal courts: perfume bottles, chandeliers, colored window pane and mosaic glass work




Blow up of nagar palika location (as known from oral narrations.

Earlier location of Nagar palika and bus stand which is now a market

Now NH2 earlier Grand trunk road

Railway line

Firozabad map

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**AR RAMESH P BHOLE**

**SCHOOL OF PLANNING AND ARCHITECTURE**
**BHOPAL**
**MAY-2022**

# GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

# HISTORICAL EVIDENCE

Location map showing archeological evidence


1. Chadami lal jain temple


2. Tomb of Firoz Shah built in 16th century


3. Gurudwara


4. Storage space at railway line


5. Temple complex by Raniwala


6. Shri Ramchandra Kanhaiyalal College (SRK College) was established in 1919


7. Residence of Rambabuji


8. Ram Lal Arora memorial was built in 1952 by Ramji Arora


9. Chaubey ji ki Haveli


10. Residence of Mushtaq Ali Khan, built before 90years ago (around 1920s).


11. Residence of Mehboob Ali Khan, it was made for residence purpose in 1939


12. Residence of Gopi Nath Aggarwal, it was made for the purpose of residence in 1947


13. Atta vala mandir


14. Remains of tehsil


15. Residence of Chadamilal Jain has two parts and built with rock cut detailing in columns, railing and decorative places like entrance and mosaic art.

Observations
All these structures are over 50 years old.
None of the structures is protected, they are either privately owned or owned by a group of people.
Detailed rock-cut elevations, arches, use of German tiles, and influence of Islamic architecture and mosaic were commonly seen.
Hence it can be inferred that historic core lies in center of the city.


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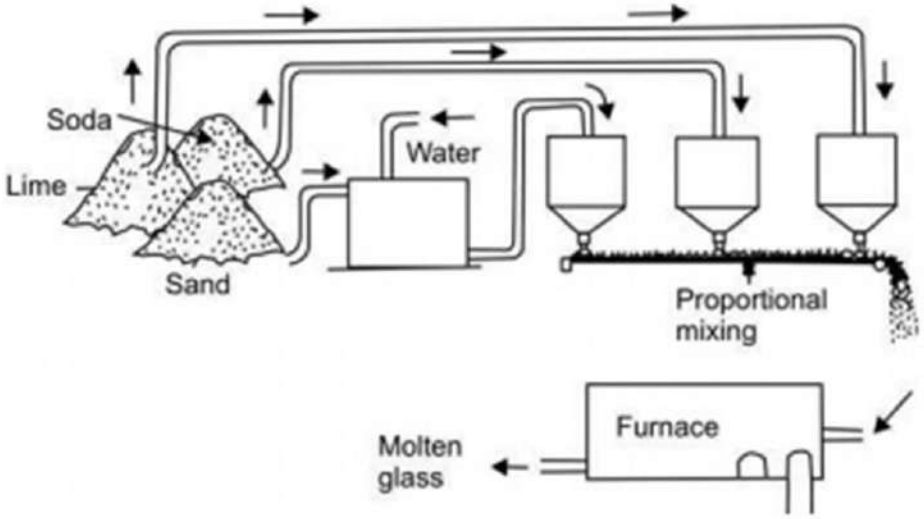
# CONTEXUAL

## WHAT IS GLASS?

The term 'Glass' refers to a specific state of matter, regardless of its chemical composition, gets solidified from the liquid state, without forming any crystals, and thus at the atomic level, lacks the regular ordered structure of normal crystalline solid material. So, glass can be said that, one in which there is no orderly pattern or arrangement of atoms. It is usually formed by the rapid cooling of a viscous liquid, where the atoms have insufficient time to align into crystal structure. It has been used as a decorative material throughout history and created aesthetic wonders.



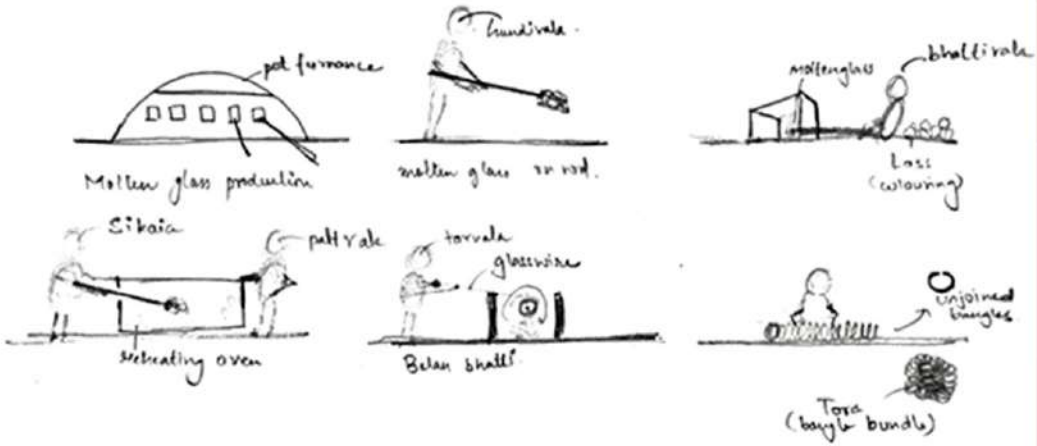

Glass molding process

Source: Researchgate

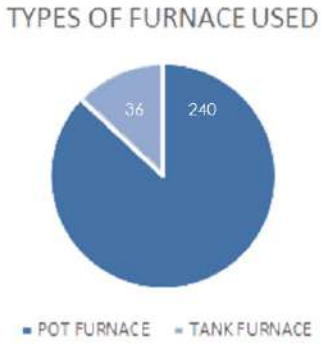
## ARTISAN'S BACKGROUND

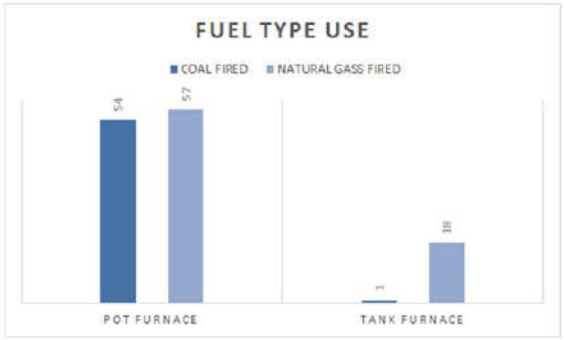
Firozabad was choosen to be fit for Glass Industry due to availability of skilled labor. A regional craft clan of bangle experts are known as sheeshgarhs. The industry does not have nay proper tarining and engineering in curating glass products. Its just the skill which is been passed on by generations to generations. Some children learn it just by observing their families.
Traditional skills prior were obtained at a youthful age as a disciple in domestic endeavors or beneath ace artisan in workshop. The aptitudes obtained in workshop utilized to be way better. But with limitations on child labor in workshop. The interns are presently permitted after 15 years of age.
The artisans feel that upcoming techniques in the feild not cost effective and it will will not succeed in the feild. This will also reduce the demand of local artisans.


## PROCESS OF MAKING GLASS PRODUCTS

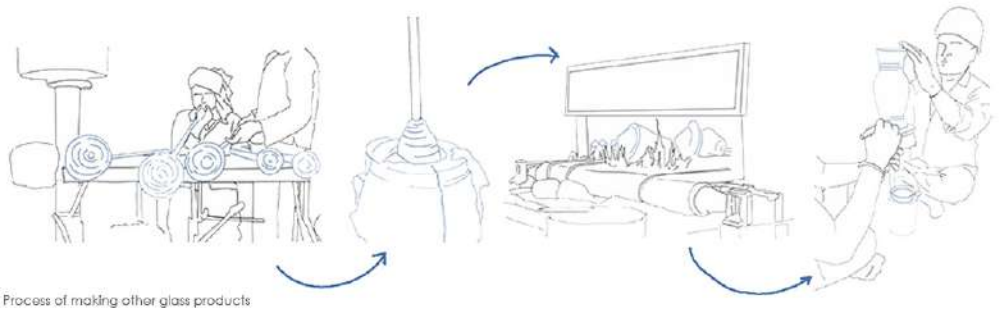



There are two type of furnace used in Firozabad glass cluster which are pot furnace and tank furnace depending on the amount of production. These furnace are locally made and maintained. There are total of 276 furnace.These furnace use coal and natral gas as there fuel type. After coal banned in 1996 when Firozabad tied under Taj Trapezium zone all the furnace shifted to natural gas.




Process of making glass bangles



Process of making other glass products

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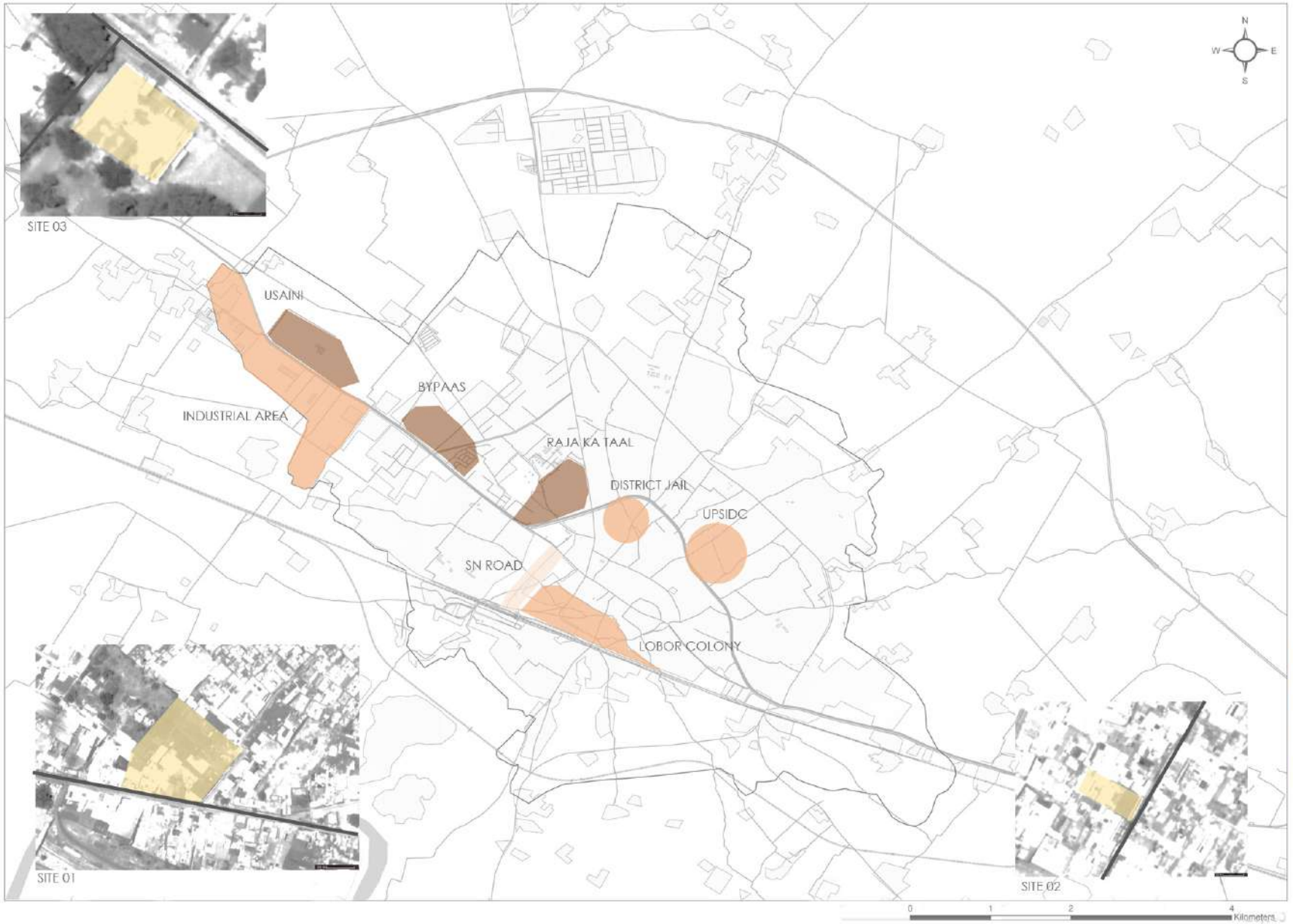
# GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

# SITE DOCUMENTATION

NETWORK MAP OF DOMESTIC WARE




LEGEND

- INDUSTRIAL AREA
- TRANSPORTATION HUBS
- MARKET HUB
- VISITED SITES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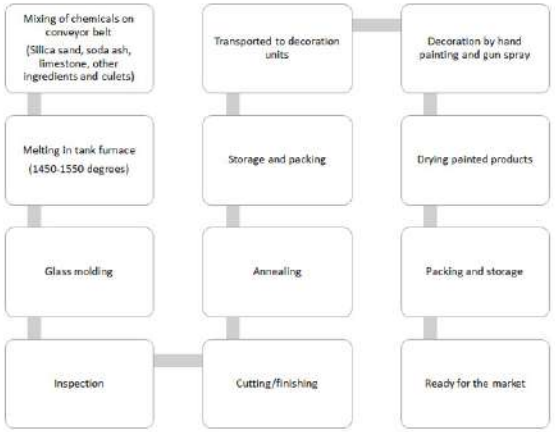
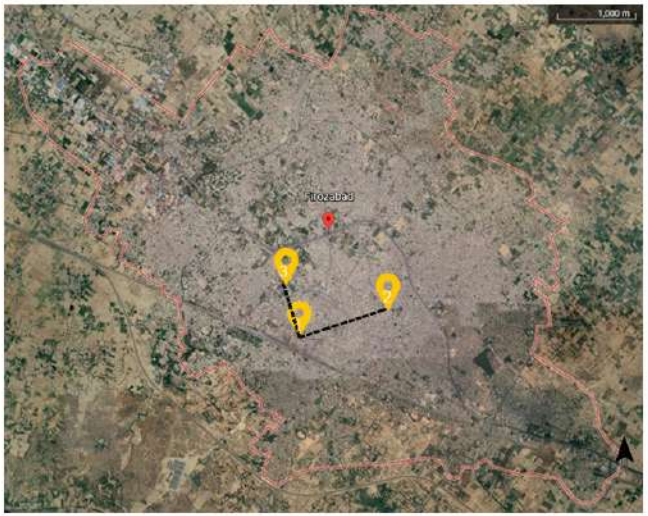
# SITE DOCUMENTATION

## DOMESTIC GLASS WARE PREPARATION

Process of making glassware

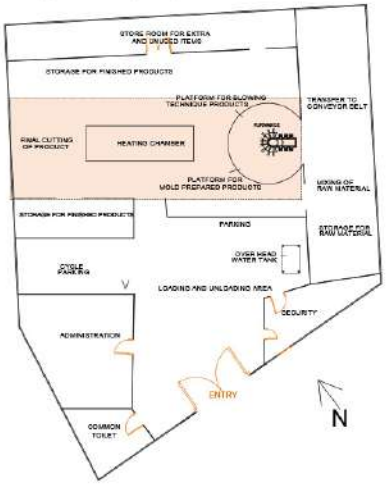



Location

There are two types of industrial setups which are required to produce domestic ware before it comes to market. Location 1 is the production unit from where it is sent to locations 2 and 3 for decoration and final packaging. From 2 and 3 product is further sent to wholesalers and retailers.

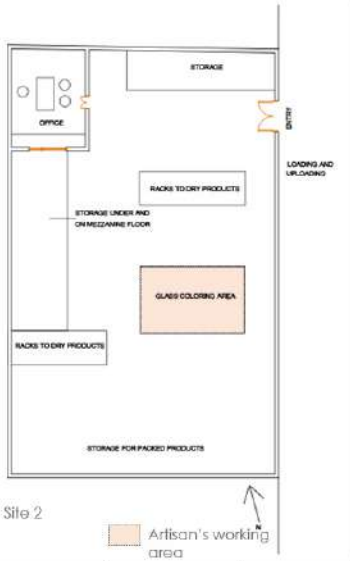
Manufacturing of clear glass product.




Site 1

Artisan's working area

Coloring and packaging of clear glass product.




Site 2

Artisan's working area


Site 3

Artisan's working area

| Process name | Related picture | Tools required |
|---|---|---|
| Mixing of raw material |  |  |
| Grinding on conveyor belt |  |  |
| Raw material from conveyor belt to furnance |  | |
| Molten glass from furnance |  |  |
| Molten glass transfered to molds |  |  |
| Annealing (cooling and further heating for strenthning of the |  | |
| Cutting and finishing |  |  |
| Finished product stocked and ready for transport |  | |

| Process name | Related picture | Tools required |
|---|---|---|
| Preparation of color |  |  |
| Coloring the clear glass product with various designs |  |  |
| Drying of prepared product |  | |
| Packing and storage of final product |  |  |

Final products display

| Process name | Related picture | Tools required |
|---|---|---|
| Unpacking and preparation of clear glass |  | A cloth to clean the surface and a basket to make a batch ready for coloring |
| Gun spray paiting to prepare the surface for further |  |  |
| Hand painting |  |  |
| Drying of prepared products |  |  |
| Final product |  | |
| Packing and storage of final product |  |  |

Observations

From site1:

All the raw material is imported its the skill which is keeping the tradition alive in the region.

The artisans work in harmony with each other.

It is a combination of permanent and daily wages for workers hired by the manager of the factory.

The artisans are well versed in the type of work they are doing despite the lack of cleaning and lack of lighting in the working area.

Despite low wages, artisans are continuing working as this is the knowledge they had been transferred.

From site 2 and 3:

Decoration on glass product do not require big setup as manufacturing unit.

The artisans do the painting sitting on the ground. The drying and packaging unit require bigger spaces as per the capacity of the factory.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# SITE DOCUMENTATION

NETWORK MAP OF DOMESTIC WARE


LEGEND

- TRANSPORTATION HUBS
- MARKET HUB
- HOUSEHOLD SETUPS
- VISITED SITES


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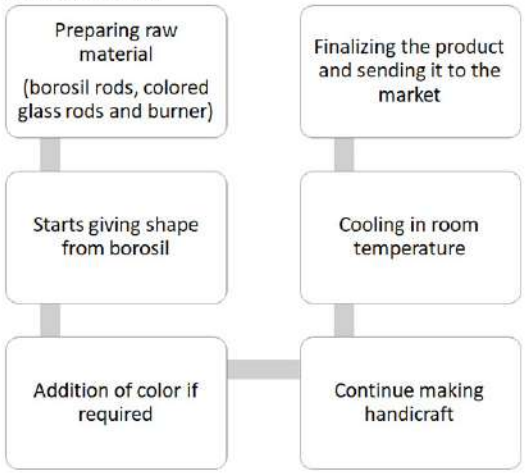
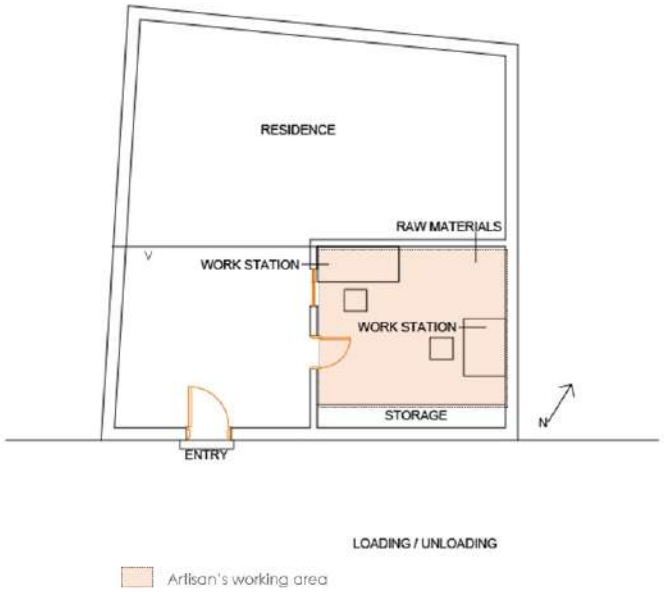
# SITE DOCUMENTATION

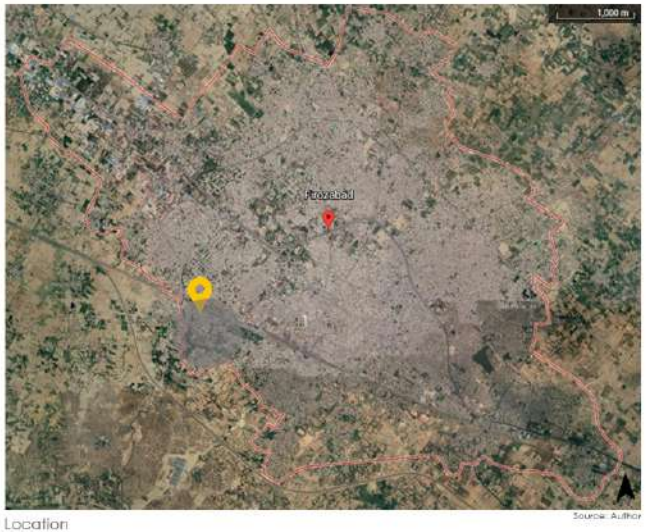
## GLASS ARTWARE PREPARATION

Process of making artware




Observation
The main artisan works with whole family including his wife and children.
He is in the proffession since 35years and learned the skill form his elder brother who learned it from a artisan from Mumbai.
The locality is involved in artware work in their households.
The setup donot require large space or many tools.
Borosil the key material is imported from Mumbai, rest gas cylinders and colored glass rods are available locally.
A table and chair is required to make these artware.
Transportation of these artware is through road.
There was no proper storage of finished products.




Location

Source: Author

The artware manufacturing is household unit. Artware work is majorly done in labor colony as marked in the map.

| Process name | Required pictures | Tools |
|---|---|---|
| Preparation of raw materials |  |  |
| Start shaping from borosil rods on burner |  |  |
| Addition of colors |  |  |
| Continue producing the design |  | |
| Cooling in room temprature |  | |
| Finalizing the product |  | |


A standard setup

Final artworks

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# SITE DOCUMENTATION

NETWORK MAP OF MARRIAGE WARE


LEGENDS

- INDUSTRIAL AREA
- TRANSPORTATION HUBS
- MARKET HUB
- HOUSEHOLD SETUPS
- VISITED SITES


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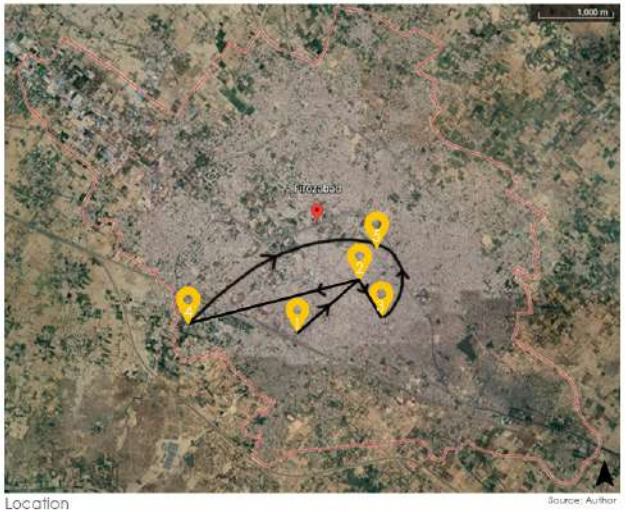
## GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

# SITE DOCUMENTATION

## MARRIAGE WARE PREPARATION

Process of making bangle

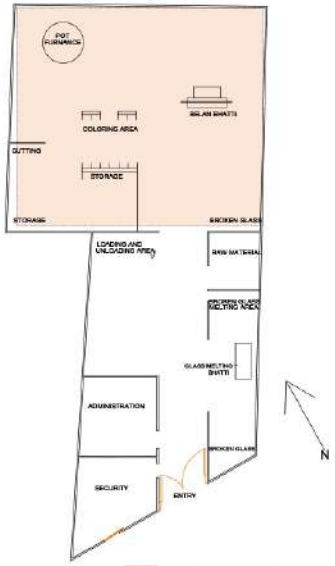




Location

Source: Author

Location 1 is industrial setup of bangle where unfinished bangles are prepared and transported to location 2 for judai (closing ends of bangles). From there it is shifted to locations 3 and 4 for decoration and further sent to location 5 for packing and from there to market.

Manufacturing of bangles.




Site 1

Artisan's working area

| Process name | Related picture | Tools required |
|---|---|---|
| Melting raw material in pot furnace | | |
| Drawing molten glass from furnace | | |
| Coloring the molten glass | | |
| Bangle in belan bhatti | | |
| Cutting of spiral bangles | | |
| Packing and storing bangles | | |

Final product ready to transport.

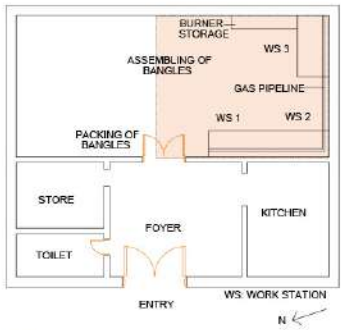
Observation

Site 1: Bangle manufacturing is the oldest traditional skill in the city.

320 bangles are packed in the bundle which is called tora locally.

Site 2: The workers who do the joining of bangles are called *judaiyas* and the process is called *judai*. It is done on kerosene lamps and workers of all age groups are involved. It is mainly done in small household setups where the whole family is involved in the process.

Bangle joinery setup

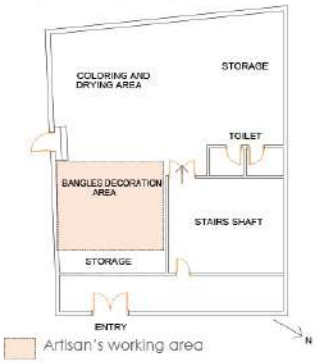



Artisan's working area

Site 2

| Process name | Related picture | Tools required |
|---|---|---|
| Unpacking of bangles | | |
| Judai of bangles | | |
| Chatai (checking) of bangles | | |
| Final packing of bangles | | |

Bangle coloring setup

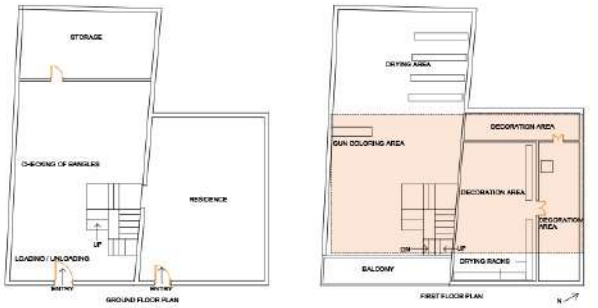



Artisan's working area

Site 4

| Process name | Related picture | Tools required |
|---|---|---|
| Assembling bangles for coloring | | |
| Gun spray paint on bangles | | |
| Decoration on bangles | | |
| Drying the bangles | | |

Bangle coloring setup




Artisan's working area

Site 3

| Process name | Related picture | Tools required |
|---|---|---|
| Storage and checking of bangles | | |
| Color preparation | | |
| Spray gun paint on bangles | | |
| Drying bangles | | |
| Bangle decorations | | |
| Drying bangles before packing | | |
| Inspection and packing of final products | | |

Observation

Site 3: The whole colouring unit is set up on the first floor of the residence.

Inspection for broken bangle and quality of colouring is done frequently.

From here bangles are packed and sent to packaging units.

All the transportation of the bangles is by hand pullers called *thela*.


Site 5

| Process name | Related picture |
|---|---|
| Storage of bangles | |
| Checking and counting of bangles | |
| Final touches to the bangles | |
| Dabba (box) packing in group of 24 and 12 | |

Observation

Site 4: It is a home based decoration unit where all the family members and neighbours were involved.

Raw material like paint and brushes were need to complete the process.

Site 5: This was a packaging unit which bring product to the market.

The bangles are packed in group of 12 and 24 numbers depending upon the requirement.

The broken glass from the site is sent to industrial setup for recycling purpose.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# GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

# SITE OBSERVATIONS



Bangle making and judaai



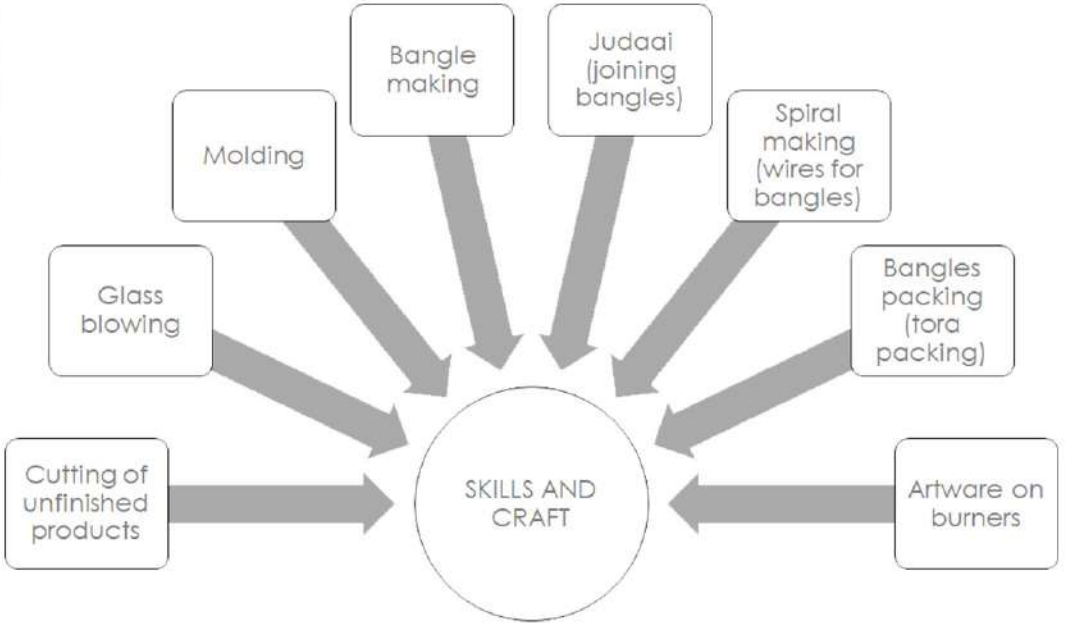
Glass molding and blowing


Cutting of unfinished products

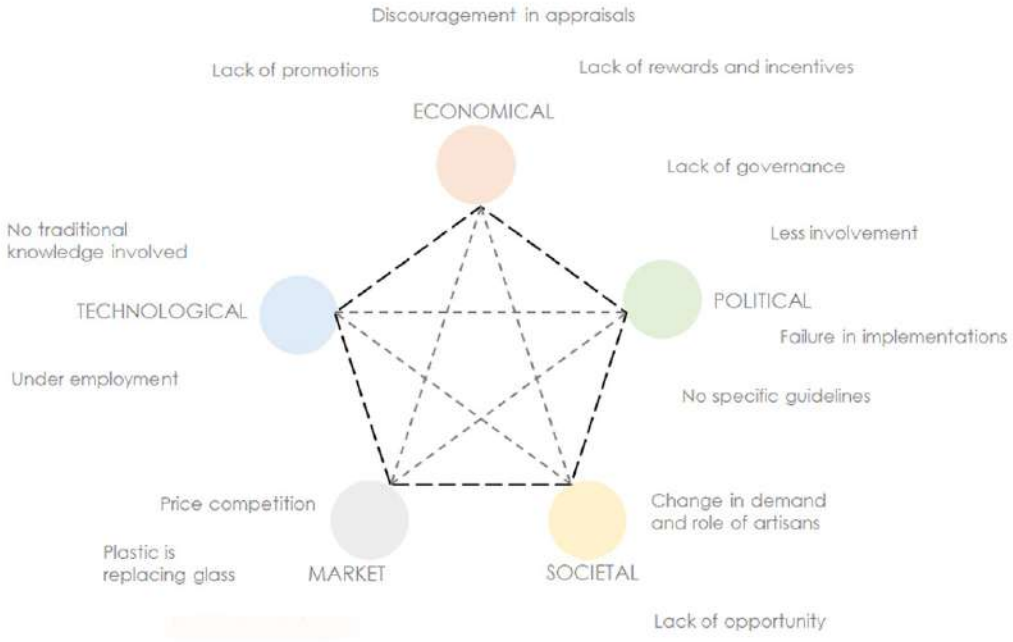

Spiral making


Bangles packing


Artware making




Industries are hevily depended on manual skills but there are some gaps noted in existing system.




ECONOMICAL
- Lack of rewards and incentives

There is no proper incentives other than daily wages for workers.
- Discouragement in appraisals

While appraisals no proper appreciation/acknowledgement of work.
- Lack of promotions

There are no promotions, an artisan can be doing same work for years and there would not be any promotions or acknowledgement

POLITICAL
- Lack of governance

No proper government body takes care of glass cluster
- Less involvement

Polictical parties lack in involvement for any help for the community
- Failure in implementations
- No specific guidelines

SOCEITAL
- Change in demand and role of artisans

Change in architecture, material and techniques
- Lack of opportunity

Opportunities are lacking for artisans to showcase their knowledge and skill

MARKET
- Plastic is replacing glass

Plastic is involved in the process of pacakaging and also replacing glass. Being a non sustainable material it is replacing glass which effects the market of glass.
- Price competition

The products are available in every price from highest to lowest

TECHNOLOGICAL
- Under employment

Machine work require less labor and more managing team resulting in under employment of local labor
- No traditional knowledge involved

Machines and advance equipments do not require any traditional knowledge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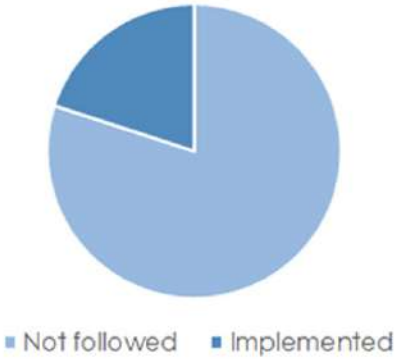
# GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA

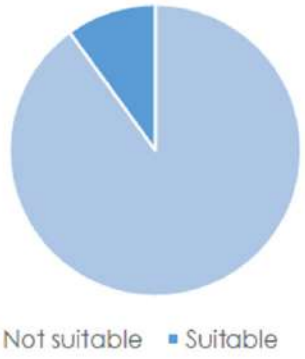
# ANALYSIS AND RECOMMENDATORY FRAMEWORK

## ANALYSIS

The importance of these craftsmen communities and centers depends upon the betterment on the industries. Skills contributes to shaping these cultures, and to transmitting them to other communities alongside skills, and to forming the bulk of a social consciousness related to the belonging of communities sharing similar relations with the craft.
For artisans it is the only industry where they find work but because as a low-tech and labour-intensive industry it is heavily reliant on skilled workers to organize the production process. This is only skill they have learned while growing up. The industries will reduce workers being the assitant of the machine does not suit well in this case as industries are dependent on artisans for finished products which cannot be done by machines like judai work on bangles, decoration on various products, artwork curation and many more. There could be machines to ease work but not to complete it.




Rules and regulations in the factories




Suitable building environment

Spatial analysis:
Industries- Lack of facilities like no resting space, lack of lighting, in bangle industries the order of the work is not arranged in a spatial manner and there is no proper standards of working spaces.
Household setups: No furnitures for decoration setups, no proper working environment they just work in their homes, and lack of storage spaces.

Working in factories and homes

## APPROACH TO CONSERVATION

To protect and manage existing skill in a sustainable manner considering all parameters.
To extend and build upon a knowledge with the existing information for its successful implementation.
Approach to understand these skills present today for its betterment and learning expirence for future.

### Documentation and recognition

Preparing database of the traditional knowledge system.
Understand the values and significance.

### Participation and involvement

Interaction and collaborations between the artisans of similar interests which helps enhance knowledge.
Provosion to improve incentives and appreciation of the craft and work.

### Strategies

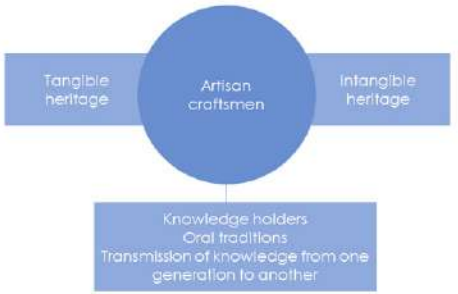
Suitable working condition for men and women.
To sustain their livelihood with increase in income and readily approachable market by everyone.
Support of legislations and implementations which helps enrich economic status.

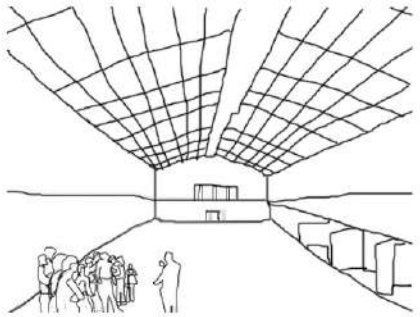
### Approach

Motivate coming generations by small talks, lectures and seminars for sustainable future of craft.
Artisans, craftmen and industry experts as co participants in shaping the future practices.

### Action

To increase awareness improve safety and security for the artisans by providing necessary facilities.
Updating information about schemes, incentives through different mediums for more participation.
Provide guidelines for all the categories of works.



Visitor engagement


Interaction with next generation to uplift the craft along with industries

SUBMITTED BY
AKSHITA JAIN
2020MCO013

THESIS GUIDE
AR RAMESH P BHOLE

SCHOOL OF PLANNING AND ARCHITECTURE
BHOPAL
MAY-2022

# GLASS INDUSTRY OF FIROZABAD UTTAR PRADESH: TRADITIONAL CRAFT TO INDUSTRIAL HERITAGE OF INDIA