METAL HANDICRAFTS OF MANNAR

The Untold Legacy of the Bell Metal Town of Kerala

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**This study has been done during the first semester,
under the 'Environmental Exposure Course', of KSID's foundation year
for PG Diploma Programme in Design. The duration of the course was three weeks.**

DEDICATION

‘This work is dedicated to all the known and unknown craftsmen of the Bell Metal Town- Mannar for their never dying spirit to keep the legacy going on’

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ACKNOWLEDGEMENT

This study has been done with the help of many persons. We propose our sincere thanks to all the craftsmen of Mannar's metal handicrafts who believed in us and let us know about them and their undying craftsmanship. We are highly debted to each one of them, known or unknown.

We are very grateful to Mr. Anantha Krishanan Achary and his family who acted as our local guardians there, supporting us in every possible aspect. We are thankful to PRM Laxamana Iyer Associates, the very well known name in the business of metal handicrafts, for their valuable inputs and information.

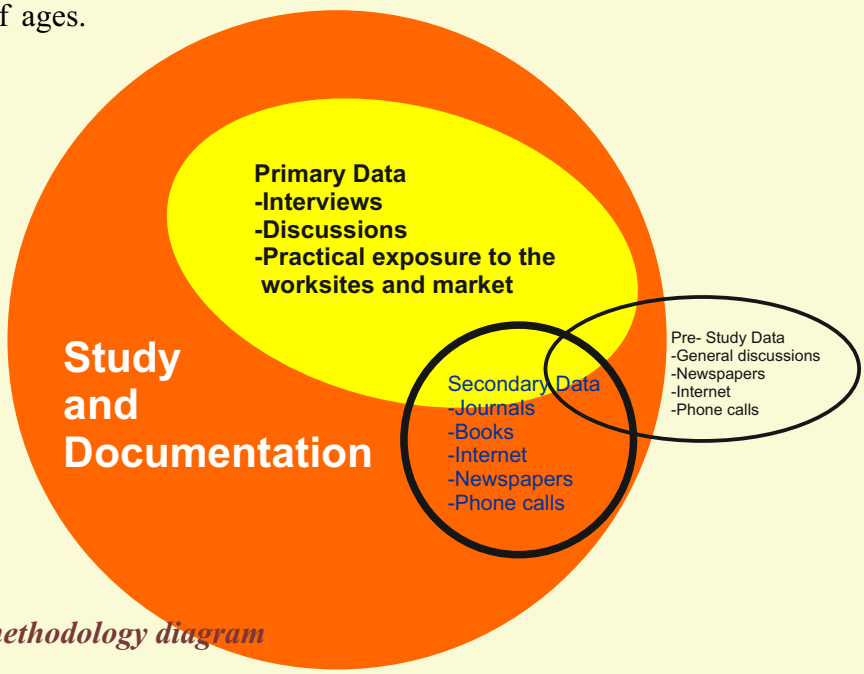
We extend our thanks to Mr. Girish PT, the Executive Director and Mr. Manu T, Faculty and the Course Co-ordinator, KSID for their continuous guidance and support to make this study enriched and accurate to the possible extent at the time.

METHODOLOGY AND SIGNIFICANCE OF THE COURSE

This study has been done with a particular focus on craft and business, both, of traditional metal handicrafts industry of Mannar.
The objective has been realized mainly with the help of primary data collected exclusively through interviews, discussions, conversations with craftsmen and exposure to their worksite and the market. The secondary data have also been used for realizing the objective. Before starting the primary data collection and exposure to worksite and the market, we have gone through the general understanding of the metal handicrafts industry of Mannar and other states of India via available resources on internet, phone calls etc. This study has been documented as per the real life observations and data inputs.

We, as the design school students, got the opportunity to know the cultural heritage and craftsmanship of Mannar and came to know the reality and present scenario of this wonderful sector. This enriched us in many ways like checking the authenticity of the available information in secondary data sources and, thus, cleared many myths and misconceptions about the metal handicrafts of the 'Bell Metal Town of Kerala'.

We realize that there is no serious recognition for this metal craft in the country and unlike many other crafts of Kerala this has no Geographical Indication also. We hope this study will open some new doors to this handicraft and there will be more efforts from the artisans and the Government as well to recognize, promote and preserve this rich legacy of ages.



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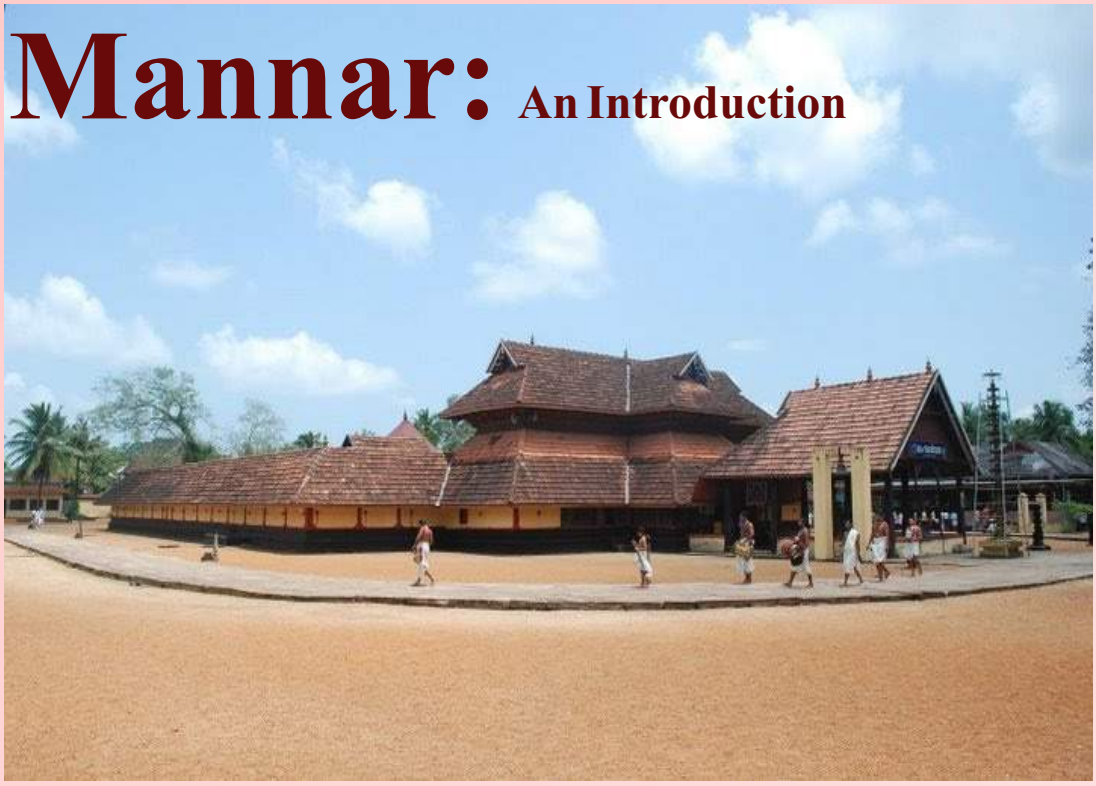
Mannar: An Introduction



P1.Thrikkuratti Temple

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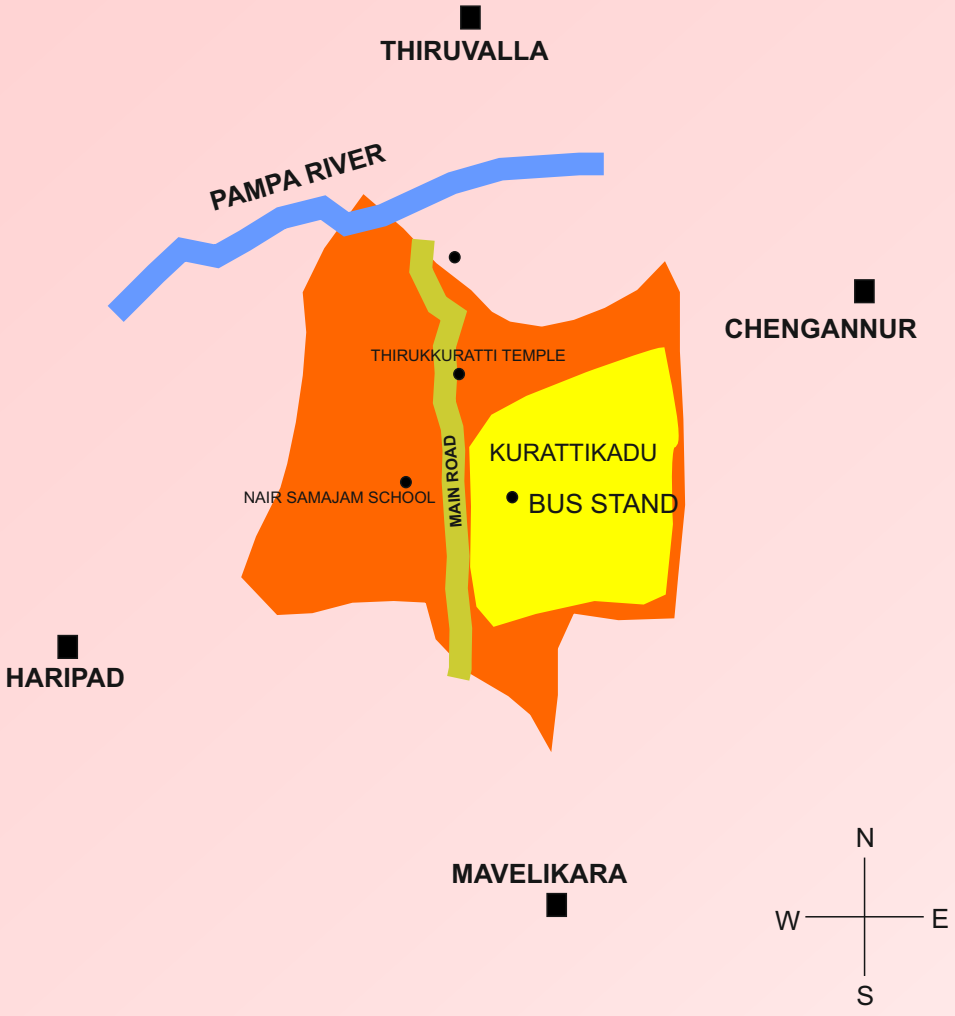
Mannar is a major business town midway between Mavelikara and Thiruvalla in Chengannur block of Alappuzha district in Kerala. It is situated on the banks of the Pampa, Manimala and Achankovil rivers. Cochin International Airport is about 122 km and the Trivandram International Airport is about 124 km from Mannar. This town is connected via 4 railway stations- Chengannur, Thiruvalla, Mavelikara and Haripad; at a distance of 10 km each on four sides. The geographical location of Mannar is at the latitude of 9.318651 and longitude of 76.534095. The Mannar Grama Panchayat has 17 wards and it is situated on the western end of the Chengannur block. It is connected with some part of upper Kuttanadu, the rice bowl of Kerala. Until the bridges appeared, Mannar was an island surrounded by the rivers Achankovil, Pampa, Manimala and many canals. Mannar and Kurattissery villages are included in this panchayat.
This panchayat is the second largest panchayat in Chengannur and its area is 18.56 sq. km. Its total population is 24,536. A belief is that Mannar derived its name from a Koviladhikari of Erimathur Kovilakam who was named Mandhathavu and that the place name commemorated as Mandhathapuram in his name and later as Mannar.

When Mannar was the northern most frontier of the Kingdom of Kayamkulam; then the kings used to stay here to dispense matters of administration. It is believed that the mythical 'Naranathu Bhranthan' lived here. Even today there is a pond here known as "Naranathu Kulam'. It is also believed that earlier there was a hill here. Today it is not there but the spot has still the name "Naranathu Kunnu'.
One of the few famous 'Surya Kshetrams' (temples dedicated to the God Sun) in India is located here. The famous Muhuyuddeen Juma Masjid on the side of the old 'Rajapatha' (state road) is believed to have been built by the Muslim missionary Hazrath Malik Dinar and his team about thousand years ago.
Mannar is a place of numerous temples most of which are dedicated to Shiva and Bhagavathi, the most important Shiva temple being the Thrikkuratti Temple. The place has also the rarity of having a Saraswathi temple. The place name Kurattikadu where the temple is located is derived from the name of the temple itself. It is also believed that Kroshtaka Muni, engaged in the practice of asceticism at this place and that the place Kurattisseri derived its name from it. In neighbourhood of the town the Parumala Church is a pilgrim centre of Orthodox Syrian Church and is in the name of St. Gregorios Metropolitan. Alind Switch Gear Factory and several other metal industries are located here. Apart from this there are various colleges, schools and other educational institutes in the town. Nair Samajam (Community) has a major influence and they have many schools and colleges in the region. There are star rated hotels and budget lodges as well to cater the need of tourists and visitors to the town. The major areas of the town are divided and are addressed as junctions e.g the bus stand area is called store junction.

Mannar occupied importance in the annals of Travancore history. On the northern side of the Shiva temple, known as Padanilam, a decisive war (1741 A.D.) was waged between King Marthanda Varma and the Kayamkulam Raja in which the latter was defeated and had to enter into an agreement with the former. This treaty is known as Mannar Treaty. This place is situated at a short distance of two furlongs from the Thrikkuratti Temple. By the treaty of Mannar, the Travancore Raja received all the territories of the Kayamkulam Raja and received the tributes of a sum of Rs. 1000 and an elephant also. This treaty led to the drafting of another treaty between Dutch and Travancore later in 1748.



D2. Mannar Town and Neighbourhood

The Bell Metal Town of Kerala

P8. The 1100 kg cauldron casted with bronze

Mannar is traditionally very famous for metal handicrafts producing utensils, lamps, bells etc. made out of bell metal, brass, bronze and panchdhaatu even. Alloys like bronze, brass etc were used in ancient times also. Epics like Mahabaratha, Ramayana and Vedas says that use of these metals and their alloys can control the forces like hunger, thirst, sleep etc. positively. These myths and legends have been carried down with generations and are still believed now. Kurattikkadu is the main part of Mannar and the hub of metal handicraft forges. Many institutions like Mannar Panchayath Office, Mannar Village Office, Mannar Panchayath Library, National Granthashala and Village Extension Office are in Kurattikkadu. Craftsmen of this town use the lost wax method to cast different metal products.

Some of the unique works of the Mannar craftsmen include the world class products like the world's biggest cauldron placed in an antique shop in Jew Town in Kochi, the world's biggest church lamp at Kuravilangad Church, the world's biggest temple lamp at Chettikulangara Devi Temple, the world's biggest temple bell at Shimla Temple, the world's biggest church bell at the Cathedral Church, New Delhi and the replica of the

famous 'Tree of Life' and the 'Knowledge Lamp', the 17th century bronze sculptures for a museum in Chennai.

Mannar is the second biggest destination for metal products in India, after to the city of Moradabad, UP. Like gold, bell metal is also considered as a prosperous metal. In Kerala every temple and church has Mannar's metal products. Most of the products made here are significantly large sized and thus heavy weight.

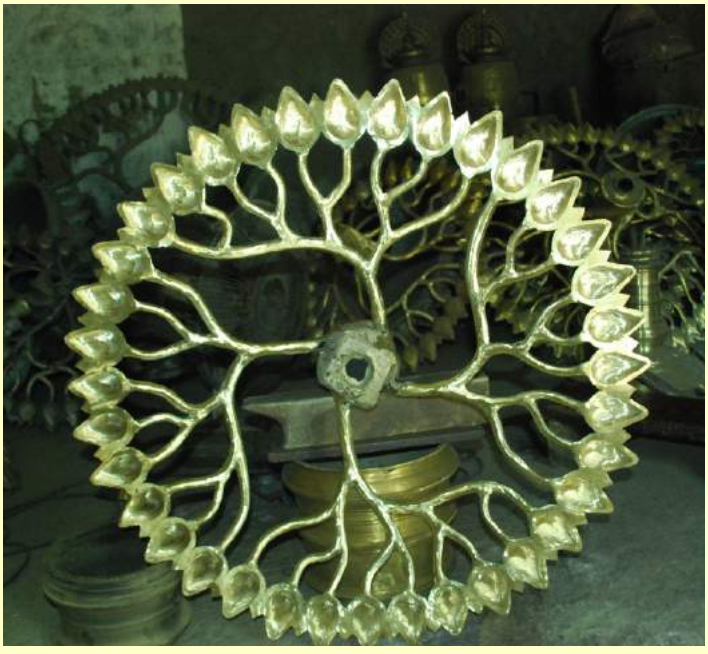
It is believed that about 200 years ago during the king's rule a community known as Vishwakarma was invited from Shankarankovil and Tanjavoor of Tamil Nadu to built temples. It was a tedious and time consuming process so those people got settled in Kerala. Then they started moving around to build temples in other places also. Soon after many of those people started to do works individually like making idols, bells etc. and the metal handicraft became their profession.

Fine clay is the essential raw material for the lost wax method of metal casting and as it was readily and cheaply available in the banks of the river Pampa. So later many artisans from other states like Tamilnadu started migrating here and this also helped the town to become the hub of metal handicrafts production. At present Moosaries and Acharies are the people doing this metal work and they belong to the Vishwakarma community. Nowadays some skilled and unskilled artisans have been immigrated due to the lack of availability of workforce locally.

It is said that the bell metal works rooted back around two hundred years ago. Bell metal products were common in royal houses, temples and churches and armoury of the kings. The 'Koftagiri' art of inlaying light colour metal on a dark colour metal was practised abundantly. Earlier the utensils were made of bell metal and it is believed that having food in bell metal items increases the life span. Bells and idols in churches and temples were made out of bell metal. Beautiful and unique products were made by the magical hands of the Vishwakarma community. These peoples were paid well and were encouraged in making more and more of these products. This may be the one of the reason for more immigration of craftsmen community from Tanjavoor and Shankarankovil of Tamil Nadu.

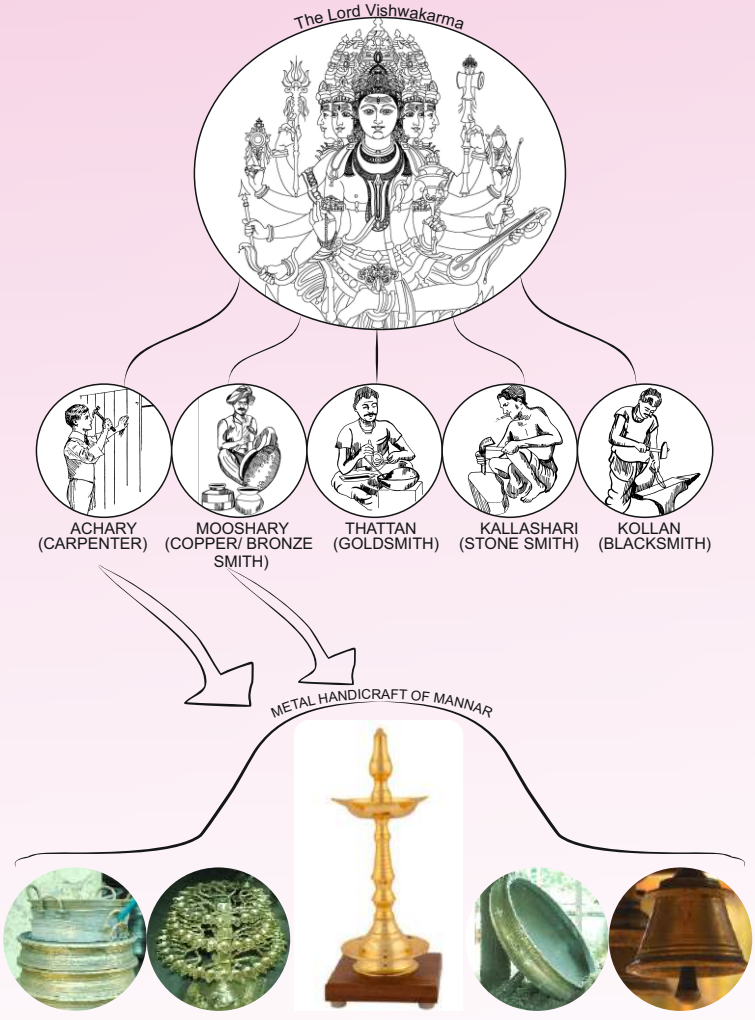
At present there are only 12 units working for the craft. Earlier more than 50 families were working individually. Nowadays most of the family based unit artisans have joined big traders' forges and are working there on daily wages. Now a total of 95 artisans are working in Mannar's metal handicrafts forges. There is well developed market for metal products. This market has been evolved during the course of hundreds of years and many shops are from generations in this town. There are about 45 shops full with metal products. Most of the products are sold by weight and some detailed works like figurines and idols are priced according to weight and the work done both. Nowadays these shops are selling some products brought from Moradabad also as they are light weight, more finished and thus affordable also. But still Mannar's metal handicrafts have the major market share as these have their own USP.

P9. Anantha Krishnan Achary and his work



P10. Section of a lamp in finishing line

People, Raw Materials and Tools



D3. The Vishwakarma Mythology: Origination of the craftsmen

People

South Indian metal workers of the fourteenth to seventeenth centuries predominantly belonged to a distinctive fivefold hereditary community called Vishwakarma and as said earlier that about 200 years ago Vishwakarma community was invited to Kerala to build temples and later those people settled here and started practicing metal handicrafts as a profession which, today, forms invaluable part of the cultural heritage of Kerala. Vishwakarmas are believed to be the ancestors of the Lord Vishwakarma. Lord Vishwakarma is considered as the divine engineer and architect in Hindu mythology. He is supposed to have been born with five heads. Three of his faces were of three metals-gold, copper and iron, from which emerged the goldsmith, copper or bronze smith and the blacksmith. The other two faces belonged to the mason or stone smith and the carpenter.

At present this community is divided into five categories namely Achary, Mooshary, Thattan, Kallashary and Kollan. Initially Acharies were the people who specialized in wood works, Moosharies in metal works and Thattans in making ornaments of gold and silver. Kallasharies used to do carving and designing in stones and Kollans were skilled in making tools and equipments. Nowadays both Acharies and Moosharies are working as metal craftsmen in Mannar.

P11. A.C.Jaganathan, the famous craftsman of Mannar, working on a Narayana Guru Idol

They have a rich legacy of metal works and Chinkili Achary and Neelakandan Achary were known as the most famous utensils makers there. About 20 years ago there were more than 50 individual families involved in this craft but now most of them have stopped working individually and they have joined big forges and traders working there as employees. In metal casting forges of Mannar, artisans are divided in three major categories- skilled, semi-skilled and labourer. A skilled worker does designing and carving/ sculpting jobs and semi-skilled artisan do mould making and metal melting and finishing jobs whereas the labourers are meant to perform general physical labour jobs like mixing of clay, making pits for casting, sticking tile pieces for the strength of the mould. These artisans and workers are paid accordingly. They work daily from 9 am to 5 pm and if there is need they work in overtime shift also. For the overtime work they are paid almost double of the normal wages.

All the craftsmen from Mannar are more than 35 years of age and, as the social transformations are happening rapidly and the Vishwakarma community is getting highly educated, the next generation is not willing to join the age old profession. So there is a major shortage of skilled artisans and that's why local traders and forge owners are hiring people from other states also. Tamilnadu, West Bengal and Uttar Pradesh are the destinations for such artisans. And as the Moradabad is the provider of highly finished but cheap similar metal products, Mannar has also started working with sand-box moulding method. For this all the artisans have been hired from UP only. These artisans are young ones under 30 years of age. Along with skilled artisans, general labour from other states also comes for livelihood to Mannar. The employer provides the lodging to the immigrated employees and those employees prepare their meals by themselves only.

D4. No. of Units and Craftsmen Working in them

S.No.	UNIT/ OWNER	NO. OF ARTISANS
1	Rajan Achari	16
2	Anantha Krishnan Achari	4
3	Rajan	6
4	Gopi C S	4
5	Sooraj N R	4
6	Shivanandan	4
7	Ratheesh	11
8	Palani Achari	4
9	Jhamban	4
10	Ayyapan Achari	4
11	Murukan	4
12	PRML Iyer	30
	Total	95

D5. Daily Wages of Craftsmen

S.No.	Artisan Category	Daily Wages (Rs.)	
		Normal	Overtime*
1	Skilled	900	1800
2	Semi-skilled	750	1400
3	Labour	500	900

*Craftsmen work on hourly basis in part time shift, then their wages are calculated accordingly

Raw Materials

These craftsmen use some particular raw materials which include different types of wax, clay, rubber tree wood and coconut husk as fuel, and different types of scrap metals which includes copper, zinc, tin and scrap alloys of bell metal, brass and bronze. Honeybee wax is purchased from farmers who collect it from woods and the amber is sourced from local church markets. Rubber tree wood and coconut husk is bought from local market and from local residents also. Scrap vendors provide the metals and alloys as scrap to these craftsmen. Sometimes customers even carry scrap metals and alloys with them when coming to forge to place an advance order directly for their required product.

P12. Vendors supplying raw metals as scrap to the forge

The wax can be reused after collecting it from the melting process. Sometimes both waxes are mixed to get desired hardness and coconut oil is also added in wax to get softness if needed. Fresh wax has off yellowish-whitish colour while the recycled wax is dark brownish in colour. Initially the fine clay was sourced from the river Pampa, Manimala and Achankovil but at present the Government has banned the mining of clay from these river's banks. So the forges source this clay from Tamilnadu and sometimes from Andhra Pradesh also. This is fine, smooth and sticky black clay which provides ease and accuracy to details of the design in mould making. After casting the metal, mould is broken down in pieces and then grinded in powder form to reuse it mixing with fresh clay. The broken pieces are also used to stick, with the wet clay, on mould to provide it strength.

Rubber tree wood is used because it can provide high calorific value of heat and it burns evenly spreading the heat equally in the furnace. It is easily available also. Coconut husk is another fuel which is easily and cheaply available to the craftsmen. This coconut husk can be fine packed and place in the furnace while baking the mould to melt the wax. Scrap vendors collect the scrap metals and alloys from homes and various religious places and then sell to the forges. Scrap vendors are their primary and major suppliers for raw metals. Bell metal, brass and bronze are called red metals also.

Bell metal is a heavy metal having the density of 8.7 gm/cm3 and a very high melting point of 1500℃. It is the mixture of copper and tin in the ratio of 78% and 22% respectively. It gives a resonating sound and this is the main reason of making bells out of this alloy. The resonating sound comes because the atoms in the crystals of the alloy can interchange their positions when we struck the bell. This alloy has a rare property of expanding slightly when it cools down. Thus the fine cracking or gaps in the mould are covered automatically. The opening for inlet of molten alloy prevents the mould from breakage due to this expansion.

It is costlier and harder than other metals and alloys used and difficult to work on while finishing. This is one of the reasons why bell metal products are being replaced by other metals slowly. Brass is the alloy of copper and zinc in ratio of 60% and 40% respectively. Since zinc is cheaper in comparison of tin; brass is also cheaper than bell metal. It has a muted yellow colour and gives a dull sound when struck. Its melting point is 900 ℃ and the density is 8.4 g/cm^3. It's highly malleable and can be hammered in thin sheets easily. Bronze is the mixture of copper, zinc and tin in ratio of 85%, 5% and 5% respectively. It is reddish in colour having higher melting point of 950 ℃ than brass because of the presence of tin. Its density is 8.6 gm/cm^3 and it gives a clear ringing sound.

Copper is a metal with reddish orange colour and melting point of 1084 ℃. It's highly malleable, soft and ductile. It's a good conductor of electricity. Because of these two properties of ductility and conductivity to electricity, electric wires are made with this metal. Its density is 8.9 gm/cm^3. Zinc is silvery grey in colour while tin is silvery white. They have melting points of 919 ℃ and 231 ℃ respectively.

D6. Raw Material Costs and Properties

S.No.	RAW MATERIAL	COST (Rs./kg)	PROPERTIES
1	Honeybee Wax	400	Hard, Easy for detailed working
2	Amber	150	Soft, Whitish in colour
3	Rubber Tree Wood	10-15	High calorific value, Spreads heat evenly
4	Coconut Husk	30	Small size
5	Clay	15	Smooth and fine, Sticky

D7. Raw Material Costs and Properties

S.No.	PROPERTIES	BELL METAL	BRASS	BRONZE
1	COMPOSITION	78% Cu 22% Sn	60% Cu 40% Zn	85% Cu 5% Sn 5% Zn
2	COLOUR	Silvery White	Muted Yellow	Reddish Brown
3	MELTING POINT	1500℃	900℃	950℃
4	DENSITY	8.7 g/cm^3	8.4-8.7 g/cm^3	8.7g/cm^3
5	NATURE	Very Hard Brittle	Soft Highly Malleable	Hard, Malleable Brittle
6	SOUND	Resonating Sound	Dull Sound	Clear Ringing Tone
7	SCRAP PRICE (Rs./per kg)	700	300	500

D8. Properties of Metals

S.No.	PROPERTIES	COPPER	ZINC	TIN
1	COLOUR	Reddish Orange	Silvery Grey	Silvery White
2	MELTING POINT	1084℃	419℃	232℃
3	DENSITY	8.96 g/cm^3	7.14 g/cm^3	7.36g/cm^3
4	NATURE	Soft, Malleable Ductile	Lustrous	Hard
5	SCRAP PRICE (Rs./per kg)	450	220	2000

Tools

A large number of tools and equipments are utilized by the metal craftsmen. They include both, which are made either by the local iron smith or carpenter thus indigenous; according to their specification and order, and some power tools used for some of the processes. These power tools are made outside of the town by power tool industries. The tools varies according to the size and varieties of products produced. The types of tools also vary with the type of metal used.

Following are the basic type of tools used for casting of brass, bronze, and bell metals products.

P13. Hammering to break scrap metal

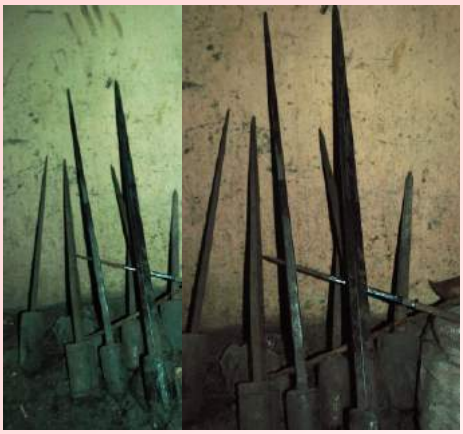
Hammers

Hammer is a T- shaped tool commonly used for nailing and beating in general life. In metal casting forges of Mannar different types and sizes of hammers are used. One is with iron body and wooden handle and the other is made entirely of wood only. The wooden hammer is used for beating and smoothen the wax before it is applied on the mould. Iron hammers are used in chiseling for engraving and finishing purposes, breaking big chunks of raw materials including metals and clay.

P14. Different hammers

Files

File is a long flat shaped gripped iron tool and have a wooden handle. The size and length of the files varies according to the products to be finished. These are generally used for smoothening the irregular surface and edges of a product. Sometimes these files are used even in wax carving of idols and other ornamental works.



P15. Various files

Blower

Blower is a tool used to provide enough air in the furnace while melting the wax or metals in the crucible. Earlier there was no tool or equipment for providing air in furnace and people used handheld fans; then later bellows came in fashion which function by compressing and expanding the leather bag, the main body of the tool, to give out air. Nowadays blowers are used. There are two types of blowers- one is manual and other electricity operated. The manual blower functions by rotating the handle of the blower by hand and the electric one uses the electric motor.

P16. Blower

P17. Small Crucible

Crucible

Crucibles are mud pots, a tumbler like structure which are narrow in bottom as compared to their mouth. These are used to heat and melt the specific metals in correct proportion of their weights. Thus in a crucible raw metals are melted and mixed, automatically, to form an alloy of those metals. A special type of mud is used for making these crucibles. This mud is brought from Andhra Pradesh because the crucibles made from this places' mud are more durable than the crucibles made in Kerala's mud. These crucibles can be used for about fifteen times for heating metals in furnace whereas the crucibles made in Kerala can only be used once. The size and length of the crucibles can vary according to the requirement of molten alloy for a specific product to be casted.

A crucible is called *moosha* in local language and the craftsmen generally associate it with the community of Moosaries.

P18. Big Crucible

Pincers

It is a gripping tool used for holding crucibles and is very much similar to a normal plier except that its handles are very long comparatively. It is made of iron and its size varies. The long handles provide ample gap between crucible and the person for safety as crucibles carry molten metals at very high temperature. Big size pincers are used for holding big crucible and small one for small crucibles. The handles of pincers are approximately more than thirty inches in length.

Kodil is a type of pincers which is used to hold very small crucibles. The length is more than 18 inches approximately.

P19. Pincer

Drill

It is a hand operated electric device used for making holes on metal wares wherever necessary. There are different kinds of drilling bits available starting from 0.5 cm.

P20. Electric drill

Lathe

Lathes are used for turning works for big and small clay moulds while placing even layers of wax and clay. There are two types of lathes; one is the wooden lathe which works by the repeated rotation of a handle by the operator in one direction only. The other type is a rotary one made of stone, wood and iron which can be operated both in clockwise and anticlockwise. Nowadays electric lathe of heavy duty are also being in finishing of the products while grinding, engraving the rings around the product and polishing.

P21. Heavy duty lathe

Chisels
There are various types of chisels varying in shape, size and weight. Small flat ones are used for shaping the edges and bigger ones are used with hammer for engraving designs. Chisels are also used while breaking the mould and then removing the clay in grooved details of the design. These are made up of iron.


P22. Different chisels

Narayam
It is made up of iron and has wooden handle. It is a small wooden piece on which smaller moulds are made by hands and after making moulds these are kept in a pit for waxing. Then it works as the central axle while turning the mould in that pit.


P23. Narayam

Achukol
It is also made from the wood of poovan tree. It is big in size and is used for making the bigger moulds manually.


P24. Achukol

Arippa
The baked soil after breaking the mould is powdered and reused. So to filter that clay powder finely this tool is used. These filters are small netted structure made up of aluminium wires in a wooden frame.


P25. Arippa

Welding Machine
It is used for joining different pieces of the products using soldering rods of a metal of low melting point. It's a gas welding, generally acetylene.


P26. Gas Welding

Chopper
It is a special heavy weight knife used for chopping jute sacks into smaller pieces which are added into clay to provide fibrous structure to the mould and thus making it strong to withstand against the heat while melting the wax. This tool is made up of iron.


P27. Chopper

Kada Irumbu

It is a tool used for smoothing the wax layer while making the product design in wax. It is heated and placed in touch of the wax layer on the mould placed in a pit in which the mould can be rotated in both clockwise and anti clockwise direction. This gives a smooth finishing of wax and it helps in fast setting of the same also. Vangirumbu and Urukkirumbu both do the same purpose like Kada Irumbu, just they are smaller and bigger respectively. Irumbu means iron in Malayalam and thus it's made up of iron.

P28. Kada Irumbu

Other Tools

Roller Stone is made up of stone and is very heavy, used for grinding the baked-broken mould clay pieces into powder by hands. It's in two parts- one acts as base and the second is moved to and fro on the base part.

P29. Roller Stone

Spade is a tool with handle and a flat blade used for digging sand and making pits to burry the baked and hollow mould in ground so that the molten alloy can be poured immediately.

P30. Spade

Compass is used for marking the measurements on idols as these idols are made according to the one head measurements and making perfect circular designs when needed. It is made up of iron. **Ruler Thadi** is used for flattening the wax. **Mattam** is a 'L' shaped perpendicular ruler used for measuring.

Cutting and Grinding Blades are used to cut and grind off the unwanted pieces from the edges and surfaces of the products, while finishing them, with power tools. **Sander Blade** is used to smooth the rough areas of a product and the **Fibre Blade** is used for making the surface smoother, shinier and finished.

P31. Different Blades

PROCESS: The Lost Wax Method

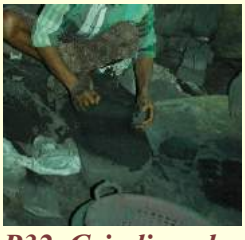
This process was named so because in earlier days people didn't use to collect the molten wax and the wax was lost time. They realized later that they can collect it and reuse it for making the same product designs. Nowadays also, almost 50% of the wax used in design of the desired product is lost in form of fumes and smoke and rest of the wax get molten and craftsmen collect it in a vessel generally half filled with water. This prevents it from sticking to the vessel.

There are two types of waxes which are used in metal handicrafts production. They are honeybee wax; which is used in making idols; and white wax for making kitchen utensils like bells, urali, lamps etc. The consumption of wax varies in different worksites according to the quantity, production and to the weight needed for the final products. Honeybee wax is mainly brought from shops and sometimes farmers or local people also sell it after collecting it from woods. White wax is also available in local. Clay is taken from paddy fields and streams. The clay from paddy fields is mostly preferred as it is stickier and smooth and fine. This clay is supplied to the worksite through agents, as per demand, in lorries or trucks. Depending on the type of product there are two ways of doing the wax method. One is directly carving on wax and the second one is making the base mould first and then placing layers of wax on it. Again this mould is clayed thus forming two moulds now-one male and one female having the product in form of wax in between of them. Further process for both the methods is same. Idols, figurines and other ornamental products are done with the first method and the big products like utensils are made with the second method.

Following steps are followed in the lost wax method of metal casting:

Step 1

The process starts by making a mixture of clay, cow dung and casted soil of the previously used and broken moulds (also known as recycled clay). These are mixed into a dough form and a mould of required design is made around the achukol whereas idol or figurine moulds are made by enclosing the wax design with this clay. The base mould is kept in sunlight for one day to dry it. For making idols the first step is by preparing idols on honey wax and then craftsmen continue from step 3.



P32. Grinding clay P33. Cow dung

P34. Recycling baked clay pieces

P35. Chopping jute sack

P36. Preparing the base mould

P37. Waxing

Step 2

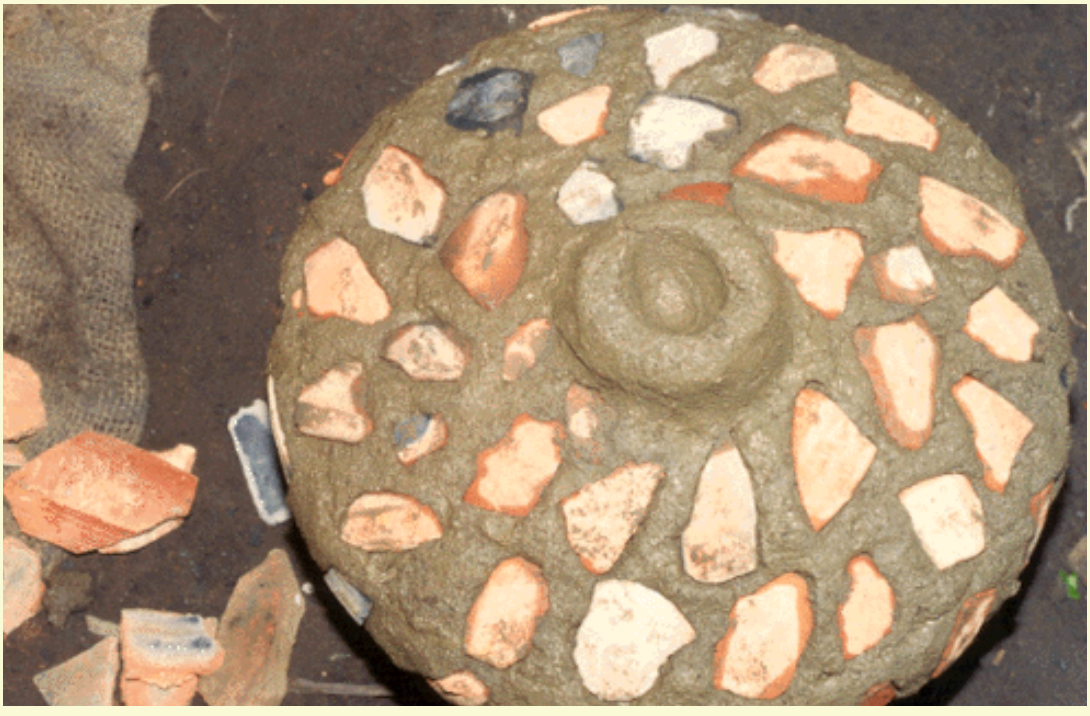
After the mould is dried, white wax is applied on top of the mould, for easy rotation this mould is placed in the pit with lathe mechanism; certain thickness of wax has to be maintained while applying it to the mould. Thickness of the wax varies from product and their functionality, for example if it is uruli that has to be waxed, then except base the rest part is waxed initially and then kept for drying whereas the wax is applied on whole bell moulds. Then the base is waxed and for fast setting a hot kada irumbu is used otherwise it is difficult to handle. Generally a fine strip of wax with desired thickness of the product is placed across the mould and craftsmen match up this strip over the whole mould. This takes almost 1 hour to dry in sunlight.

P38. Completing the waxing on a base mould of a bell

Step 3

Soon after this process, a mixture of clay, finely cut jute sack pieces and powder of casted broken pieces of previously used moulds, is also applied leaving an opening for inlet of the molten alloy while pouring in later stage. There may be one more opening, depending upon the type of the product, for outlet of molten wax and air also while pouring the molten alloy to cast the desired product. On top of moulds; small tile pieces, of baked-broken moulds, are fixed to provide it necessary strength so that it can withstand against the high temperature while melting the wax in furnace. Then this is kept for 4 days in sunlight. In case of getting it dry faster, this can be done exposing it to the heat by burning coconut husk.

P39. Applying clay layer on waxed mould



P40. Mould with a covering of baked clay pieces

Step 4

After this the final coating is applied again with clay and kept for 4 days for drying .This step completes the process of mould making. Then this is dried so that it can be processed further to melt the wax by heating in the furnace.

P41. Mould kept in sunlight

Step 5

The dried mould is covered with tiles by forming a furnace. The size of the furnace can vary according to the mould which again depends on the product. If needed, two or more moulds can also be baked simultaneously in one furnace. Then the raw metal or alloys are weighed, according to the desired alloy of the final product, and filled in crucibles. For bell metal the ratio of copper: tin is 4:1 and it's done accordingly to the composition for brass and bronze also. Nowadays due to the high cost of tin it is being replaced with zinc. If the scrap collected is bigger in size then these are broken down into smaller pieces. Crucibles are made of special type of mud which is brought from Uttar Pradesh. This mud has the quality to withstand very high temperature so crucibles made up of this clay can be used for 10-15 times whereas the crucibles made with local clay can be used once only. The size of the crucible used varies with the required amount of molten alloy which depends on the product to be casted.The ratio of weight of wax and alloy required to cast the product is in the ratio of 1:10 which means that if the product design in wax has a weight of 1 kg then the final product made up of the alloy will weigh 10kg.

P42. Filling the crucible with weighed metals

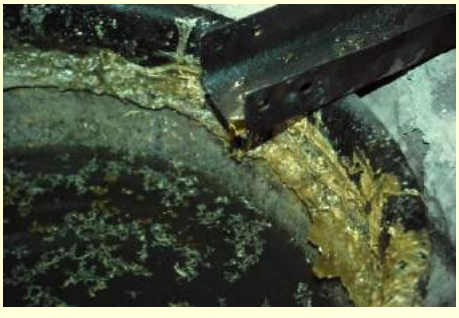
Step 6

Mouths of crucibles are covered with clay to avoid spilling while heating and transferring. These crucibles are placed in a fire vent (choola) for melting the raw metals to form an alloy. The fire vent is made up of certain depth and bricks are placed in vertical manner. On the base of the fire vent holes are made for air which comes from the blower via underground pipes made for this purpose. These crucibles are heated for 4-5 hours so that the raw metals inside them melt and form the desired alloy. Experienced craftsmen can easily identify whether the raw metals have been melted or not by observing the colour of the flame in the fire vent. The normal flame is reddish yellow but the flame coming out from the molten metals is distinctively greenish blue in colour.

While melting the metals, the wax is also melted out from the mould simultaneously in a different furnace. For this an enclosed space is selected and a furnace is constructed using bricks and clay. The size, length and width of furnace depend entirely on the mould. The mould has to correctly set in without much gap around sides and on top. The mould is set a little higher from ground to set fire and little space is provided to keep logs for firing. Rubber tree wood and coconut husk are used as fuel. After one hour of setting it on fire the wax starts to melt and by 3-4 hours it melts completely. This time can also vary according to the size of the product. As discussed earlier, the craftsmen collect the melted wax to reuse it. About 50% of the wax is lost in form of fumes and smoke due to the high temperature.

P43. Igniting the furnace

P44. Furnace after ignition



P45. Melting wax

P46. Preparing the metal melting fire vent

P47. Fully ignited metal melting fire vent

P48. Greenish blue colour of molten metals

Step 7

After melting of the wax the mould is carefully placed in a freshly dug pit according to the size of the mould. The mould is covered in mud after digging out twice the length of the mould using spade to prevent from breakage while pouring molten wax. Then the crucibles are taken out of the fire vent and their top cover is opened. Then the slag is separated using iron metal rod and pieces of jute sacks are also burnt in mouth of the crucible for this. The molten alloy is poured through the inlet holes provided on the mould and it is kept for 6 hours to solidify the alloy. Craftsmen provide a shield using the jute sacks to prevent the molten alloy spilling over to feet or to prevent the man pouring molten alloy from strong flame of burning jute sacks inside crucible. The pouring of the alloy is done while the mould is still hot because it prevents sudden cool down of alloy in the hollow mould and thus prevents the mould from breakage also.

P49. Collecting the wax

P50. Placing the hollow mould in pit

P51. Taking out the crucible

P52. Pouring molten alloy in mould

Step 8

After the alloy solidifies in the mould it is taken out from ground and the clay is broken using hammers. Sometimes chisels are also used for this purpose if the product is a fine detailed one having minute details. The broken pieces of baked clay can be recycled again by powdering and adding to the next set of clay. In this step we get the unfinished final product.

P53. Breaking the mould

Step 9

Then the product is taken for finishing process which includes several sub-steps. Extra parts are cut and grinded off using power tools. The grinding is done using machine grinding machine in which three blades of different grades are used successively. First the rough portions are made a little smoother. The next blade is sander blade (scrap blade) which is used for further smoothening and the third blade is a fibre blade for completely smoother and shinier product. For round objects lathe machine is used for smoothening. Then the product is polished using buffing machines and polishing soap for finishing. Objects can also be finished without using the buffing process but the clarity will be little dull.

P54. Grinding

P55. Buffing

Step 10

Finally the product is polished with a clear liquid metal polish. Now the product is ready to be supplied to the shops and traders.

P56 & P57. Polishing materials

P57

P58, 59 & 60. Finished products

PRODUCTS

Mannar is famous for making traditional lamps, vessels and bells. Following are the products of the magical craftsmanship of this town:-

Lamps

Lamps are available in various shapes and sizes. These are usually made of bronze and brass. People use cotton wicks and ghee or oil to lighten the lamp. There are 3 different styles of lamps. One is, with single wick, lit towards deity and another is with two wicks, lit in opposite directions (one towards deity and the other to the front) and the third is with 5 wicks which are equally placed on the lamp. Lamps are used by Hindus and Christians equally in their houses, temples and churches and in various ceremonies. Koothattukulam, a place in Ernakulam district, has a huge lamp in 9 layers where 1000 wicks can be lit and it has an entry in Limca Book of Records in year of 2007. It is 24.5 feet in length and 6000 kg in weight.

A huge lamp called **Thamaravilakku** is displayed in front of the Nedumbassery Airport, in which there are 108 lamps in the first bottom layer which is joined together to replicate a blooming lotus. In Bhopal at Indira Gandhi Rastra Manava Sangralaya, a lamp called **Aaluvilakku** which is 14 feet in height and 2500 kg in weight is displayed. In 2009 **Vaasthuvilakku** was designed and patented by the famous PRM Laxamana Iyer Associates of Mannar, with help of some priests of temples to heal the Vaasthu Doshas in homes. It has been designed according to the Vaasthu rules and it is believed that this lamp brings prosperity to houses and it is available in 4 different sizes. The cost of this lamp varies from Rs. 3,000 to 30,000.

P61. Thamaravilakku

P62. Aaluvilakku P63. Vaasthuvilakku

P64. Mayilvilakku

Chettikulangara temple there is a very famous ancient lamp known as aaluvilakku, inspired from banyan tree and the branches are depicted in layers, made using bronze where 1000 wicks can be lit, usually seen in places of worship. On each branch it has lamps to light. It is mounted in a square base. **Nilavilakku** is a traditional lamp used in Kerala. Nila means floor and vilakku means lamp. There are two types of nilavilakku one is plain round in shape and the other one is pointed on the sides of the lamp so that the cotton wicks can be put onto it. It is made up of brass and bronze. It has a stem, base and a circular portion to light wicks on top. Traditionally the nilavilakku is placed at the entrance of the house. Lighting the nilavilakku on any occasion is considered as auspicious. **Thookuvilakku** is made of bronze with a chain attached to it, usually hung in the verandas. The height of the lamp is 14.5 cm. It is lighted in the evening to worship the almighty. It is mainly found in traditional houses and in temples. **Ashtamangalyavilakku** is also known as Changala Vatta. It is a traditional lamp which has a height of 30 cm. It is a long leaf shaped lamp made out of bronze. It is used in special occasions like marriages and other ceremonies.

Lakshmivilakku is a traditional lamp which is made up of bronze and brass. The lamp has an image of the Goddess Lakshmi sitting in the full bloomed lotus and there is an extended portion in which the wick is lit. **Aamavilakku** is found in temples, the base of the lamp is in the shape of tortoise and the top portion is like layers in the shape of nilavilakku and is round in shape. It is also made up of bronze. The layer is bigger in the base and moving from bottom to top it becomes smaller and smaller. **Mayilvilakku** is used in temples, there is a small depiction of peacock on the top portion and other features are same as common nilavilakku.

P65. Nilavilakku

P66. Thookuvilakku

P67. Aamavilakku

Bells

Bells have a shape of a hollow cup, whose sides form a resonator. The strikes are made by clapper. These are made usually by casting metals. The church bells may be up to 5 meters tall. When the clapper strikes on the bell a resonating sound is produced. World's biggest temple bell is at Mohan Nagar in Shimla which is 6.5 feet in length and 3.5 ton in weight. Puthupally is a place in Kottayam, where the bell at St. George Church is more than 1.5 ton. Bell at St. Mary's Church at Thodupuzha is 275 kg in weight and it took 1½ months to finish. There is a Jews Church in Mattancherry in Ernakulam district; having a huge bell which is 3157 kg in weight and 12 feet in length. It took 1year of hard and fine craftsmanship to complete.

Generally bells are casted with some parameters to meet the need of clear, longer resonating sound. The height and the diameter of the circular mouth of the bell is almost 1:1 ratio. The ratio of diameters of the lower bigger circle of mouth to the smaller circle at base is almost 2:1.

P68. Shipping of a bell to the customer

P69. Small bell for home pooja sthal

Diameter of bigger circle	2x
Height	2x
Diameter of smaller circle	x

P70. Design parameters for a bell

Kitchen Utensils

Uruli, is a traditional cook ware used in South India. It is a round bowl used in homes for cooking and making ayurvedic medicines. Earlier it was made in bell metal but nowadays it is made in bronze. Nowadays urulis are used as a decoration bowls and to float flowers. These are available in different sizes. Kinnan is a round shaped bowl, usually used for serving dishes. It is also available in different sizes. It is made of bell metal and bronze. **Naazhi** a hollow cylindrical vessel used for measuring grains, available in different sizes and shapes. It is made of bell metal and bronze.

Sevanaazi is a cylindrical shape vessel, with a rotating handle on the top and small holes at the bottom used for making idiyappam, murukku etc. The dough is filled and squeezed through the holes. Generally it is 20 cm in length and made up of bronze.

Puttukutti is a cylindrical shape vessel with a handle and a conical shaped cap on the top. It is used for making steamed cakes and is made in brass. **Vaarpu** is a large bowl made from bronze. It is used for making ayurveda medicines and meals during festivals in homes and temples. As these vessels have little depth they are perfect for making medicines. The latest vaarpu was made for Guruvayoor temple which is 79 inches in diameter. The weight of the vaarpu is 1100 kg which costs Rs. 8 lacs and it took 6 months to get completed.

P71. Kindi

P.72 Kinnan

P73. Nazhi

P74. Uruli

Other Products

Kindi is like a large jug usually found in old houses of Kerala, usually made with bell metals, commonly used for pooja to pour holy water. It is also used to keep water in the entrance so that visitors can wash their feet. Holy cross is a frequent used symbol of Christianity which is made of bell metal, bronze, and brass. Some of the icons are Ganesha, Lord Krishna, Durga, Sri Narayana Guru (a social reformer, saint and philosopher, considered as the leader of Ezhava community). After his death many temples were built in memory of him. Earlier his statues were made of terracotta and now it has been replaced by bronze, bell metal and brass. The Govt. Of Kerala's emblem in the Secretariat at Thiruvanamthapuram was made in Mannar. The emblem includes elephants, Ashoka Stambam and shangumugam also. The width of this as 25 feet and the weight of the emblem is 6 ton. Prabhamandalam is the ornamental piece which is used as the aura in background with the various God and Goddesses. There are some decorative items also which include bells, charminar, chariots etc. Nowadays door handles and other functional items are also being casted in these metals.

P75. Lord Ganesha idol

P.76. Shree Krishna idol

P77. Different novel items on display of a shop

MARKET

Market scenario is discussed in following sections:

Raw materials

Raw materials are readily and cheaply available for metal handicrafts productions in Mannar. Forges get the most of the raw materials from and around the town. Raw materials like rubber tree woods, charcoal that are taken from places like Kottayam, Mavelikkara respectively and scrap metals from different temples either from Mannar or from other places. They have many agents to supply them with raw materials and there are no cases mentioned with shortage of raw materials.

Demand

There is always a good demand for Mannar products. The order can be for a single product or for a batch production. This is only possible with lost wax method, whereas for Moradabad style single item production is not economically viable. These products have demand in and around India and from foreign countries also. Most of the demanded products are uruli, vaarpu, lamps and bells. Other than these, there are also products like idols, statues and that are made according to the order. There is also demand for special items like Vasthuvillaku that has been patented. Different forges does different kind of item productions. There are some cases where the demand was not met because of the large number of orders. This town has more than Rs. 400 crores' turnover annually doing business of metal handicrafts.

P78. Broken mould clay pieces

P79. Peacock for top of a lamp

P80. A Shop view

Shops

There are more than 45 shops at Mannar alone. These shops spread about 6 kilometres from Parumalakadavu to Thrikuratti temple which displays Mannar products along with other products. There are also temples which display only Mannar products. This is because many people believe in the quality of products. Even though they are heavy and time consuming, there is a great demand for these products. To get a product done directly from the forge one has to order it beforehand calculating the time when it has to be delivered whereas for urgent purchases people opt for going to shops. There are also shops outside of Mannar like in Ernakulam, Bangalore who sells Mannar products. Usually there is a stable demand throughout the year, whereas during festival seasons they have more demand and supply for lamps and bells more than any other products. The price of the product varies according to the height and weight. Whereas there is an alloy known as Panchaloha (mixture of gold, silver, copper, tin, zinc) which costs minimum Rs. 3000 (with minimum and low quality metals) and this can cost even lacs of rupees depending on the amount of gold and silver used.

The local people who are engaged in bell metal handicrafts fall in the age group of more than 40. They have their own style of working and they don't accept any new change even though the shopkeeper accepts the order. Shopkeeper doesn't force them to do what they are not comfortable with whereas more innovations are possible in with tools and technological up gradations.




P81, 82, 83 & 84. Shops full of metal handicrafts products

RECENT ADVANCEMENTS

People

Craftsmen have started working under big traders and as there is shortage of skilled and unskilled labour, people from other states are also coming to Mannar for their livelihood. The next generation craftsmen community is not willing to work in metal handicrafts field as they are getting higher education. Some of the people also like to migrate to gulf countries and other states within India. Some craftsmen are self employed in some other works like running a floor mill at home, also.

P85. Immigrated craftsmen from Tamilnadu (left & right)

Raw Materials

Use of raw materials is very much same as the age old craft. Nowadays the clay is being sourced from other states like Tamilnadu and Andhra Pradesh. Instead of coal rubber tree wood is used abundantly and raw metals costs have grown with the market changes.

P86. Grinding with power tool

Tools

During early times each and every process were done by hand, right from the waxing to finishing process. For example finishing of a product was done using rock pieces. Blowing was done using leather equipment for pumping air while burning charcoal etc. Now the entire situation has changed. Due to advancement in technology many tools and equipments have developed for making the work easier. Power tools have made the work faster compared to olden days. There are machines used for grinding, polishing etc. In some forges there are blowers that are

P87. Electrical metal sander

operated with hand whereas in some forges there are motor blowers. People are not ready to make the full utilisation of advancement in technology in the processing stages. The traditional workers believed that using machinery in processing will destroy the beauty of the product without much finish and detailing which is only possible by hand.

Products

Most of the products are very much traditional. Some people have started working for refinements in old products like PRM Laxamana Iyer Associates have developed a Vaasthuvilakku which is supposed to be accurate with Vaasthu rules. They have gone for patents and Limca Book of Records, for some of their products, also

P88. Different lamps on display

Market

The market is being captured by cheap and mechanically made Moradabad products. Other materials are also competing in the utensils range of metal handicrafts. There are websites made for some shops engaged in metal handicrafts. Online presence makes it easy to get orders from different places; some people believe that it is hard to take orders by selecting pictures through web sites because each product have its own speciality, weight, details etc. So some shopkeepers believe that customer should see the product actually to make decision on what to order and purchase.

P89 & 90. Sand box mould making

Moradabad Style

Metal craft of Mannar is second to that of Moradabad. Technology has made batch productions possible saving lot of time, energy and thus money also. Using machinery, the production of larger quantities is possible with minimum time at cheaper prices.

PRM Laxamana Iyer Associates have started a new unit in which they make metal handicrafts

with sand box moulding instead of the lost wax method. This method is easy, economic and fast comparatively. They have employed 30 artisans for this hired from Moradabad. This method has some limitations also- one single item is not economical and thus only industrial batch production is viable with this method.

Exhibitions

The craftsmen have started participating in exhibitions organized by State Govt. and other Govt.-private agencies to sell their products.

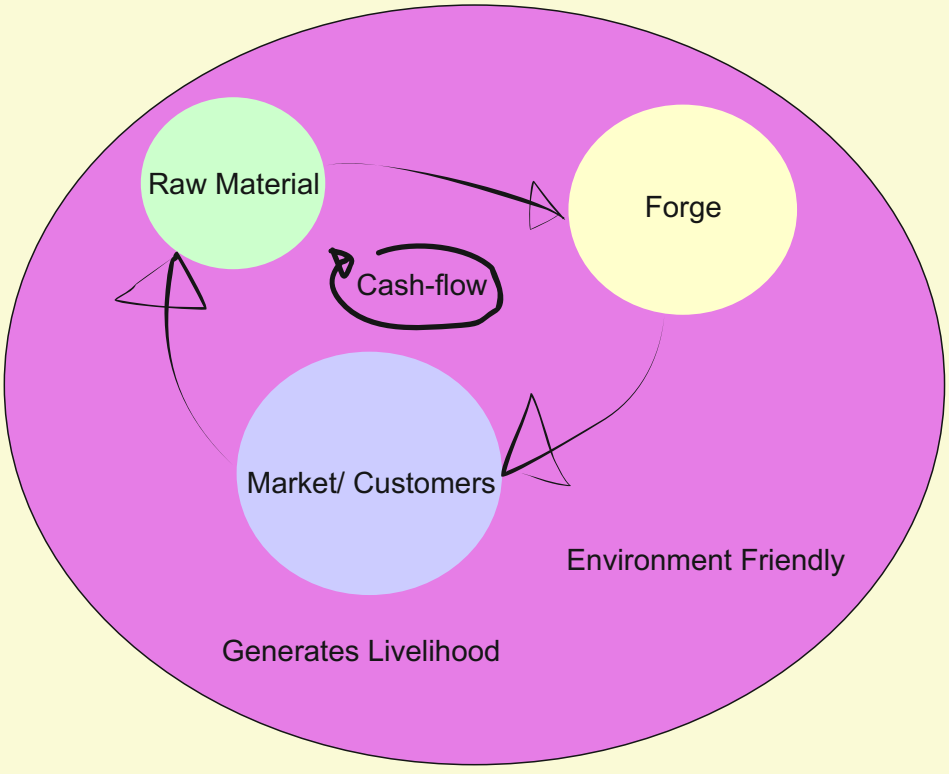
P91 & 92. Anantha Krishnan Achary, a craftsman, at his stall in an exhibition

SIGNIFICANCE OF MATERIALS & TOOLS USED & PRODUCTS MADE

The craftsmen of metal handicrafts of Mannar are using the naturally available raw materials. These raw materials are available in the local region only. These two factors have a huge impact on economy and environment of the town. As the raw materials are natural they are eco-friendly and thus don't cause any damage to the ecosystem. Second there is no wastage or unutilized by-products, so there are not any disposal problems. The old products or scrap is recycled again and again this also helps the forges and the customers or scrap owners in smooth transactions of material and money.

Due to this metal craft a lot of people have their well earned livelihood-directly and indirectly. Artisans working in the forges are earning directly. With all this the wax provider farmers, scrap vendors, local residents having old stuff or scrap are earning indirectly.

Most of the tools used are indigenously made providing job to some blacksmiths. The products made here have very important place in temples, churches, homes and various ceremonies. All these factors are contributing to the rich and stable economy of Mannar and the State also, as it is helping in a fast and repeated cash flow system.



D9. Significance of the metal handicrafts of Mannar

PROBLEMS

We divided the problems of Mannar's metal handicrafts in two broad categories. they are as follows:

Problems in Artisans' Mind

No Government Support
The artisans think that their industry is a diminishing one. They complain that they doesn't get any pensions or any support from the government. Reality is that they don't know much of the government schemes initiatives for such crafts and they have not taken any serious initiative to form groups to get government recognition.

Increased Costs of Raw Materials
When compared to the olden times there is a hike in price in raw materials .The artisans or workers think that high costs of raw materials is another issue for their diminishing craft.
The fact is that the prices have been increased with the economic changes and advancements and with all this their product prices and wages have also been increased accordingly.

No Market
Most artisans often complain that there is no market for their product. There is always an open market for the products from Mannar. The products are sold in and around India and even abroad. There are sales through shops and also direct sales from forges. There are also customers who come directly give the orders to these people and collect it by themselves. These products even have a good space in exhibitions. Even though there is a competition with Moradabad product, every shop has a space for items from Mannar. These will always have a market because of one of the advantage that how small or big the product is they can make single items which is not possible in case of Moradabad products. These products are durable having trust and attachment from people.

The Real Problems

Ergonomics
This is a problem that is not thought about.
The workers doesn't have a good environment to work on, they adjust themselves within the available space. Artisans work in single and uncomfortable positions for more hours which can create various physiological problems later.

P93. Uncomfortable sittings

Lighting
This is another factor to be discussed. There is no proper lighting in forges for the workers to work. It is really difficult to work in such a condition. Most of the workers have been habitual to this condition so they don't realize it but any newcomer can spot this instantly.

P94. Improper lighting in the working area

Smoke and Metal Dust
Since the worker do metal cutting and grinding jobs also it can leads to health problems. They even don't wear a mask. And especially while burning metals the smoke that is emitted, metal dust can cause serious health problems.

P95. Exposer to metal dust

Recognition
Earlier the artisans used to work individually at their home and now these people work under a shop. So whenever any famous or unique product (in terms of quality, size and weight) is made by them and sold by the shopkeeper; the entire credit goes to the shop and not to the artisans. They don't get any recognition for their work. The shopkeeper gets all the privileges.

P96. Students of KSID with a craftsman

Competition from Moradabad Products

The bell metal products have got recognized always and they have a good market. But nowadays Moradabad products are also gaining the market share as they are very cheap and highly finished when compared to Mannar products. The price difference is due to the light weight of the product. Moradabad products are available at almost half the price of a similar Mannar product. Those products weigh almost half of the similar Mannar product.

P97. Moradabad products in a shop

Competition from Aluminum/ Plastics/ Steel and Ceramic Products in Similar Categories

Items in these materials are really cheap and readily available which makes them a favourite choice for purchasing. They are very light weight when compared to Mannar product.

Traditional and Constrained Mindset of Artisans

Most of the workers who are engaged in this metal crafts are traditional people who have adjusted to their styles and have their own working styles. They won't accept to new innovations or new changes according to market. They have traditional approach. They don't try using new styles or new machineries.

Usually there are customized designing done in bell metals, there are some shopkeepers who are ready to adapt to new changes or use new ideas but since the artisans have a traditional approach and doesn't have a mind to experiment new things; customization of products gets limited to traditional products. This is the reason why new innovations or experiments are not done in this craft.

P98. Craftsmen at work keeping the legacy of metal handicrafts going on

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This study has been done with a particular focus on craft and business, both, of traditional metal handicrafts industry of Mannar.
We, as the design school students, got the opportunity to know the cultural heritage and the craftsmanship of Mannar and came to know the reality and present scenario of this wonderful sector. This enriched us in many ways like checking the authenticity of the available information in secondary data sources and cleared many myths and misconceptions about the metal handicrafts of Mannar.

We realize that there is no serious recognition for this metal handicraft in the country and unlike many other crafts of Kerala this has no Geographical Indication also. We hope this study will open some doors to this handicraft and there will be more efforts from the artisans and the Government, as well, to recognize, promote and preserve this rich legacy of ages.

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