# STONE CRAFTING & SPACE

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## THE TYPOLOGICAL AND TECHNOLOGICAL EVOLUTION OF STONE CARVING GUILDS IN JAIPUR, INDIA
## &
## ITS URBAN IMPLICATIONS

BY

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UNIT 18

# CONTENTS

This essay analyses the spatial and typological configurations of stone carving workshops, in Khazane Walon Ka Rasta, Jaipur. The essay will discuss the scale of economies these workshops cater to and the corresponding patterns of economic agglomeration they generated, during its evolution to determine its impact on architecture and urban form. The essay will place the spatial analysis of the workshops, of Khazane Walon Ka Rasta, Jaipur in historical context on one hand and on the other will be tracing some of the global transnational links of evolved contemporary workshops to speculate the crafts future relationship with art and architecture.

Technological advancements have been the driving force of craft throughout the world. Therefore, its effects on the stone carving workshops of Jaipur will also be discussed and analysed to determine not only its spatial and urban implications, but also its relationship between architecture and craft on one hand and on the other the possibilities of stone as a contemporary architectural materiel. This research of technological evolution with regards to the workshops of the past and present gives the opportunity to speculate the future of stone craft and its possibility to exists in different forms capable of achieving the requirements of 21st century art and architecture.

Observations made during the Unit 18 field trip to Rajasthan, will be the primary source of information used to analyse the spatial and typological configurations together with the evolution of technology and its impact on the architectural layouts of stone carving workshops. I will also be using books such as; Monastery and Guild – commerce under the Satavahanas, Buddhist India by T.W. Rhys Davids and Crafts & Craftsmen in Traditional India by M.K. Pal, to analyse the politico-religious and socio-economic conditions of ancient India and its relationship with the stone carving guilds in order to determine how stone carving guilds were viable and its impact on architecture and urban form.

THE PROCESS OF TURNING RAW MARBLE INTO WORKS OF ART AND ARCHITECTURE

Stone carving globally has been a defining factor of architecture, in the past, present and could even be in the future. The process of turning raw marble or stone into works of art and architecture has been practiced as a form of artistry for centuries in the subcontinent. Its impact on the politico-religious conditions, the arts and not least architecture has been profound. Stone architecture has been an integral part of ancient civilisations, whereby many of the early shelters and temples were situated, within naturally formed rock overhangs and caves. With time these stone shelters were carved forming architectures that represented the potential and the needs of these ancient civilisations. These carved architectures developed and gained sophistication and started to be highly ornamented with spiritual motifs and events that influenced these ancient communities and societies. There were two key aspects that led to the rapid growth in the craft of stone carving and stone architecture. One was the change in the politico-religious conditions of ancient Indian society and the other was the rapid development in technology, tools and methods. Technology proved to have a significant impact on the intricacy of ornamentation which, is a defining factor of the stone architectures of ancient India.

Stone carving was on the rise during and after the period of the Mauryan Empire, where intricately carved rock cave temples such as Ajanta, Kanheri and Ellora were constructed. These cave temples were places of learning, academies for skills-training and technological innovation. The inceptions of stone carving guilds are presumed to have begun in these cave temples although there is no direct evidence to prove it so. With the rapid development of trade; craft and technology too developed and was, therefore, able to produce more sophisticated architecture. The Jain temples at Rankarpur and Palitana in Rajasthan, constructed in intricately carved white marble, defines an epoch of highly sophisticated free standing stone architecture. These stone carving guilds further developed with time and during the Mughal Empire under the rule of Shajahan constructed the highly ornamental and sophisticated architectural monument; the Taj Mahal, totally in white Makrana Marble. With a gradual decline in stone architecture during colonial rule and the higher costs involved in marble quarrying and labour charges, the craft of stone carving in the subcontinent has currently been limited to the construction of smaller scale temples, shrines and idols. However, projects such as the Neasden Hindu Temple constructed in North London probably reinvents this ancient craft, to a modern day craft capable of delivering a highly intricate stone building in a short period of time, utilising new technological advancements and tools.

During ancient times with the demand for highly ornamental and complex art and architecture rising, not only did these guilds of stone carvers increase in number but also the tools, technology and processes they used rapidly developed as well. When analysing the evolution of technology and tools used by these stone carving guilds it can be closely related to the spatial and typological configurations of their workshops. In contemporary India particularly in Jaipur, Rajasthan, these ancient stone carving workshops could be seen operating and co-existing amongst its evolved typologies. Below is an analysis of the tools, methods and technology they use in the traditional typology and its technological evolution corresponding to the spatial evolution of these stone carving workshops.

The earliest forms of stone carving before the formation of guilds and organisations used pieces of tougher stone to engrave and carve softer stone. These tools are the most basic of stone carving tools, which are also yet used to create intricate marble inlaying and decorations.

The evolution in technology will be discussed by looking at the process of turning a block of raw marble into an intricately carved idol. A comparison of tools and technologies between the traditional typology and the evolved typologies will give an insight into the technological advancements made to cater to the evolving demands of society.
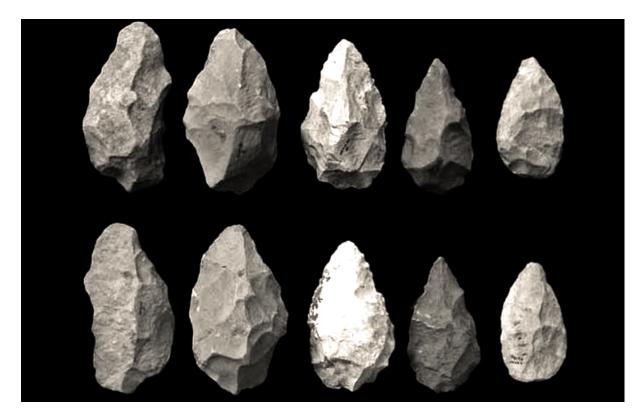
**Figure 1 -  Ancient Stone Carving Tools**

## STEP 1 - MARKING AND SHAPING

After purchasing a block of fine quality marble from the quarries, it is brought to the workshop and cut into the desired sizes. To make the figure, a vertical line is drawn along the axis and then a two dimensional outline of the proposed design is drawn on the rough boulder, using a marker, a scale, right angle and compass as shown in figures 3 & 4. This is a rough hand drawn sketch in order to get an idea of the proportions and locations. The two-dimensional drawing of the imagined sculpture is then sketched on the sized block of marble, roughly the size of the sculpture, with some margin for wastage. The sketch is translated on stone using a scale, compass and pencil. Artists inheriting generations of practice and command over their dexterous hands can directly start sculpting idols of Shiva, Radha-Krishna, Hanuman, Ganesh or any other deity, without the need of any guiding tools.[1] With the process of Hammering and chiselling around the sketch, the extra material is done away with.  The production line typology uses templates and machinery such as electric grinders and large floor standing grinder machines to do the initial shaping of the stone, as shown in figures 8, 9 & 10.

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1 Design Source - Stone Carving Guilds of Jaipur

**Figure 2 -  Raw Marble Blocks**
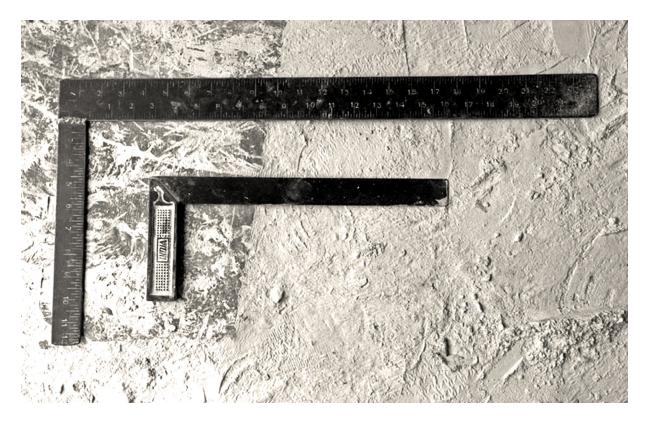
**Figure 3 -  Right Angle**

**Figure 4 -  The divider Prakaa - scaling tool**

**Figure 5 -  The shape of the idol sketched onto the shaped marble blocks**

**Figure 6 -  Hammers used for the Chiselling Process**

**Figure 7 -  Chisels used for the Initial Shaping of the Raw Marble Blocks**

**Figure 8 -  Template used to size the Raw Marble Blocks when particular Idols are Mass-Produced**

**Figure 9 - Grinders used for the initial Shaping of the Raw Marble Blocks**

**Figure 10 - Grinders used for the initial Shaping of the Raw Marble Blocks**

## CUTTING & CARVING

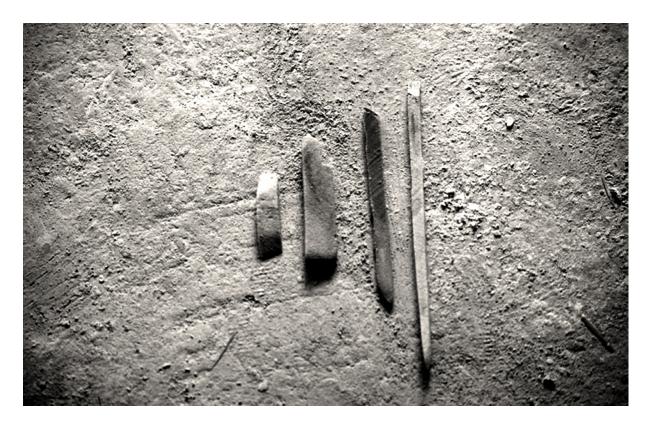Once the marking and outline is carved, the artisan, with the help of a hammer and chisel brings-out the imagined figure by removing the unwanted material. Initially, flat big chisels as shown in figure 7 are used to scrape off the stone and get a rough shape of the desired figure. After that again a second level of sketching is done to mark the detailing. The process of marking and carving goes on until the figure of the idol gains shape as in figure 11. Small fine chisels and drills as in figure 12 are then used for chiselling and drilling to give fine detailing and the final shape to the object. Further minute details are carved out after completing the whole sculpture.[1] In the production line typology to reinforce the finer features like facial expressions, folds of the skin or fabric etc, a sketch is drawn again on the stone and fine eroding hand machines such as the ones in figures 13 & 14 are used to carve the features to perfection, three-dimensionally. In years following 1980, eroding hand machines have been employed to ease the labour of chiselling, filing and finishing.

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1 Design Source - Stone Carving Guilds of Jaipur

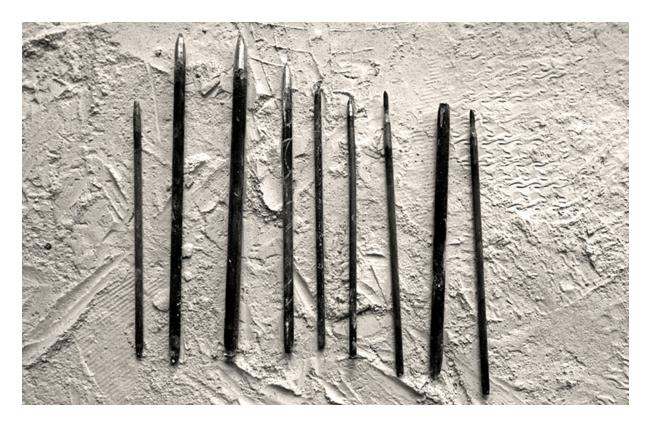**Figure 11 - Carving begins and the process is repeated until the carving becomes a 3d figure**

**Figure 12 -  Fine and sharp chisels are used to carve in the finer details and shapes of the carving**

**Figure 13 -  Fine and sharp chisels are used to carve in the finer details and shapes of the carving**

**Figure 14 -  Fine and sharp chisels are used to carve in the finer details and shapes of the carving**

## FINISHING & POLISHING

After carving out the whole figure sandpaper of 80, 120, 200 numbers are used to smoothen the rough parts of the statue. A mixture of powdered red stone and water (geru) is then applied on the marble sculpture as in figure 15, essentially to demarcate the regions on which finishing is pending from the rest of the stone canvas. Finally the most intricate features like the pattern on the fabric, the design of the ornaments, are engraved into the stone. The sculpture is roughly polished using a long stick made of porous sandstone (batti).[1] This erases the redness caused by geru and indicates the finished areas. The eventual polishing is done using a wet process where a number of natural stones of different abrasive qualities such as the ones shown in figure 16 are rubbed against the surface of the carved idol to give it a deep lustre.

In the production line typology finishing is primarily done by a buffing machine that uses a number of types of different abrasive sand paper and stone.

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1 Design Source - Stone Carving Guilds of Jaipur

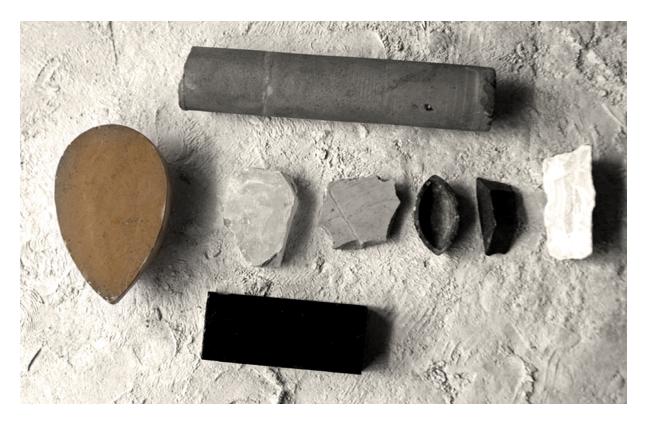**Figure 15 -  Once smoothen Geru is applied to make sure that all parts of the idol will be polished**

**Figure 16 -  Different types of stone used for polishing**

**Figure 17 -  Polishing takes place by rubbing different stones of various levels of smoothness**
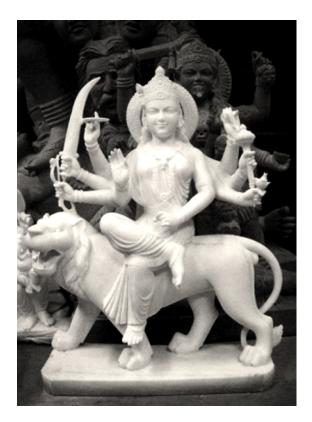
**Figure 18 - Finished idol**

To meet the demands of today's building regulations, codes and the constraints in terms of costs and time, stone carving has been replaced by methods of casting and prefabrication that can be mass-produced in factories at a minimal cost and in a minimal amount of time. With the rapid development in 3D software programs and technologies such as CNC milling and robotic milling, stone carving has been taken to a digital age (as shown in figures 19 & 20). Today, with the invention of robotic milling a particular design could be created on a 3D program and then fed into a robotic milling machine that could carve a raw piece of stone into an idol, ornament or a part of a larger piece of architecture in a matter of hours. This has revolutionised the craft of carving, whereby the craftsman and his skill has been made obsolete and a designer could now take on the role of carving and crafting. Since this technology is at its inception the costs involved in operating robotic machines is extremely high. Therefore, the craft of stone caving is still economically sustainable.

**Figure 19 -  Robotic Milling Process**

**Figure 20 -  Robotic Milling Process along with finished column base**

THE CONTEMPORARY GUILDS OF KHAZANE WALON KA RASTA - JAIPUR

Even today these artisans, sculptors and craftsman exists in a few locations throughout the Indian subcontinent. Khazane Walon Ka Rasta in Jaipur is one such location, where marble and stone sculptors live and work creating unique, magnificent pieces of art and sculpture. On the Unit 18 field trip I was able to observe this ancient craft, operating and existing in contemporary Jaipur. Khazane Walon Ka Rasta is situated in the inner, historic city of Jaipur, where the city is laid out according to the plan of the Hindu temple. The city of Jaipur is unusual among pre-modern Indian cities in the regularity of its streets, and the division of the city into six sectors by broad streets 34 metres wide. Networks of gridded streets further divide the urban quarters. Five quarters wrap around the east, south, and west sides of a central palace quarter, with a sixth quarter immediately to the east. In the square of Chandapol in Jaipur's historic city the streets are lined with stone carving workshops agglomerated in an irregular fashion. These workshops probably dominated the streets of Khazane Walon Ka Rasta at some point in time, but today they seem to have been engulfed by clothing, fashion and souvenir shops that cater to the local community as well as to numerous tourists that visit Jaipur's historic sites.
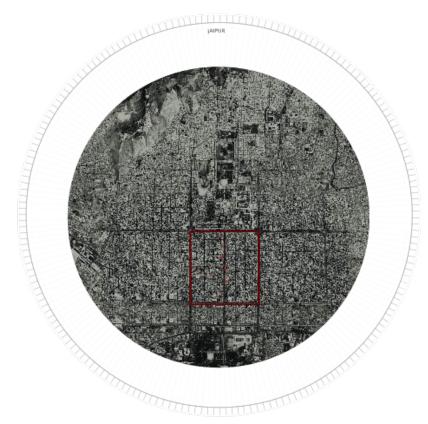
**Figure 21 - Map of Jaipur's Historic City - Showing where Stone Workshops are Located**

In ancient times these works of art may have been taken to lands faraway; to Tibet, China, Persia and Arabia but in the recent past with transportation rapidly developing and tourism being a key part of the contemporary Indian economy these arts have a rather steady niche market in Jaipur itself. Although the craft has a steady market, its ability to cope and adapt to changes, seem a daunting task since plaster and marble powder are used to cast idols and statues using fibre-glass moulds. This is the primary threat to the stone carver's craft since their hard work can be replicated and mass-produced for a fraction of the price. Almost all households in India and most households of sub continental countries have a shrine room, which consists of statues; of Gods, Goddesses and Gurus. Therefore, in terms of market size it could be considered a large market. But due to statues made of plaster and more recently in powdered marble the stone carvers of Jaipur have stiff competition. In fact they do not compete any longer in this market. Contemporary stone carvers of Jaipur caters to a market where statues are collected not primarily for religious purposes but as works of art by the more wealthy families and individuals across the subcontinent and the world.

When analysing the contemporary stone carving workshops that operate in forms of guilds, in Khazane Walon Ka Rasta it could be categorised into four distinct organisational, spatial and typological forms.

1. **Showroom Typology** - A company based on buying and selling of sculptural art – in this case stone carvings.

2. **Production Line Typology** - A company that hires stone carvers to work for them and produce statues that are then sold via the companies established networks and contacts. These workshops take the format of a factory production line.

3. **Developed Workshop Typology** - Ancient stone carvers that have been able to transform their craft into a business by expanding; hiring other stones carvers, utilising modern equipment and establishing a more production-based, profit-orientated business.

4. **Traditional Workshop Typology** - Ancient form of workshops where a number of stone carving families collaborate and create statues and sell them locally by displaying the finished products at their workshops.

**Figure 22 -  Street view of Khazane Walon Ka Rasta**

**Figure 23 -  Typical Stone Carving Workshop - Khazane Walon Ka Rasta**

**Figure 24 -  Typical Stone Carving Workshop - Khazane Walon Ka Rasta**

**Figure 25 -  Typical Stone Carving Workshop/Showroom - Khazane Walon Ka Rasta**

During the Unit 18 field trip I was also able to speak to some of the merchants and craftsmen who have workshops along Khazane Walon Ka Rasta and learnt that today artisans from all religious backgrounds Hindu, Muslim, Sikh, and Baniya work together as a community and help in growing these crafts. This is probably an indication that religious heterodoxy may have played a vital role in crafts and made possible an organisational form that goes beyond conservative social stratifications and segregations. I was also able to meet some of the craftsmen who have passed on the trade from father to son over many generations. At one particular workshop cum family home I was able to meet 3 generations of stone carvers from the same family. Figure 27 shows the grandfather teaching his grandson the craft. There are many stone carvers workshops cum dwellings along these lanes. These artisan groups apart from practicing the craft also collaborate to protect and improve their craft. This could be seen as the existence of a evolved version of the ancient guild where a number of stones carvers collaborate with each other as well as with other organisations including governmental organisations such as the Jaipur tourism board and the traditional arts and crafts societies in order to promote and market their products.

**Figure 26 - Family Owned Stone Carving Workshop/Showroom - Khazane Walon Ka Rasta**

**Figure 27 -  Family Owned Stone Carving Workshop/Showroom - Khazane Walon Ka Rasta**

In order to take care of the stone carvers families and children they also have formed welfare societies, whereby they contribute a part of their income, which goes towards education, health and other social activities of the community.

THE SPATIAL AND TYPOLOGICAL ANALYSIS OF STONE CARVING WORKSHOPS

To keep up with today's contemporary socio-economic conditions some stone carvers have turned this ancient craft into businesses and companies which can be seen as contemporary organisational forms that have employees, showrooms and web sites and are cable of exporting and reaching markets around the world.

## TYPE 1 – THE BUYING AND SELLING SHOWROOM

In the first organisational form listed above some of these companies are owned by businessmen and merchants that buy the idols and statues in bulk from the stone carvers (particularly from the production line type of workshops) and then sell them via their showrooms and web sites as shown in figures 28, 29 & 30. This form of organisation takes a purely profit-orientated dimension where the craft and the making process is not of any concern and could be done with only an eye for selecting statues rather than an understanding of stone carving and the unique skills required to produced these statues. In the showroom type it can be stated that the process of crafting has been buried or hidden to comply with global consumerism which demands a dominant visual culture. Therefore labour is made invisible bringing about a sense of luxury together
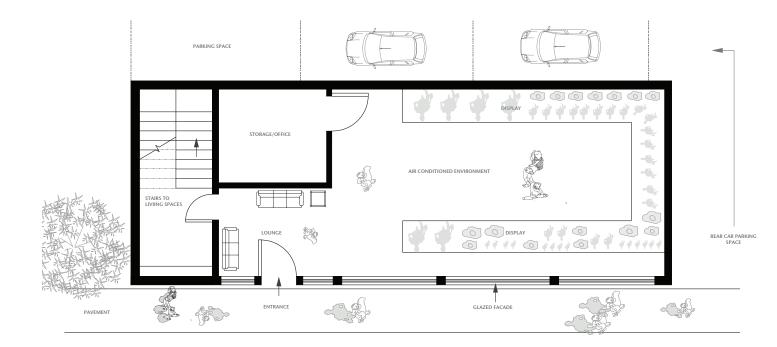
**Figure 28 -  Showroom Typology**

**Figure 29 -  Showroom Typology**

**Figure 30 -  Showroom Typology**

**Figure 31 - PLAN: Showroom Typology**

PARKING SPACE

DISPLAY

STORAGE/OFFICE

AIR CONDITIONED ENVIRONMENT

STAIRS TO
LIVIING SPACES

DISPLAY

REAR CAR PARKING
SPACE

LOUNGE

PAVEMENT

ENTRANCE

GLAZED FACADE

MAIN ROAD

with oriental hospitality in order to please and entice the contemporary customer. This organisational form has little relevance to ancient craft guilds of India but is a product of the effects of contemporary socio-economic conditions.

The 'buying and selling' showrooms are located bordering Khazane Walon Ka Rasta on the broader streets with easy vehicular access. This showroom typology depends on clients from wealthy social strata; therefore require private parking spaces and clean controlled environments within the showrooms. Unlike the other typologies, there is no production process taking place in the premises. Therefore there is no dust and dirt and the climate inside is highly controlled with air-conditioning and mechanical ventilation. This is probably a method of enticing clients to visit the shop where they will encounter a very pleasant environment and will be able to look at the sculpture and art at ease. The sculpture will also be dust free nicely polished and gleaming under the halogen spotlights used to light up the showroom. This typology therefore could be seen as an adaptation to a new market for people who are not wiling to walk down the narrow streets of Khazane Walon Ka Rasta and look in dusty workshops for treasure any longer.

In terms of the spatial layout this typology has one large hall like space that is used as the showroom. The entrance from the main road will directly lead into the showroom, which typically has a small lounge like space at the front. The showroom is also connected to other smaller rooms which are usually used for storage, office space etc, and will probably either consist of a second showroom floor or accommodation space for the owner's family. In the case, the first floor is used as a additional showroom space the steps leading to the first floor will be within the ground floor showroom space whereas if the upper floor is used as accommodation space then the step leading to it will be enclosed with a separate entrance as shown in figure 31.

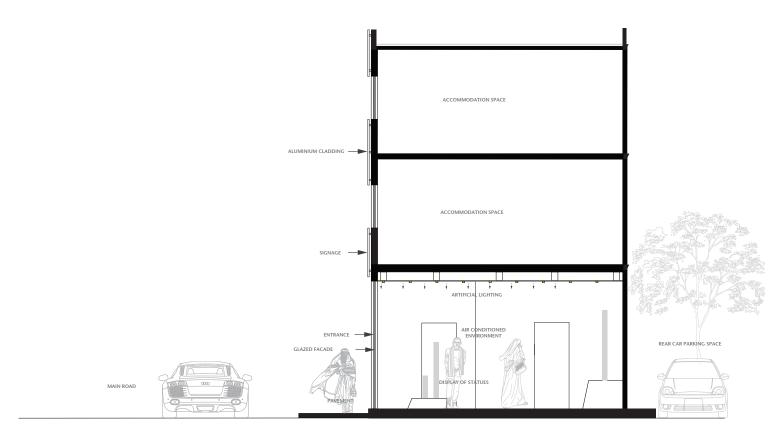ACCOMMODATION SPACE

ALUMINIUM CLADDING

ACCOMMODATION SPACE

SIGNAGE

ARTIFICIAL LIGHTING

ENTRANCE

AIR CONDITIONED ENVIRONMENT

GLAZED FACADE

REAR CAR PARKING SPACE

MAIN ROAD

DISPLAY OF STATUES

PAVEMENT

**Figure 32 - SECTION: Showroom Typology**

## TYPE 2 – THE FACTORY PRODUCTION LINE

In the second organisational form, some of these merchants and businessmen who have firm contacts and steady markets in the subcontinent and around the world employ a number of stone carvers to work for them and carve statues, shrines and small scale temples. In this instance the craft of stone carving is somewhat used in a factory, production line like fashion, where many craftsmen are used to carve a specific part of a statue or a specific instance in the process of producing a statue. For example some craftsmen are used to do the basic shaping of the stone, some are used to etching the shape of the idol on to the stone, some used to do the main bits of carving, some to do the finer bits of carving and some used to do the polishing of the carved product. These companies are able to also produce bespoke sculptures according to the clients needs as well. This brings in a new dimension into the workshops of Khazane Walon Ka Rasta. This organisational form could be seen has an evolution of the ancient guild, since even in ancient times not all guilds were worker owned, therefore similar in organisational structure to these companies, which are owned by a few people or a single family.

**Figure 33 -  Factory Typology**

**Figure 34 -  Factory Typology**

**NATURAL LIGHT**

**DIFFERANTLY SKILLED WORKMEN MOVE FROM ONE PIECE OF SCULPTURE TO THE OTHER FORMING A INVERTED FROMAT OF A PRODUCTION LINE**

**ARTIFICIAL LIGHTING**

**LARGE INDOOR WORKSHOP SPACE**

**STAIRS TO LIVIING SPACES**

**TOOL STORAGE /OFFICE SPACE**

**TOOL STORAGE /OFFICE SPACE**

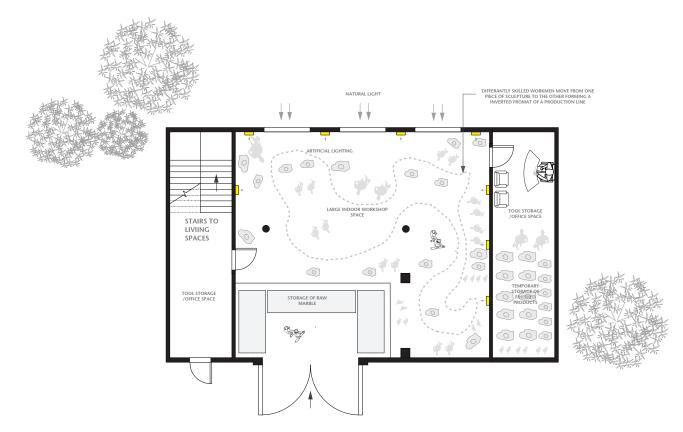**TEMPORARY STORAGE OF FINISHED PRODUCTS**

**STORAGE OF RAW MARBLE**

**Figure 35 -  PLAN: Production Line Typology**

The production line typology is a type that can be seen as a direct evolution of the traditional stone carving workshops. Although it is an evolution of the traditional workshop the scale of economy it caters to is significantly different. These workshops mainly supply the showroom typology discussed above. Therefore, since the scale of economy is significantly larger these workshops tend to require large amounts of floor space. The demand for more space has pushed this type of workshops to the outer limits of Jaipur's historic city where land is less expensive and having a larger space become economically viable. These workshops typically tend to be hidden from the public view and operate in an enclosed property although the environment of the workshop itself consists of a semi indoor outdoor space. This is a key similarity when comparing with the traditional workshop typology, whereby it too has a semi indoor outdoor workshop space and the outdoor space is used for the storage of raw marble blocks. But in contrast the production line type does not use the outdoor space for the carving process and instead uses the large indoor space which is artificially lit throughout the day.

The key organisational difference compared to the traditional workshop is that this typology employs full time and part time craftsmen to work in these workshops. Therefore, it tends to take the organisational structure of a modern day family owned company where the family controls

the activities of the company, plans its marketing strategy and forms a coherent production line cable of producing statutes according to the demands of the market. Like the showroom typology, this typology too has one large space, which in this case is used, as the workshop. Like the showroom, this space leads to few other spaces where storage of tools, finished products and office space is located. The upper floors will typically be used for accommodation of the owner's family and will have a sperate entry into this private space.
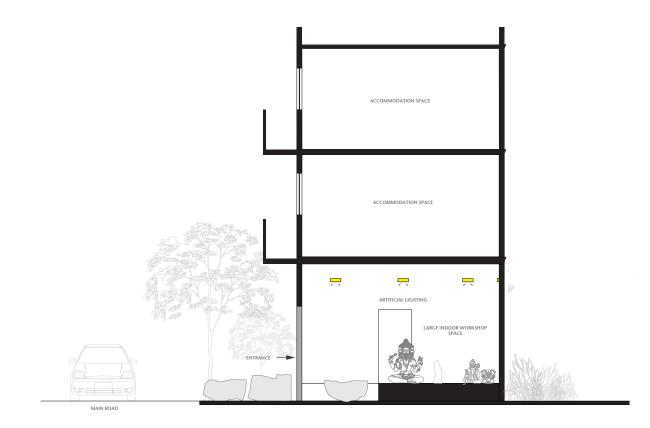
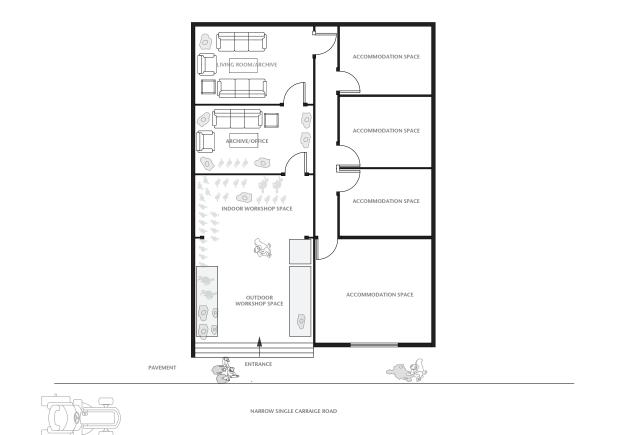**Figure 36 - SECTION: Production Line Typology**

**TYPE 3 – SUB TYPE 1 - THE DEVELOPED  WORKSHOP**

This typological configuration can yet be seen along the streets of Khazane Walon Ka Rasta. They are irregularly placed amongst the traditional typology along these streets. Spatially these workshops are very similar to the traditional workshop. The stone carvers themselves own these workshops, where they are able to do the carving as well as manage a profitable marketing strategy capable of selling the finished products. Unlike the production line typology this type of workshops show more collaboration amongst each other and therefore could be seen as a form of contemporary guild. In order to sell the finished products they have collaborated with governmental and non-governmental organisations in order to create web sites that acts as a common platform for all traditional craft in jaipur. They also do have a common fund amongst themselves to protect their livelihoods and to look into the welfare of their families.

This organisational form retains the nature of bespoke, one off sculpture but is slowly adapting to a semi production line type as for some statues, they too have templates and carve them in bulk.  But, in general, idols are carved by a single craftsman from start to finish unlike the production line typology. These workshops are very orderly and kept very clean unlike both the production line type and the traditional type.

**Figure 37 -  Developed Workshop Typology**

LIVING ROOM/ARCHIVE

ACCOMMODATION SPACE

ARCHIVE/OFFICE

ACCOMMODATION SPACE

INDOOR WORKSHOP SPACE

ACCOMMODATION SPACE

OUTDOOR WORKSHOP SPACE

ACCOMMODATION SPACE

PAVEMENT

ENTRANCE

NARROW SINGLE CARRAIGE ROAD

**Figure 38 -  PLAN: Developed Workshop Typology**

NATURAL LIGHTING

INDOOR NATURALLY LIT WORKSPACE SPACE

INDOOR WORKSHOP SPACE

ARCHIVE/OFFICE

LIVING ROOM ARCHIVE
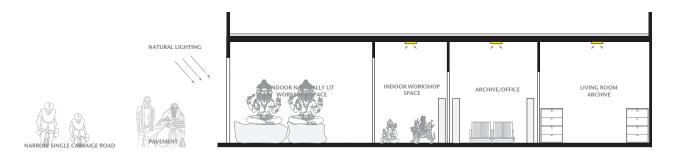
NARROW SINGLE CARRIAGE ROAD

PAVEMENT

**Figure 39 - SECTION: Developed Workshop Typology**

This typology makes use of modern equipment such as electrical grinders and eroding tools along with the traditional chisels and other tools.

One key spatial feature is the cohabitation of dwelling and workshop. The entrance to the craftsman's house is through the workshop where basically the outdoor workshop leads into a indoor workshop which then leads to an archive cum office space which then again leads to a living cum archive space. The living quarters lie parallel to the workshop or in more evolved versions above the workshop. This typology like the traditional typology uses a semi outdoor workshop space but it is protected by the elements due to a concrete slab roof but has an open front that provides the workshop floor with not only sunlight but also a visual connection with the street. The workshop space also has a inner section although not physically divided it uses artificial lighting throughout the day and uses fans as mechanical ventilation. This space tends to operate as an ad-hoc space and therefore on certain days of bad weather the sculpting could be carried out here. It also is a storage space for finished products since it too has a direct visual connection with the street.

**TYPE 3 – SUB TYPE 2 - THE DEVELOPED WORKSHOP WITH MINI SHOWROOM**

This is a sub typology of the developed workshop whereby the workshop now encompasses a mini showroom for the display of the finished products to entice the by-passer into the workshop. This mini showroom is merely a shelf for display at the very front of the workshop and has a glass facade to provide a visual connection. This mini showroom, unlike the showroom type does not have a controlled environment. In fact, is uncontrolled and has similar conditions to the workshop itself. In this typology the workshop has been pushed back in to the building forming an enclosed space for the carving process. This is in stark contrast to the traditional typology since this workshop is not naturally lit but uses artificial lighting throughout the day. The workshop space itself is considerably smaller compared to the other sub typology described above. Therefore, it limits the ability for outside craftsmen to work within the workshop.

Unlike the traditional workshop typology this has a separate access to the accommodation space, which is situated above the workshop.

**Figure 40 -  Developed Workshop Typology - With Mini Showroom Display**
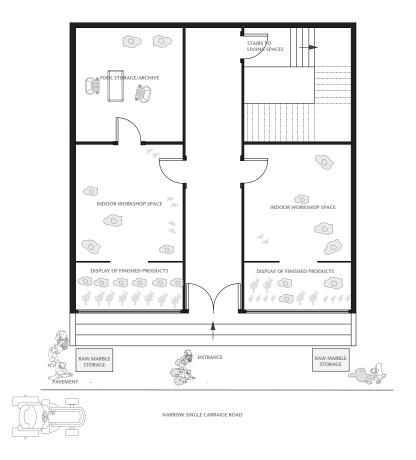
**Figure 41 - PLAN: Developed Workshop Typology - With Mini Showroom Display**

The following labels appear within the plan:

STAIRS TO LIVING SPACES

TOOL STORAGE/ARCHIVE

INDOOR WORKSHOP SPACE

INDOOR WORKSHOP SPACE

DISPLAY OF FINISHED PRODUCTS

DISPLAY OF FINISHED PRODUCTS

RAW MARBLE STORAGE

ENTRANCE

RAW MARBLE STORAGE

PAVEMENT

NARROW SINGLE CARRAIGE ROAD
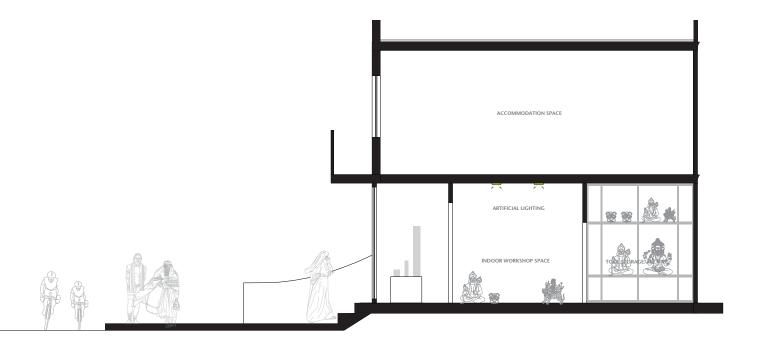
**Figure 42 -  SECTION: Developed Workshop Typology - With Mini Showroom Display**

ACCOMMODATION SPACE

ARTIFICIAL LIGHTING

INDOOR WORKSHOP SPACE

TOOL STORAGE/SHELVING

## TYPE 4 – THE TRADITIONAL WORKSHOP

While new and hybrid organisational forms appear to exploit the potential of stone craft as well as keep up with the challenges arts and craft of 21st century India faces, the old fashioned workshop and guild too is yet a part of the socio-economic fabric of Khazane Walon Ka Rasta. On the unit 18 field trip I was able to observe many small-scale workshops that operate as a community of craftsmen dedicated in producing this artistry to provide for new temples, domestic shine rooms and as works of art. The traditional typology is a type that hasn't changed or evolved significantly for many centuries. In fact they still seem to be in their original format, where each craftsmen's family has one small workshop. The guild or co-operative is in its most active form with the traditional typology, whereby they collaborate to secure raw marble, find potential markets for finished products and secure welfare for their families.

This typology is defined by its outdoor workshop space which is the primary space of the layout. This outdoor space is open to the elements but provides a key social interactive space since the

**Figure 43 -  Traditional Workshop Typology**

STORAGE OF FINISHED PRODUCTS

VISUAL CONNECTION
OF FINISHED
PRODUCTS FROM THE
OUTSIDE

WORK SHOP/ARCHIVE
SPACE

STORAGE
OF FINISHED
PRODUCTS

IN DOOR WORK SHOP
SPACE

TOOL STORAGE

STEPS TO
ACCOMMO-
DATION

ENTRANCE

RAW MARBLE
STORAGE

OUTDOOR WORK
SHOP SPACE

PAVEMENT
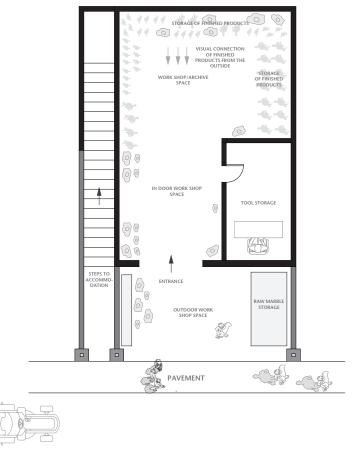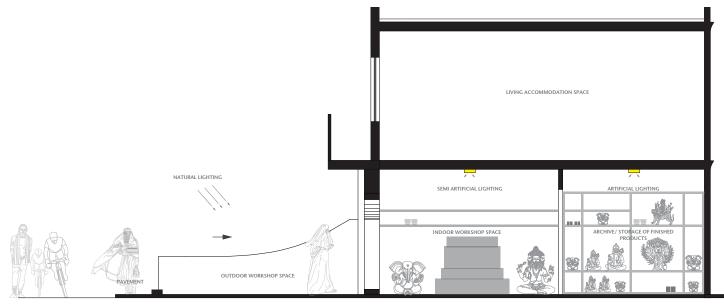
**Figure 44 - PLAN: Traditional Workshop Typology**

NATURAL LIGHTING

LIVING ACCOMMODATION SPACE

SEMI ARTIFICIAL LIGHTING

ARTIFICIAL LIGHTING

INDOOR WORKSHOP SPACE

ARCHIVE/ STORAGE OF FINISHED PRODUCTS

OUTDOOR WORKSHOP SPACE

PAVEMENT

NARROW SINGLE CARRAIGEWAY ROAD

**Figure 45 - SECTION: Traditional Workshop Typology**

process of carving the entire idol will take place in this space, which is located adjoining the pavement and the street. The inner space acts as a secondary workshop space in case it rains or the sun is too strong. The example above shows the accommodation on top of the workshop itself which probably is an adaptation/evolution of the original traditional typology. It may be due to land prices escalating and for reasons such as debt settlement etc the living accommodation has moved from parallel to above the workshop.

**Figure 46 -  Traditional Workshop Typology**
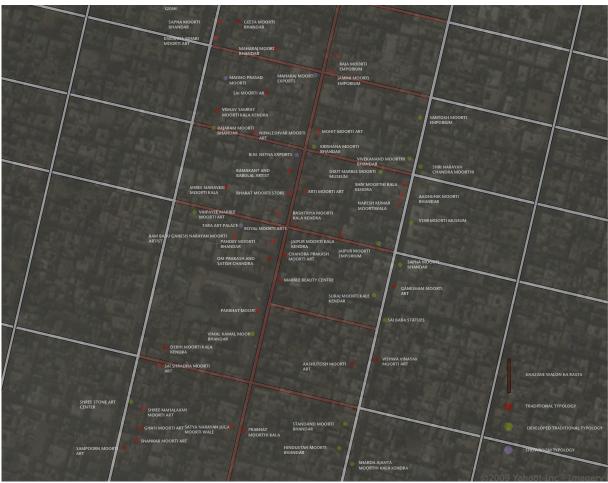
**Figure 47 -  Traditional Workshop Typology**

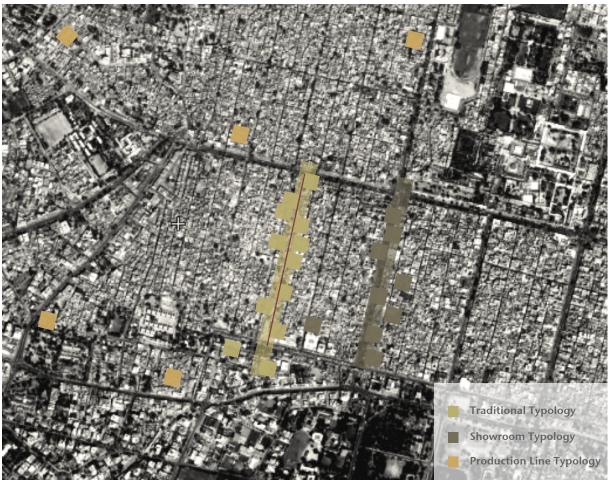**Figure 48 -  Traditional Workshop Typology**

## SCALE OF ECONOMY, ECONOMIC AGGLOMERATION AND ITS IMPACT ON URBAN FORM

The scale of economy plays a key role in the patterns of economic agglomeration and thus impacts urban form. The scale of economy also varies with the typology since each typology caters to a slightly different market. The showroom and production line types, work hand in glove since in most instances the items produced by the faster production line typology is then bought by the showroom type and displayed for potential customers. Therefore, the pattern of agglomeration of the showroom type and the production line type differs from the traditional and developed traditional workshops. The showroom types are located within the historic city bordering Khazane Walon Ka Rasta on the wider main streets. The maps below shows the relation of the showroom type with Khazane Walon Ka Rasta. The production line type requires large amounts of space and is not necessary to be visible to the passer-by. Therefore these workshops are mainly located outside the historic city where more space is available and the prices of land is comparatively low.

The patterns of economic agglomeration and the scale of economy are completely different in the traditional and the developed variants of the traditional workshop.

GRAH

SAPNA MOORTI
BHANDAR

GEETA MOORTI
BHANDAR

KNUSHNA BIHARI
MOORTI ART

MAHARAJ MOORT
BHANDAR

RAJA MOORTI
EMPORIUM

MADHO PRASAD
MOORTI

MAHARAJ MOORT.
EXPORTS

JAMINI MOORTI
EMPORIUM

SAI MOORTI AR

VISHAV SAMRAT
MOORTI KALA KENDRA

SANTOSH MOORTI
EMPORIUM

RAJARAM MOORTI
BHANDAR

NIHALESHVAR MOORTI
ART

MOHIT MOORTI ART

KRISHANA MOORTI
BHANDAR

B.M. NETHA EXPORTS

VIVEKANAND MOORTHI
BHANDAR

SHRI NARAYAN
CHANDRA MOORTHI

RAMAKANT AND
BABULAL ARTIST

DIXIT MARBLE MOORTI
MUSEUM

SHREE MAHAVEEI
MOORTI KALA

BHARAT MOORTI STORE

ARTI MOORTI ART

SHIV MOORTHI KALA
KENDRA

AADHUNIK MOORTI
BHANDAR

NARESH KUMAR
MOORTIWALA

VAIPAYEE MARBLE
MOORTI ART

RASHTRIYA MOORTI
KALA KENDRA

STAR MOORTI MUSEUM

TARA ART PALACE

ROYAL MOORTI ARTS

RAM BABU GANESH NARAYAN MOORTI
ARTIST

PANDEY MOORTI
BHANDAR

JAIPUR MOORTI KALA
KENDRA

OM PRAKASH AND
SATISH CHANDRA

CHANDRA PRAKASH
MOORTI ART

JAIPUR MOORTI
EMPORIUM

SAPNA MOORTI
BHANDAR

MARBLE BEAUTY CENTRE

GANESHAM MOORTI
ART

SURAJ MOORTI KALE
KENDRA

PARBHAT MOORT

SAI BABA STATUES

VIMAL KAMAL MOOR
BHANDAR

DEBHI MOORTI KALA
KENDRA

AASHUTOSH MOORTI
ART

VISHWA VINAYAK
MOORTI ART

SAI SHRADHA MOORTI
ART

KHAZANE WALON KA RASTA

SHREE STONE ART
CENTER

SHREE MAHALAXMI
MOORTI ART

TRADITIONAL TYPOLOGY

GHASI MOORTI ART SATYA NARAYAN JUGA
MOORTI WALE

PRABHAT
MOORTHI KALA

STANDAND MOORTI
BHANDAR

DEVELOPED TRADITIONAL TYPOLOGY

SHANKAR MOORTI ART

HINDUSTAN MOORTI
BHANDAR

SAMPOORN MOORTI
ART

SHOWROOM TYPOLOGY

SHARDA AJANTA
MOORTHI KALA KENDRA

These workshops have a much smaller scales of economies and unlike the showroom type they do not have connections with clients locally and globally. These types do have very basic web sites linked on to a common platform to create a more professional face when approaching potential clients, since they do not have the capacity to mass produce, cost effectively in short periods of time like the production line typology. Their small-scale workshops are not attractive to foreign buyers and therefore their scale of economy is more confined to the immediate local communities and to the enthusiasts in search of original works of art. But in contrast to the showroom types they have a more architectural involvement whereby small-scale local temples are crafted and constructed by these workshops not primarily on the profit basis but more as a charitable deed. Therefore these workshops need to have a collaborative network to keep a steady market going and an organisational network that could look into the difficulties these workshops face in adapting to the contemporary conditions of Jaipur.

Traditional Typology

Showroom Typology

Production Line Typology

THE FORMATION OPERATION AND EXISTENCE OF ANCIENT GUILDS OF INDIA

The ancient political, religious, social and economic landscape and life in India was complex and multi-dimensional in nature, although most of history saw monarchial rule, monarchical thinking was constantly battling another vision of self-rule by members of guilds, villages and extended kin groups. This vision of co-operative self-government often produced republicanism and sometimes even democracy similar to classical Greek democracy.[1] The co-orporation is the most popular form of business organisation in today's contemporary world. Its inception could be traced to both western and eastern civilisations. The co-orporate form or guilds, which is known as Sreni in India, was being used in the sub-continent from around 800 BCE, and perhaps even earlier.[2] Sreni is a legal entity composed of a collection of people who normally engage in a similar trade, but who do not necessarily belong to the same caste.[3] A Sreni need not be totally dedicated to a single profession and members could practice different trades. Further the Sreni was mobile and has been known to move from one location to another, in order to find new resources, skilled individuals and new markets.[4]

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1  Steve Muhlberger Pg 4

2  Vikramadiya S. Khanna (2005) Pg 01
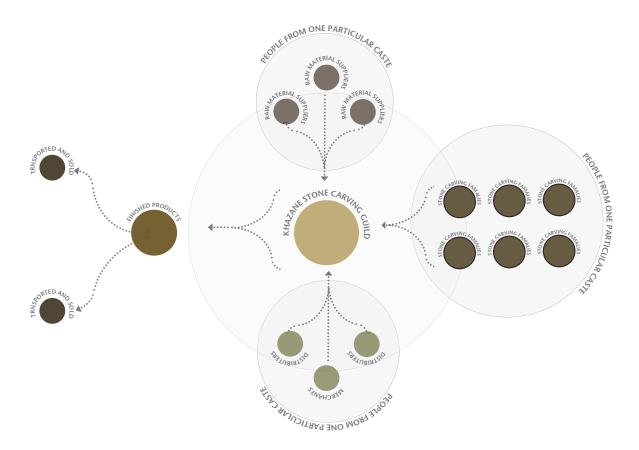
3  Ibid Pg 07

4  Ibid Pg 08

**Figure 51 - Differently Skilled People from Diffrent Castes Forming One Guild**

It also should be underscored that a guild is a trade organization of workers but does not mean that all business and enterprise must be worker owned. In fact, the use of the Sreni in ancient India was widespread including virtually every kind of business, political and municipal activity.[1] Although the Sreni was utilised in many different occupations, its basic internal structure was quite consistent.[2] The first component of the Sreni was the general assembly, which consists of all its members. Some Sreni could have over a 1000 members sine there were apparently no upper limits.[3] In terms of the basic structure, Sreni constituted a head, executive officers and members, who were basically all individuals involved in the organisation. In operational control the Sreni had a considerable degree of centralised management and there were two sets of key players, which are the headmen and the executive officers, who were elected by the members or the assembly.[4] The headmen played the most pivotal role within the Sreni from exercising adjudicative powers to setting conditions for work, binding the Sreni with contracts and to represent the Sreni in the king's court.

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1 Vikramadiya S. Khanna (2005) Pg 01

2 Ibid Pg 01

3 Ibid Pg 10
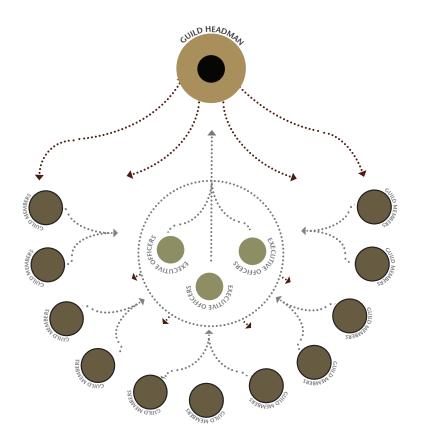
4 Steve Muhlberger Pg 17

**Figure 52 - Hierarchical Order of a Guild**

The rules and regulations that governed the Sreni were tailored to each specific Sreni, its production practices, prices, quality controls and so forth. These regulations and codes of conduct were called Sreni Dharma. What also makes the Sreni so unique is that it permitted people from different castes to enter it and practise the same profession and also permitted people to leave the Sreni of their own volition and enter different Sreni if they wanted. The degree of social mobility suggested by the procedure for entry and exit into a Sreni stands in marked contrast to the generally perceived rigidity of the caste system.[1]

In terms of profits and losses the partners must share all legitimate expenses of business such as those incurred by the purchase and sale of merchandise, provision for necessary travelling, wages of labourers, realisations of dues, etc. The profits and losses of the business are to be shared according to the share contributed by the individual to the stock.[2] Although the Sreni would accumulate assets from a number of sources, it also had a number of expenses that would deplete those assets.

1 Vikramadiya S. Khanna (2005) Pg 15

2  M.K. Pal (1978) Pg 124

In particular the cost of producing goods for sale or purchasing goods for later resale would have been an important cost.[1] However, Sreni were active in other aspects of life besides trade. Many Sreni would engage in acts to support charity and religious institutions. It was quite common for the Sreni to use some of their profits towards building or maintaining public gardens, tanks, assembly halls and religious edifice as well as providing support to people during natural disasters and to those who are ill, destitute or otherwise economically disadvantaged.[2]

To better understand the development of the corporate form in ancient India it is important to examine the political and economic history of India and what parts of it led to the development of the corporate form. [3]

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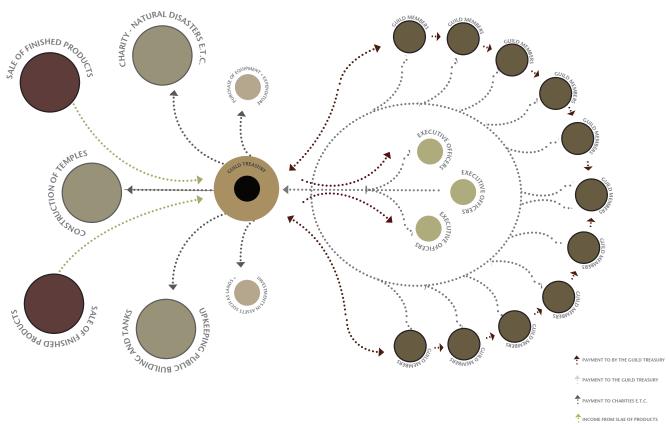1  Vikramadiya S. Khanna (2005) Pg 17

2  Ibid Pg 19

3  Ibid Pg 27

**Figure 53 - Flow of Wealth within a Typical Guild**

SALE OF FINISHED PRODUCTS

CHARITY - NATURAL DISASTERS E.T.C.

PURCHASE OF EQUIPMENT - EXPENDITURE

CONSTRUCTION OF TEMPLES

GUILD TREASURY

SALE OF FINISHED PRODUCTS

UPKEEPING PUBLIC BUILDING AND TANKS

INVESTMENTS IN ASSETS SUCH AS LANDS -

GUILD MEMBERS

EXECUTIVE OFFICERS

EXECUTIVE OFFICERS

EXECUTIVE OFFICERS

GUILD MEMBERS

PAYMENT TO BY THE GUILD TREASURY

PAYMENT TO THE GUILD TREASURY

PAYMENT TO CHARITIES E.T.C.

INCOME FROM SLAE OF PRODUCTS

93

The Indus Valley Civilization, which spread and flourished in the north-western part of the Indian subcontinent from 3300 BCE to 1300 BCE in present-day Pakistan and northwest India, was the first major civilisation in South Asia. Along with ancient Egypt and Mesopotamia it was one of three early civilisations of the ancient world, and of the three the most widespread. [1] It flourished in the basins of the Indus River, one of the major rivers of Asia, and the Ghaggar-Hakra River, which once coursed through northwest India and eastern Pakistan. This civilisation collapsed at the start of the second millennium BCE and was later followed by the Iron Age Vedic Civilisation, which extended over much of the Indo-Gangetic plain and which witnessed the rise of major polities known as Maha-janapada (Independent self-governed communities).

The Maurya Empire conquered most of the subcontinent during the 3rd century BCE. Ashoka Maurya (304 BCE - 232 BCE), commonly known as Ashoka the Great, was an Indian emperor of the Maurya Dynasty who ruled almost the entire Indian subcontinent from 269 BCE to 232 BCE.
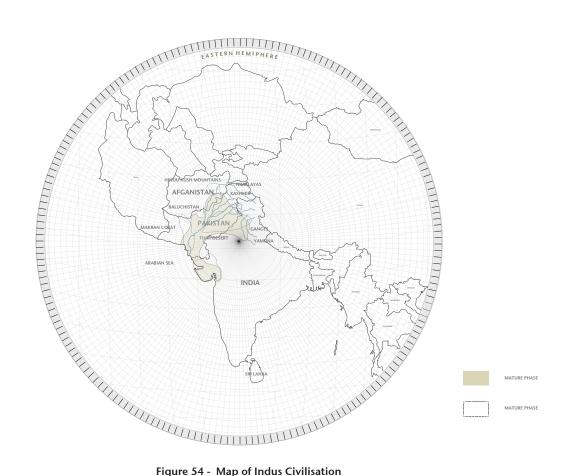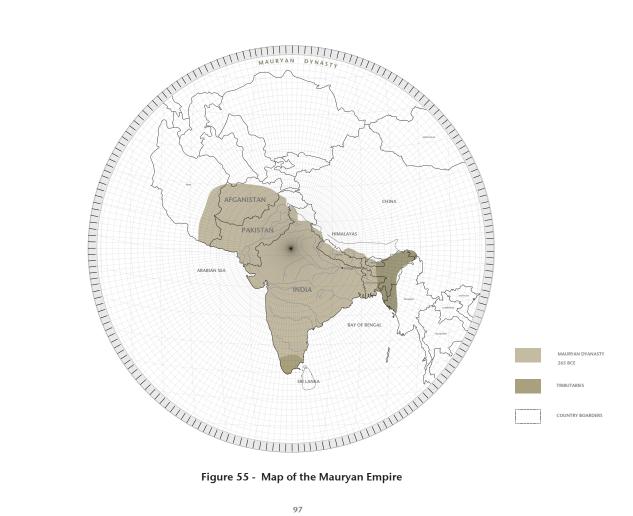
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1 Herman Kulke (1986) Pg17

MATURE PHASE

MATURE PHASE

**Figure 54 -  Map of Indus Civilisation**

Figure 55 - Map of the Mauryan Empire

Ashoka reigned over most of present-day India after a number of military conquests. His empire stretched from parts of the ancient territories of Khorasan, Sistan and Baluchistan, what is now Afghanistan and possibly eastern Iran, through the Hindu Kush Mountains in Afghanistan, to present-day Bangladesh and the Indian state of Assam in the east, and as far south as northern Kerala and Andhra Pradesh.[1] The cruel consequences of war led to the death of over 100,000 people, and many more who died later on. Due to this experience King Ashoka abjured further warfare and turned to Buddhism. This was a defining moment in the history of the Indian sub-continent and it led to the most enduring legacy of Ashoka Maurya, which was the model that he provided for the relationship between religion and the state.[2] Throughout South-eastern Asia, the model of rulership embodied by Ashoka replaced the notion of divine kingship that had previously dominated. Under this model of 'Buddhist kingship', the king sought to legitimise his rule not through descent from a divine source, but by supporting and earning the approval of the Buddhist Sangha (clergy/ a guild of monks). Following king Ashoka's example, kings established monasteries, funded the construction of stupa's, and supported the ordination of monks in their kingdoms.

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1 Herman Kulke (1986) Pg 66

2 Ibid Pg 66

Both religions found a number of adherents in India with Buddhism becoming very popular and changing the landscape in many ways for nearly 1000 years.[1] Apart from the religious and political significance of Buddhism and Jainism, trade was significantly impacted during this time. Both religions did not stress the caste divisions and thus permitted easier interchange amongst groups in society and this further helped to expand trade, innovation and production.[2]

Numerous middle kingdoms ruled various parts of India for the next 1,500 years, among which the Satavahanas and Gupta Empire stands out. The expansion of agricultural settlements and trade, both internal and external, helped transform society in the Deccan from a loose conglomeration of several tribes to a unified political system under the Satavahanas. While this process may have commenced with commercial exploitation of the region under the Maurya Empire, it perhaps was accelerated with the increasing participation of ports along the west coast with the rapid rise in external demand.[3] The growing power of the Satavahanas extended patronage to both Buddhism and the Brahmanical religions in a bid to establish firm control over newly

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1 Vikramadiya S. Khanna (2005) Pg 35
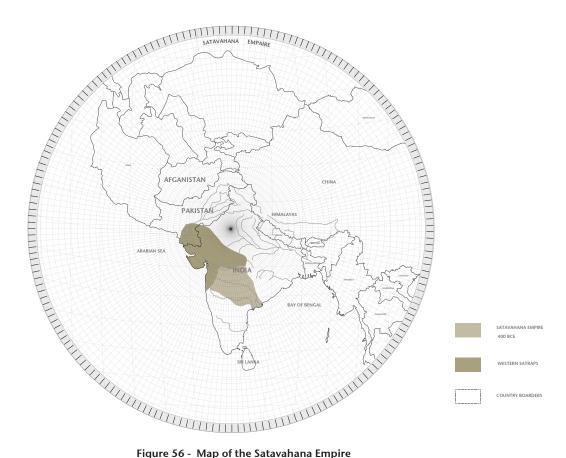
2 Ibid Pg 35

3 Himashu P. Ray (1986) Pg

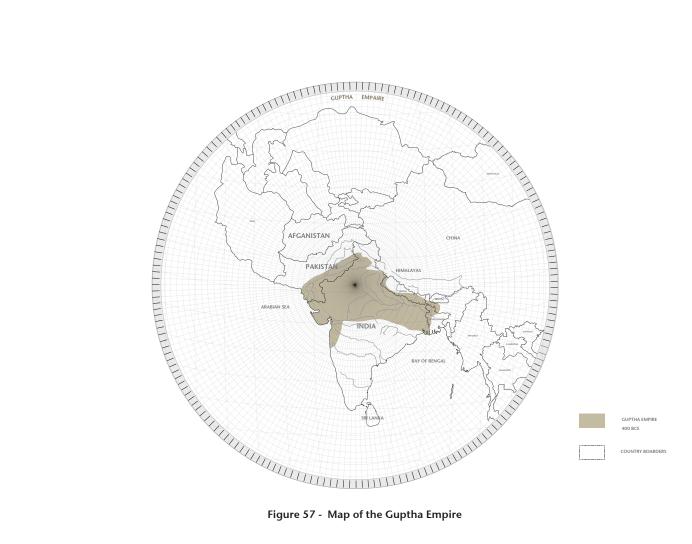**Figure 56 -  Map of the Satavahana Empire**

**Figure 57 - Map of the Guptha Empire**

settled lands. The resultant peace and expansion of trade is reflected in the inscriptions of the western Deccan, which record donations for religious activities not only by royalty but also by prosperous occupational groups such as blacksmiths, iron mongers, carpenters, sculptors and fisherman.[1]

After the decline of the Maurya and Satavahana Empire the next significant Indian empire was the Gupta Empire. The Gupta Empire dates from around 240 CE to 550 CE. It was a period of rapid growth in trade and enterprise with Sreni's being a dominant entity of society.[2] The loose and less rigid form of governance with devolution of political powers to the mini states and villages within the empire gave the Sreni more room for exploiting natural resources, new skills, technology and new markets both within the Gupta Empire and outside in foreign lands. It was also a period where trade routes to northern India, China, Persia and Europe began.[3] By 550 CE the Gupta Empire weakened and fell, giving rise to a number of smaller kingdoms that were ruled by remnants of the Gupta Empire and numerous warring factions.[4]

1 Himashu P. Ray (1986) Pg

2 Vikramadiya S. Khanna (2005) Pg 46
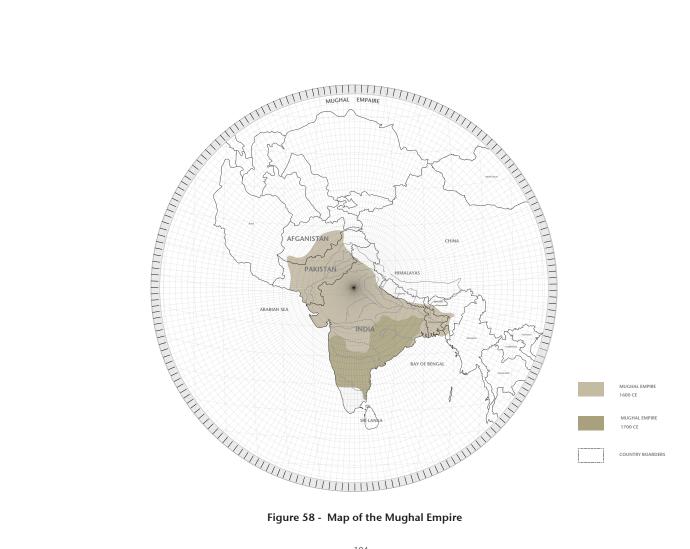
3 Ibid Pg 46

4 Ibid Pg 46

Around the 7th to the 11th centuries saw the tripartite struggle between the Pala Empire, Rashtrakuta Empire, and Gurjara Pratihara Empire centered around Kannauj. Southern India saw the rule of the Chalukya Empire, Chola Empire, Pallava Empire, Pandyan Empire, and Western Chalukya Empire. This period, witnessing a Hindu religious and intellectual resurgence, is known as the classical or "Golden Age of Hindu India".

Muslim rule started in some parts of north India in the 13th century CE when the Delhi Sultanate was established in 1206 CE.[1] In the 16th century Mughal rule came from central Asia to cover most of the northern parts of India. The Mughal Empire suffered a gradual decline in the early 18th century, which provided opportunities for the Maratha Empire and Sikh Empire to exercise control over large areas in the subcontinent.[2] In the late 18th century and over the next century, the British East India Company annexed large areas of India. The subcontinent gained independence from the United Kingdom in 1947, after which the British provinces were partitioned into the dominions of India and Pakistan.[3]

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1 Caterine B. Asher (1992) Pg 1

2 Ibid Pg 292

3 Herman Kulke (1986) Pg 312

**Figure 58 - Map of the Mughal Empire**

CRAFT AND CRAFTSMEN OF INDIA

## HISTORICAL CONTEXT

In ancient India economic organizations were governed by the existing social structure; the best example of this maxim is the spurt in trade during the middle of the first millennium BCE, when the society went through a phase of rapid change.[1] The importance of growing trade is that it creates incentives for collective efforts. When trade increases people tend to travel more to sell their wares. Travelling has not always been easy, especially if the traders are moving through foreign and dangerous territories.[2] Trade has played a consistently important part in Indian history. It is, thus, not surprising that ancient India possessed a variety of different organisational forms to facilitate trade.[3]

With agricultural output increasing and new trading markets in the middle-east opening via sea trade routes, specialised groups such as Stone, Pottery and Jewellery craftsmen were exposed to new markets and therefore the number of craft guilds started to grow.

1 Himashu P. Ray (1986)

2 Vikramadiya S. Khanna (2005) Pg 04

3 Ibid Pg 04

Craft is both a method of industrial production and a form of artistic activity.[1] Craft is usually more concerned with household art than with small-scale industry or cottage industries. In small-scale industry, technical skill is given more importance, where as in household art or craft, artistic and aesthetic elements play a more important role.[2]  In a gradually extending world the craftsmen became the keystone of a developing commerce. They played a pivotal role in organising guilds and unions that operated in similar fashion to modern day trade-unions.

Stonecutter's craft is one of the oldest crafts of India. Its inception is not fully understood as most examples are so mutilated that it's difficult to study them. In any case, the link between the stone carvers craft of the Indus Valley and that of the Mauryan period is missing, and the development of the craft only starts under the patronage of the imperial court, especially of King Asoka Maurya. From this period onwards the stone carvers craft in India really saw the heyday of its glory throughout the succeeding ages.[3]

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1 M.K. Pal (1978) Pg 02

2 Ibid Pg 02

3 Ibid Pg 27

**Figure 59 -  Craftsmen at Work - In a Traditional Workshop Typology**

From the beginning of the classical phase the Deccan has been the home of significant stone craft. But sculptural remains of the 6th century BCE are very few. However, from the 5th century BCE onwards there appears to have been prolific activity in stone carving. The rock cut reliefs of the caves at Badami, Ajantha, Karle, Anurangabad and Kanheri are some examples. At the same time there was perhaps an influx of merchants and trading groups from the cities of the north as well as foreigners loosely categorised under the term yavanas. The situation was further fuelled by the presence of strong influences from both Buddhism and Janism. The former on account of its liberal attitude towards social mixing was better suited to traders who had to travel long distances and often had to accept hospitality from people of all social strata.[1] It is likely that these early agricultural settlements received a stimulus with the commencement of long distance trade under the patronage of the Mauryan's.

1 Himashu P. Ray (1986)

High caste Hindus enmeshed in the net of family and caste obligations are bound by caste rules adding to the discomfort and hazard of travel outside their home ground. Therefore, they may well find the life of long distance traders distasteful. Seeing merit above all in personal austerity and strict conformity to caste rules they somewhat lack the initiative which induces Buddhist Bhotia traders to devote their wealth to the construction of religious monuments, the endowment of monasteries and the acquisition of prestige by the conspicuous dispensation of hospitality and charity.[1] This spirit of entrepreneurship encouraged by Buddhism, when coupled with the patronage provided by the Mauryan state, led perhaps to an increase in long distance trade both by land and by sea. An intriguing phenomenon is the location of Buddhist caves and monasteries along trade routes and at the heads of important passes.

Although there is no direct evidence of guilds carving these rock cut monasteries it is assumed so through analogy when studying guilds of both western and eastern craft organisations.[2] It is believed that the caves at Ajanta, Kanehri Ellora etc were carved by these ancient stone carving guilds that lived and worked in these cave temples for many years expanding and sculpting

1 Himashu P. Ray (1986) Pg 202

2 Professor Adam Hardy - PRASADA

elaborate figures of the Buddha and other spiritual motifs. These cave temples/monasteries were at its peak, centres for leaning, skills training, technological innovation, philosophy and trade. These monasteries perhaps had hundreds if not thousands of monks that learnt, taught and provided shelter for traders, craftsmen and philosophers. Below is a spatial analysis of the monasteries these craft guilds live, worked and created.

When comparing these cave monasteries with the contemporary stone carving workshops of Jaipur it can be noted that both the contemporary guilds and the ancient guilds operated collaboratively and located themselves within close proximity to each other, for numerous reasons discussed in chapter 2. But other than raw material availability and an economy capable of supporting the craft these ancient guilds did not have a defined layout like its contemporary, but worked amongst the monks (sangha) and other guilds of artisans, merchants and philosophers. Therefore, it functionally was significantly different to the contemporary guilds of Jaipur since they have agglomerated to form collaborative organisations amongst a community of similarly skilled individuals whereas the ancient form would have had operated within an academy of innovation and minds of many different types. The ancient guilds too show a distinctive pattern of agglomeration which could be seen as a rural form due to its remote locations.

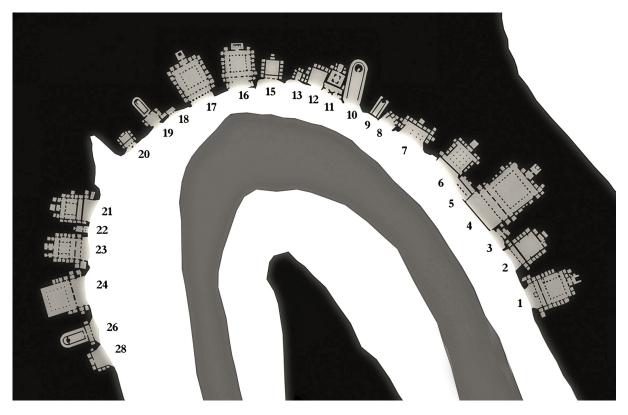**Figure 60 -  The Ajanta Cave Complex**

**Figure 61 - The Layout of the Ajanta Caves**

This is one key distinction although it must be noted that there may have been guilds in urban localities which are recorded in history but do not exists any longer in its primary form but the workshops of jaipur could be seen as its evolved form. There is no longer an evolved version of the rural guilds since the scale of economy does not support trade any longer in these remote, isolated locations, since trade routes are now of a completely different order.

When analysing the layout of the caves at Ajanta, it can be noted that they are all aligned along a single carved out street of different levels facing outwards towards the street and the river flowing parallel to the street. Similar pattern of agglomeration could be seen at the Ellora cave complex as well but at Kanheri the street is merely a rock cut fleet of steps on the face of the rock hill. This rock cut stairs performs the function of the street which the caves are aligned along facing it. It must be noted that the street performs a vital part of the formation of guilds since it acts as the common ground between workshops allowing a conducive space for collaboration and social interaction.

It also should be noted that ancient stone guilds such as the ones that may have operated from within the cave monasteries in Kanheri, Ajanta and Ellora; all used the temple layout which may

have not been ideal for carving but may have had the flexibility to move around the complex since they were also involved in the carving of the complex itself, together with carving statues and ornaments for the purpose of selling. Since these monasteries were located along trade routes many traders and merchants would have visited these caves for shelter, food etc. Therefore, these crafts could have easily been something that was sort after by these merchants and traders and thus the number of families taking to crafts such as stone craft would have been significant. It also must be noted that the skills for stone craft was not merely passed on from father to son but these monasteries were places for teaching and leaning where new crafts and trades would have been taught and learnt.

**Figure 62 -  Kanheri Cave Complex**

**Figure 63 -  Layout of the Kanheri Caves**

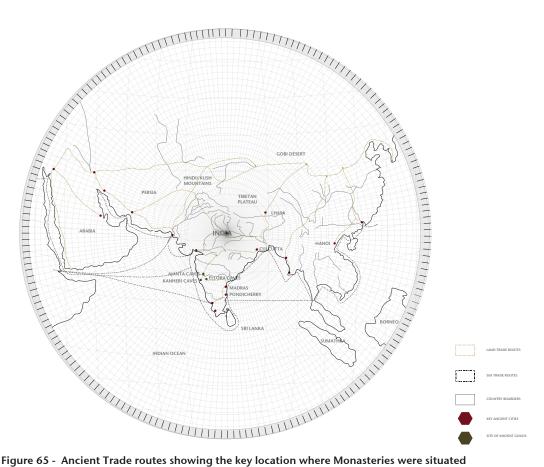**Figure 64 -  Interior view of one of the cave temples**

**Figure 65 - Ancient Trade routes showing the key location where Monasteries were situated**

## CONTEMPORARY CONTEXT

In today's contemporary context stone carving guilds only operate in the production of idols, shrines and mini temples but yet the capacity to make architecture of larger scale lies within these skilled communities. The Shri Swaminarayan Hindu Temple commonly know as the Neasden Hindu Temple is one such architectural example that proves that stone craft yet has a future amongst contemporary materials, methods and processes. Although its architecture is based on the Vastusasthra that govern the sacred geometrical orientation and spatial layout of a traditional Hindu temple, the Neasden Hindu Temple was built entirely of marble (as in ancient India) using no structural steel or concrete and was also tailored to adhere to the stringent UK building regulations. This could be seen as an adaptation to the contemporary conditions and thus required the designers and the craftsmen to push the boundaries of stone craft and architecture. The Neasden Hindu Temple was built by a Sompura contractor. The Sompura's are a community of high caste Hindus skilled with the art of building temples. They are architects cum craftsmen and are from Gujarat and the western regions of Rajasthan.
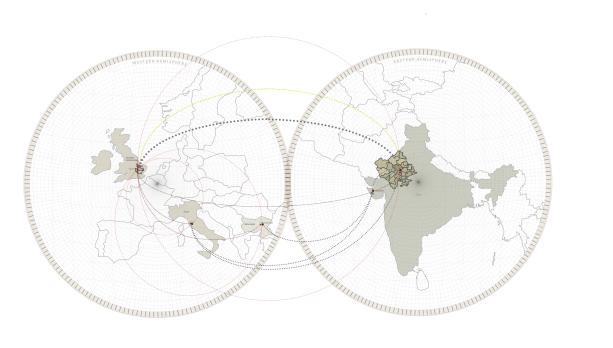
Legend:
- MOVEMENT OF FINISHED MARBLE
- MOVEMENT OF RAW MARBLE
- EXCHANGE OF INFORMATION
- MOVEMENT OF PEOPLE

**Figure 66 -  The movement of material information and craftsmen**

When analysing the construction of the Neasden Hindu Temple the crucial factor of its design and build was 'time'. Carving a giant structure would require a long period of time. Therefore, in order to save time a 15,000 square metre-plot was acquired in Kandla, Gujarat where workshops were set up to craft the stones once they arrived from Bulgaria and Italy.[1] A mini-township was developed around the workshops to cater for the 650 artisans who would be working at the site. Yet the tight timescale soon demanded that further sites be developed. For the convenience of the artisans and their families, workshops were set up in their own villages, some of which had been sites of stone-carving for generations if not centuries. For example, 125 craftsmen worked on the Ambaji marble in Ambaji itself. A further 250 and 150 craftsmen worked at Pinwada and Dungarpur, respectively, in Rajasthan. At peak, a total of 1,526 stone-carvers were involved at 14 different sites in Gujarat and Rajasthan.[2] This form of operating shows similarities with the workshops of the production line typology in Jaipur. Whereby the most skilled craftsmen are used to do the main bits of carving along with the intricate detailing, and the other semiskilled craftsmen, their family members as shown in figures 66 & 67 work on drawing and shaping the

1 Baps - Shri Swaminarayan Mandir

2 Baps - Shri Swaminarayan Mandir

stone to increase the efficiency of the carving process. The process to transform rough blocks of stone into intricately carved pieces for the Mandir was a long, patient and meticulous affair. The roughing out process typically results in about 15-20% of wastage. However, diagrams of each piece were carefully configured onto each block, leading to eventually only 2% of unusable stone. This was possible only due to the advancements in technology, whereby all the drawings were developed on 3D software and then transferred onto the stone. Some drawings were first transferred on to metal stencils and then  transferred onto the stone for better accuracy.

**Figure 67 -  Semiskilled craftsmen etching the drawings onto the marble**

**Figure 68 - semiskilled craftsmen along with their family members etching the drawings on the marble**

After the drawings were transferred on the stone the stone craftsmen then took over with their innate skill, concentration and patience, they diligently chipped away to create the intricate designs and figures, using not only mallet and chisel but also using pneumatic hammers, eroding machines and other power tools. Even though electrical equipment was used; to complete a deep-carved column, it would take 4 full-time craftsmen each working on one side of the column about 60 days.

The Sompura temple contractors do not operate in guilds nor do they have any collaboration amongst other similar construction companies, in fact they have stiff competition amongst themselves for work. When analysing a single contractor and its organisational structure they too have some similarities to the crafts guilds of Jaipur. The key similarity is that the company employs a number of stone crafting families, which probably would have their own small-scale workshops along with the large scale workshops that the company owns. Guilds too operate in similar fashion but all the craft families would have equal say within the guild, whereas the Sompura construction companies and mainly owned by a single  family or a few individuals. This organisational structure could be seen as a similarity because even in ancient times not all guilds were worker owned. As a key adaptation to the contemporary economic conditions like
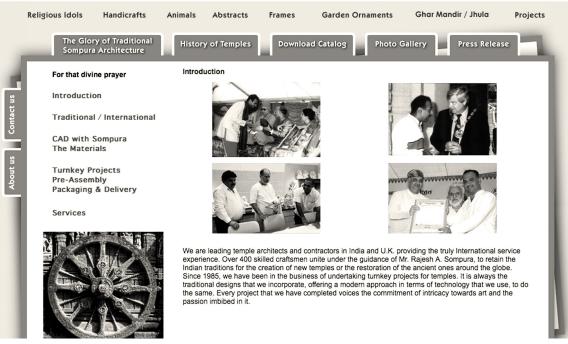
**Figure 69 -  Typical web site of a Sompura construction company**

**Figure 70 -  A temple in Rajasthan India constructed by a Sompura construction company**

the guilds of Jaipur they too have web sites to market their products and services for potential customers locally and globally. In contrast to the guilds of Jaipur they are not attached to any marketing platforms such as 'Indiamart' or 'Indiatrade' but have web sites of their own individual companies. Figure 68 shows a typical web site of a Sompura contractor and a significant fact that is noticeable is that they are capable of operating globally and promote the fact that they have constructed small to medium scale marble structures in the United Kingdom as well. This ability to work across regions and continents brings a new dimension to the evolution of stone craft and stone craft guilds.

Even though the craft has developed and adapted to contemporary conditions through flexibility, efficiency and more effective methods of marketing, yet time involved and the fact that the craft is labour intensive and, therefore, expensive is a fact that prevents the craft from evolving to a greater degree. Stone craft probably will not be used as a mainstream material/process for buildings of the 21st century but will have a niche market for architecture that will push the boundaries of this ancient material and craft.  The  most significant factor that could take stone carving to a new age is technology and yet even though electrical and pneumatic machines are available and with the introduction of Robot milling technology the craft yet requires longer periods of time and larger sums of money than mainstream materials and processes.

**Figure 71 - Gantry cranes used for the assembly of the carved marble blocks**

**Figure 72 -  The construction process of the Neasden Hindu Temple**

**Figure 73 -  Pneumatic eroding machines along with electric grinders used to do the final touches**

CONCLUSION

Stone carving guilds in the Indian subcontinent have evolved over two millennia encompassing technological advancements together with adapting to the ever changing politico-religious and socio-economic conditions of society. The notion of the guild as an entity and as an independent organisation that encompasses the values of democracy evolved at a time monarchial rule and thinking was the norm. As discussed above the conditions conducive for such an organisation, or cooperative structure, to form, was due to the politico-religious conditions that drastically changed during 600 BCE. It can, therefore, be concluded that due to the influence of religions such as Buddhism and Jainism and due to the fact that the kings and rulers of that period embraced these new values and teachings laid down the preconditions for the formation of organisations such as guilds that went beyond the social stratifications and segregation of conservative ancient society.

The drastic change in politico-religious conditions led to a change of the socio-economic environment, whereby the concept of trade and trading beyond the boarders evolved. Trade brought about a demand for craft and skill which then began to develop rapidly. This development in craft and trade brought about the need for cooperation and unity. This cooperation led to the

formation of guilds and entities that collaborated with each other for their own survival and existence. This formation into collaborative entities where a crucial factor that helped the craft as a whole to phase the dynamic conditions of society. The collaboration was not random but was according to the scale of economies these craft guilds catered to. Therefore, scale of economy influenced the patterns of agglomeration and they eventually did have a significant impact on urban and rural form. When analysing the contemporary guilds of Khazane Walon Ka Rasta, Jaipur and the ancient guilds that probably worked within the cave temples at Ajantha and Kanheri, they show notable similarities and differences.
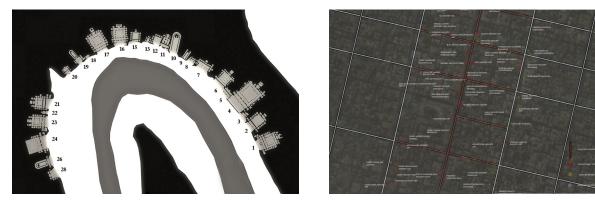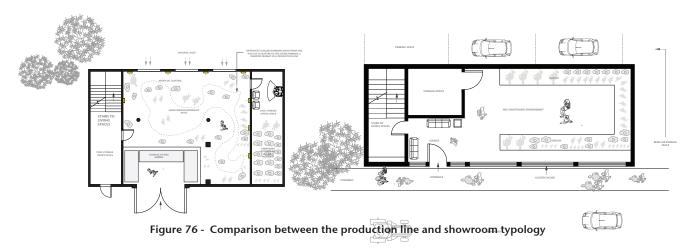


Figure 74 - Comparison between ancient and contemporary agglomeration patterns of stone carving guilds

One clear observation that could be made is the fact that the street plays a significant role in providing a conducive space for social interaction and collaboration, which was one of the defining factors that allowed the guild as an entity to evolve over a period of time. This connection with the street and its impact on urban form evolved with time to the agglomerative patterns shown in figure 73. The evolution of the contemporary guild, in its most original form; the traditional typology is a intriguing fact that the scale of economy, and economic agglomeration does not



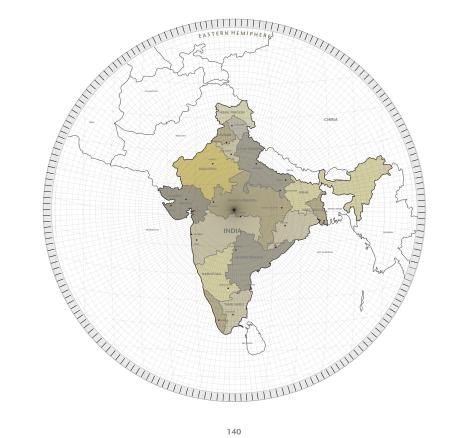Figure 75 -  Comparison between the traditional and developed workshops typology

only impacted urban form but also impacts the spacial layout and orientation of these workshops itself. The production line typology due to its minimal collaborative and interactive qualities has now moved away from the historic city limits of Jaipur, to its outskirts and the showroom typology now borders Khazane Walon Ka Rasta and are situated along the broader dual carriage-ways. Therefore, it can be confirmed that scale of economy has had an impact on the architectural layouts of the workshops but also has had a profound impact on the urban form as well.



**Figure 76 -  Comparison between the production line and showroom typology**
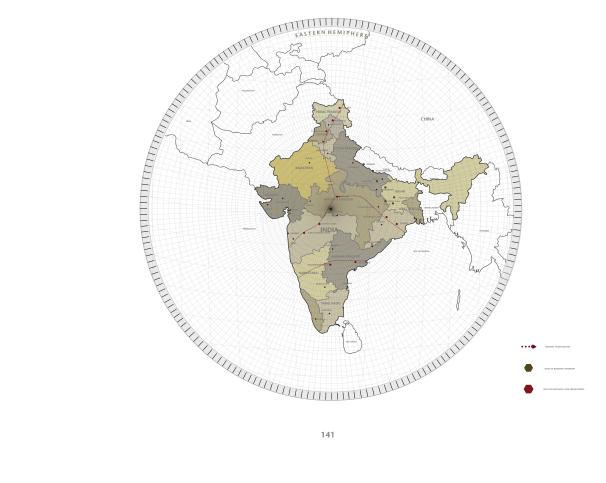
It is intriguing that the architecture they produce too has evolved with time from the rock-cut caves of Ajanta and Kanheri to free standing temples, such as Ranakpur and Palitana in Rajasthan to the Taj Mahal in Agra. This evolution of the art and architecture produced by stone carving guilds has greatly depended on technological innovation, and in today's contemporary world still is the most crucial of factors.

The digital age is one that as transformed everything around us and has greatly influenced the worlds of architecture and the built environment. Architecture has been greatly shaped by innovative thinking that can be produced directly by feeding the drawing into a machine that can produce the building blocks of a building. Due to the exponential technological development, other crafts such as wood work and metal work have reached this technological milestone, whereby the designer could produce the finished item using 3D software and machines, making the craftsmen obsolete but making it viable to be used in this new digital age. Therefore, the evolution of the guild and the evolution of technology perhaps could no longer work hand in hand, because technology will eventually reduce the need of the stone carving guild. But the stone caving guild may yet continue to evolve as an organisation for art rather than architecture.

APPENDIX

## APPENDIX 1 - MAP OF INDIA

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