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Ardhanarishvara; Chola Dynasty; c. 11th century; Government Museum, Chennai
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SAARC Culture is the annual research journal of the SAARC Cultural Centre, Colombo. It seeks to provide a platform to academics, practitioners, policymakers and other stakeholders of various dimensions of culture of the South Asian region (including Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan and Sri Lanka) to present their research findings and to debate on issues of mutual and common interests.

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Message from the Director

It is with great pride and pleasure that I present this year's edition of the SAARC Cultural Centre's Annual Research Journal, dedicated to the theme 'Celebrating Craftmanship: Exploring Cultural Heritage in the SAARC Region'.

The publication of this research journal each year reflects our steadfast commitment to fostering academic dialogue, sharing diverse perspectives, and advancing the understanding of the cultural wealth of the SAARC region. Through this endeavour, we aim to provide a platform that celebrates our shared heritage, deepens our collective knowledge, and inspires the preservation of our cultural treasures for future generations.

This year's theme, 'Celebrating Craftmanship: Exploring Cultural Heritage in the SAARC Region,' holds profound significance. The SAARC region is home to an extraordinary array of crafts that are as diverse as the communities that create them. These crafts are more than artistic expressions. They are repositories of history, carriers of identity, and testimonies to the creativity and resilience of our people. From the intricate weaves of traditional textiles to the masterful carvings of wood and stone, the craftmanship of this region reflects the essence of our cultural heritage.

However, in the face of modern challenges of globalisation, changing lifestyles, and dwindling generational transmission, many traditional crafts are at risk of being lost. This year's journal brings together insightful research and reflections from across the SAARC region, highlighting the significance of craftmanship as a living cultural legacy. It explores the artistic and historical values of these crafts and the pressing need to sustain and adapt them in contemporary contexts.

This publication is a tribute to the artisans whose skills and dedication have kept these traditions alive through centuries. It also serves as a call to action for policymakers, researchers, and cultural enthusiasts to ensure that the region's craftmanship continues to thrive and inspire. I extend my heartfelt gratitude to the researchers and contributors whose valuable work forms the heart of this journal. Your efforts illuminate the richness of our heritage and provide a foundation for meaningful action to preserve it.

I would also like to make this an opportunity to extend my sincere gratitude to the reviewers: Prof. B.D. Nandadeva (Sri Lanka), Prof. Ganapathy Subbiah (India) and Prof. Suchandra Ghosh (India) for their expertise rendered in bringing out this publication.

As you explore the pages of this journal, I hope you are inspired by the extraordinary stories, ideas, and visions that celebrate the craftmanship of the SAARC region.

Renuka Ekanayake
Director, SAARC Cultural Centre

From the Editor's Desk

With great pleasure, the SAARC Cultural Centre, Sri Lanka, presents the *SAARC Culture*, Vol-10, which celebrates the rich tapestry of South Asian culture intricately woven with the threads of traditional craftsmanship. In this edition, we focus on the timeless art forms of traditional craftsmanship.We are delighted to announce that we have received an array of articles focusing on traditional craftsmanship. These submissions encompass a rich variety of crafts including woodwork, pottery, metalwork and puppetry.

The woodcarvings from the Satras of Majuli Island, Assam, and the Mohra carvings from Himachal Pradesh, India are a testament to the region's deep connection with nature and its resources. The intricate carved wooden doors, windows and ceilings showcase the rich cultural heritage of the tradition of wood workmanship in India.

Pottery craft is one of the oldest crafts known to humanity. The article on terracotta from Bengal, through its ethnographic study of the terracotta animal figurines and the contemporary potters attempts to draw an analogy for better understanding the technology of terracotta animals from archaeological sites. Two papers on the pottery craft of Bangladesh highlight a deep cultural appreciation for craftsmanship that merges functionality with artistic expression.

The metal crafts from Arunachal Pradesh, Bengal and Karnataka in India are evidence of the centuries-old legacy that reflects societal values and aesthetics.

The last paper on puppetry not only discusses puppetry as a craft but also shows how innovative use of the craft as folk media can be used for social and behavioural change.

As we celebrate these crafts, we recognise their importance not only as economic activities but also as vital expressions of cultural identity- highlighting the cultural narratives and historical legacies of the region.

Simultaneously, we must also recognise the challenges faced by the artisans and how with the rise of mechanisation, traditional craftsmanship is at the risk of being substituted by mass-produced goods.

We hope this edition of the SAARC Culture Journal, Vol-10 inspires you to appreciate and value the traditional craftsmanship of South Asia. By valuing these crafts, we honour the artisans who keep these rich traditions alive.

Dr. Bina Gandhi Deori
Deputy Director (Research), SAARC Cultural Centre

Early Medieval Pottery from Shalban Vihara Displayed at the Mainamati Museum in Cumilla, Bangladesh: An Ethnoarchaeological Analysis

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Abstract

This paper presents an ethnoarchaeological analysis of early medieval pottery excavated from Shalban Vihara, currently displayed at the Mainamati Museum in Cumilla, Bangladesh. By examining a diverse collection of pottery artifacts, including cooking vessels, bowls, and storage containers, this research investigates the technological and cultural practices associated with pottery production and use in the region. The analysis draws upon contemporary potting techniques observed in the nearby Bijoypur area, where traditional practices remain prevalent among local artisans. The findings highlight the morphological characteristics of the pottery, revealing continuity in crafting methods and decorative styles that connect past and present. Despite uncertainties regarding the precise firing techniques and materials used by ancient potters, the fundamental principles of pottery-making, including clay preparation and firing conditions, are shown to be consistent across time. This research underscores the significance of integrating ethnographic insights into archaeological studies, providing a nuanced understanding of the social, economic, and religious contexts that shaped the pottery culture of early medieval Bengal. By linking the past to contemporary practices, this study contributes to the broader discourse on cultural heritage and the resilience of traditional craftsmanship. The findings not only enrich our understanding of the early medieval period in Bengal but also serve as a foundation for future research on pottery traditions in Bangladesh.

Keywords: early medieval pottery, ethnoarchaeology, Mainamati Museum, Samatata region, Shalban Vihara

Introduction

The archaeological site of Shalban Vihara, located in the Mainamati region of Cumilla, Bangladesh, has yielded a rich array of early medieval artifacts, particularly pottery. These ceramics, now displayed at the Mainamati Museum, provide invaluable insights into the material culture, daily life, and trade practices of the Samatata region during the 6th to 13th centuries AD. As one of the most ubiquitous archaeological materials, pottery offers evidence not only of utilitarian practices but also of the symbolic and economic aspects of past societies. This article focuses on the early medieval pottery excavated from Shalban Vihara, a significant site known for its historical and archaeological importance. The artifacts represent both the artistic and functional aspects of

pottery and serve as a testament to the craftsmanship and traditions of the potters of that era. The diverse array of pottery discovered at this site reflects the intricate cultural tapestry of early medieval Bengal, varying in form, technique, and decoration, thereby offering a glimpse into the daily lives and rituals of the communities that inhabited the region. By employing an ethnoarchaeological approach, this study aims to bridge the gap between the ancient practices of pottery making and the contemporary methods still used by potters in the nearby Bijoypur region, enhancing our understanding of cultural practices, technological advancements, and socio-economic conditions in ancient societies.

Pottery holds a vital place in the continuity of human culture and the history of art. Archaeologists believe that pottery production dates back to the Neolithic period, a time when human settlements became more permanent. Pottery has traditionally been associated with sedentary populations, as the stability of settled life, in contrast to nomadic lifestyles, is conducive to pottery production (Arnold 1985). The primary material used in pottery is clay, which is shaped into various forms, dried in the sun, and hardened by fire. Early humans began making and using pottery because it made cooking and food preparation easier, thanks to the heat-resistant properties of clay. Furthermore, food prepared in clay pots is often more digestible and flavorful. Boiling some plant and animal foods in clay pots also helped to remove toxins, making the food safer to eat. Additionally, pottery proved useful for storing liquids and grains, making it an essential tool in daily life (Arnold 1985). The production and use of pottery began around 7500–6300 BC in Japan's Jomon culture, and around the 6th millennium BC in the Jargos culture of Iraq, Southwest Asia (Rice 1987, Clark 1989). Examples of Neolithic pottery have also been discovered in the pre-Harappan period on the Indian subcontinent. In Bengal, pottery-making developed as a specialized craft from ancient times. The fertile soil of the Ganges basin provided excellent material for pottery production. Despite the geological scarcity of rock in the riverine regions of Bengal, the abundance of alluvial soil facilitated the flourishing of pottery production. Ancient inhabitants skillfully utilised this natural resource, and the flexibility of clay enabled the development of various pottery styles. Numerous types of pottery have been discovered across Bangladesh, including at sites such as Wari-Bateshwar, Mahasthangarh, Vasu Bihar, Raja Harishchandra's Mound, Shalban Vihara, Paharpur, as well as prominent West Bengal sites like Panduraja's Mound, Mahishdal, Bharatpur, Mangalkot, Chandraketugarh, Tamluk, Banga, and Rajbaridanga. The pottery types include black-and-red ware, northern black polished ware, black slipped ware, rouletted ware, amphora, pale red ware, and more (Rahman 2007). In the archaeological excavations of the Lalmai-Mainamati region of Samatata Janapada, pottery has been classified into various

categories based on color, such as red ware, red-slipped ware, pale red ware, uneven pale red ware, dull pale red ware, coarse uneven pale red ware, black ware, and grey ware. Further classification can be made based on the form and function of the vessels, which include pots, bowls, vases, pitchers, lamps, storage jars, begging bowls, censers, and others. The use of both hand-building and wheel-throwing techniques in pottery production is notable. Special attention has been given to the designs and decorations on the pottery, which often feature grooved, incised, pinched, stamped, combed, and lattice patterns on both the interior and exterior surfaces. Devanagari inscriptions were also found on fragments of three large storage vessels and a few potsherds, though these inscriptions remain undeciphered to this day.

Pottery artifacts are widely used as chronological and cultural indicators in archaeological studies. These artifacts can provide early evidence of cultural exchanges between different sites and regions. The pottery samples from the plains of Southeast Bengal are particularly important for comparing and correlating the cultural development of various sites in the region. Pottery excavated from the Lalmai-Mainamati area serves as an invaluable tool for understanding the urbanization process, as it reflects the occupations and daily lives of potter communities. Through ethnoarchaeological research, insights can be gained into pottery-making techniques, the functionality of different vessels, the division of labor, social organization, and the economic and spatial aspects of pottery production and distribution. More broadly, these factors influence the economic, social, and environmental dynamics of the region. The structural features, decorations, and production techniques of the pottery offer important clues about the development of urban centers and the technical expertise of ancient societies. Through the examination of the morphological characteristics, production techniques, and decorative elements of the pottery from Shalban Vihara, this analysis seeks to contribute to a deeper understanding of the continuity and change in pottery traditions over time. Furthermore, the insights garnered from the ethnoarchaeological data will enhance our comprehension of the cultural processes underlying pottery manufacture and use, thus enriching the broader discourse on the significance of ceramics in archaeological studies. This exploration not only emphasises the relevance of ancient artifacts in contemporary contexts but also aims to establish a foundation for future research into the dynamic interplay between past and present pottery practices in Bangladesh.

Rationale of the Study

The study of pottery serves as a vital link to understanding the cultural, social, and economic practices of ancient civilizations. In the context of early medieval Bengal, particularly at Shalban Vihara, the examination of pottery artifacts provides crucial insights into the technological advancements and daily lives of past societies. Despite the rich archaeological history of the region, there remains a gap in the comprehensive analysis of the pottery from this period, particularly concerning its production techniques and usage within a cultural framework. The rationale for this study is anchored in the need to integrate ethnoarchaeological perspectives into the analysis of archaeological finds. Ethnoarchaeology allows for a comparative approach that connects contemporary pottery practices in the Bijoypur area to ancient pottery-making techniques, offering a unique lens through which to interpret the archaeological record. By exploring the similarities and continuities in pottery craftsmanship, this study aims to illuminate the enduring traditions of pottery making and their relevance to understanding the socio-economic dynamics of early medieval Bengal. Furthermore, this research contributes to the preservation of cultural heritage by highlighting the importance of traditional craftsmanship in contemporary society. By documenting and analysing the methods used by present-day potters in Bijoypur, the study seeks to emphasise the role of pottery as not only functional objects but also as cultural artifacts that embody history, identity, and artistic expression. In essence, this study aims to bridge the past and present, providing a comprehensive analysis of the pottery from Shalban Vihara that enhances our understanding of early medieval culture in Bengal and fosters appreciation for the continuity of artisanal traditions in the region.

Objectives

This research has been conducted with the following specific aims and objectives:

1. Investigate contemporary pottery-making practices among potters in the Bijoypur region to identify similarities and continuities with the ancient pottery traditions of Shalban Vihara.
2. Analyse the cultural, religious, and social significance of the pottery artifacts, exploring how they reflect the daily life, rituals, and economic practices of the communities that used them during the early medieval period.
3. Contribute to the understanding of the pottery culture in Bengal by drawing connections between ancient practices and contemporary

methods, thereby enriching the discourse on ethnoarchaeological research in the region.

4. Identify gaps in the current knowledge of early medieval pottery in Bangladesh and suggest areas for future research based on the findings of this study.

Review of the Literature

The study of early-medieval pottery, particularly in the context of South Asia, has been approached from various archaeological and ethnoarchaeological perspectives. Pottery is a key artifact in reconstructing the cultural, social, and economic dimensions of ancient societies, and numerous studies have emphasised its role in understanding trade networks, technological advancements, and cultural exchange. This literature review outlines the significant works relevant to early-medieval pottery in Bengal, Buddhist monastic contexts, and the ethnoarchaeological methodology. The study of pottery in early-medieval South Asia provides vital insights into the material culture of the period. The early-medieval period in Bengal (6^{th} to 13^{th} centuries AD) was marked by the rise of important political, economic, and religious centers, such as Samatata in Southeast Bengal. Archaeological excavations at sites like Shalban Vihara have yielded a rich corpus of ceramics that reflect the daily lives and religious practices of the Buddhist monastic community.

Md. Shafiqul Alam and Md. Abul Hashem Miah have documented pottery from early-medieval Southeast Bengal, focusing on the diversity of forms and functions, as well as the stylistic influences from Southeast Asia. Their works suggest that the pottery of this period was influenced by regional trade networks and was produced both for utilitarian purposes and ritual use (Alam and Miah 1999). Habibur Rahman has concentrated on the technological aspects of early-medieval pottery, particularly focusing on production techniques such as wheel-thrown and hand-built methods. These studies highlight the technological sophistication present in early-medieval Bengal and provide a comparative framework for understanding the production techniques at Itakhola Mura (Rahman 1997). Nazimuddin Ahmad discusses development and significance of pottery in Southeast Bengal's history, examining various styles, forms, and functions. The work serves as a valuable resource for understanding the evolution of ceramic traditions in the region (Ahmed 1979).

Shalban Vihara, a monastic site linked to early Buddhist traditions in Southeast Bengal, is a part of the larger historical and archaeological landscape of Mainamati-Lalmai. The role of pottery in Buddhist monasteries, like Shalban Vihara, is crucial for understanding the daily lives of the monks and their

religious practices. Studies on monastic archaeology, particularly in the context of Southeast Asia and South Asia, such as those by Susan Huntington, highlight the importance of material culture, including pottery, in reconstructing the religious, social, and economic activities of Buddhist monasteries. Monks engaged in daily rituals, communal dining, and storage of food and water, all of which required functional ceramics (Huntington 1985).

Ethnoarchaeology bridges the gap between ancient and contemporary material culture by studying living traditions of craftsmanship and production. This approach is especially useful in understanding how ancient technologies and cultural practices have persisted or evolved over time. Ethnoarchaeology has been widely applied in South Asia, particularly in the study of ceramics. Seminal works by John M. Fritz and George Michell provide a framework for studying contemporary craft production as a means of interpreting archaeological findings. They emphasise the importance of observing modern potters' techniques to understand ancient production processes (Michell 1984). In the context of Bengal, ethnographic research by Asok Datta has explored the persistence of traditional pottery-making practices in rural areas. Datta's work underscores the value of local clay sources, traditional hand-building methods, and open-air firing techniques that are still in use today. These methods show remarkable continuity with those observed in archaeological finds from early-medieval sites like Shalban Vihara (Datta 2009).

Trade and cultural exchange played a significant role in the development of pottery traditions in early-medieval Bengal. The region's strategic location as a crossroads of maritime and overland trade routes allowed for the diffusion of technological and stylistic influences from neighboring regions, such as Southeast Asia, Sri Lanka, and China. Scholars such as Ranabir Chakravarti have emphasised the importance of trade in the spread of ceramic styles and techniques across South and Southeast Asia. Pottery from early-medieval Bengal, including Shalban Vihara, exhibits stylistic influences from Southeast Asia, particularly in the decorative motifs and vessel forms. These influences suggest that Shalban Vihara was part of a broader cultural and trade network that connected Buddhist centers across the region (Chakravarti 2000). Research on trade ceramics, particularly from Bengal, has demonstrated the movement of goods, ideas, and people across maritime trade routes. Susan McIntosh has highlighted the role of pottery as an indicator of trade, noting that variations in material composition and design can reveal the extent of cultural interaction between regions. The stylistic and material diversity of pottery from Shalban Vihara provides evidence of such cross-cultural influences, supporting the notion that the site participated in regional trade networks (McIntosh 1995).

Pottery is not only a functional object but also a reflection of the cultural and social identity of the community that produces it. The shapes, designs, and production techniques of pottery can provide insights into the social organization, technological capabilities, and cultural values of a society. Decorative motifs on pottery often carry symbolic meanings, as explored in the works of scholars like Vidya Dehejia and her study of Buddhist art and symbolism. The lotus motifs and geometric designs found on the pottery from Shalban Vihara may have had religious connotations, aligning with Buddhist iconography and the cultural values of the monastery (Dehejia 1997). The existing literature on early-medieval pottery in South Asia, Buddhist monastic archaeology, and ethnoarchaeology provides a solid foundation for this study. By integrating archaeological analysis with ethnoarchaeological observations, this research builds on previous studies to explore the cultural, technological, and symbolic aspects of pottery from Shalban Vihara. The findings contribute to a deeper understanding of the material culture of early-medieval Bengal, the role of monastic communities in trade and cultural exchange, and the persistence of traditional craft practices in modern-day Cumilla.

Theoretical Framework

The present research follows an ethnoarchaeological theoretical framework, with an emphasis on ethnography. Ethnoarchaeology, as defined by Stark is a joint effort between archaeology and anthropology to understand both past and present cultures (Stark 2003). Fagan describes ethnoarchaeology as the study of contemporary societies and cultures to help analyse and interpret archaeological data (Fagan 2003). Similarly, Stiles defines ethnoarchaeology as the study that bridges ethnological and archaeological data, using ethnographic comparison and archaeological insights while avoiding theoretical and methodological issues (Stiles 1977). David adds that ethnoarchaeology establishes the connection between people and material objects (David 1992). A significant challenge in interpreting ancient pottery is the lack of ethnographic data necessary to understand the relationship between pottery, culture, and environment. This limitation makes research in this area both difficult and complex. Archaeologists, without sufficient ethnographic information, often struggle to create accurate models of past cultures or pottery use. However, a closer approximation can be achieved through ethnographic studies. Even today, in an age of industrialisation, pottery production and use remain prevalent in many parts of the world. Ethnoarchaeological research has made it possible to reconstruct pottery production techniques and usage patterns. Ethnological research is invaluable in understanding human behavior and material culture, providing crucial insights into prehistoric practices that remain relevant today. Through

ethnoarchaeological studies, we gain knowledge about pottery-making methods, functionality, labor division, social organization, as well as the spatial and numerical aspects of pottery production and distribution (Kramer 1985). This research highlights the importance of ethnography in creating a more comprehensive understanding of the relationship between people, their culture, and the objects they produce.

Methodology

This study employs a multi-faceted research methodology that integrates both qualitative and quantitative approaches to analyse the early medieval pottery artifacts from Shalban Vihara.

- A comprehensive review of existing literature on early medieval pottery in Bengal, with a focus on Shalban Vihara and the surrounding regions. This review will include academic journals, books, and previous archaeological reports to establish a theoretical framework for the study and identify gaps in the current research.
- Conduct site visits to Shalban Vihara and the Mainamati Museum to document the pottery artifacts on display. Analyse excavation reports and data related to pottery finds from previous archaeological digs at Shalban Vihara, emphasising the context in which the pottery was discovered.
- Classify the pottery samples based on their morphological characteristics, including shape, size, and decorative elements. This classification will facilitate a comparative analysis of the artifacts.
- Utilise techniques such as petrographic analysis to determine the clay composition and firing techniques used in pottery production.
- Conduct interviews and surveys with contemporary potters in the Bijoypur region to document their pottery-making techniques, materials used, and cultural significance. This qualitative data will provide insights into traditional practices and their potential connections to ancient methods.
- Engage in participant observation by assisting local potters during the pottery-making process. This hands-on experience will enhance understanding of the techniques employed and their relevance to the artifacts studied.
- Compare the findings from the pottery analysis with the ethnographic data obtained from contemporary potters. This comparison will help to identify similarities and continuities in pottery-making practices.
- Situate the pottery findings within the broader historical and cultural context of early medieval Bengal, drawing on historical texts and archaeological

findings from the region. Analyse the collected data using qualitative and quantitative methods.

- Interpret the morphological characteristics of the pottery in relation to the ethnographic data, focusing on the implications for understanding the social, economic, and cultural dynamics of early medieval societies.

Lalmai-Mainamati: A Comprehensive Exploration of Prehistoric and Ancient Sites

Lalmai-Mainamati, located in the Cumilla district, is home to several important prehistoric and ancient archaeological sites. Among these are Lalmai-1, Bara Dharmapur, Sadar South; Lalmai-2, Bara Dharmapur, Sadar South; Leela Mura, Bara Dharmapur, Sadar South; Takka Mura, Bara Dharmapur, Sadar South; Tipra Mura, Bara Dharmapur, Sadar South; Mandara Mura, Bara Dharmapur, Sadar South; Muharram Ali's House, Bara Dharmapur, Sadar South; Member's Khil, Bara Dharmapur, Sadar South; Meher Kuler Mura, Bara Dharmapur, Sadar South; Sardar's Mura, Bara Dharmapur, Sadar South; Taka Mura, Bara Dharmapur, Sadar South; Colonel Mura, Bara Dharmapur, Sadar South; and Shakwinya Mura, Bara Dharmapur, Sadar South. In 1955–56, the Directorate of Archaeology conducted a survey of Lalmai-Mainamati, identifying it as one of the political and cultural centers of the ancient Samatata region. The survey identified a total of 54 archaeological sites, of which 20 have been declared protected areas. These protected sites include: Mainamati Mound 1, Mainamati Mound 1(a), Mainamati Mound 1(b), Mainamati Mound 2(a), Mainamati Mound 2(b), Bairagir Mura, Kutilamura, Anand Rajar House, Rupban Kanya's House, Bhoj Raja's House, Itakhola Mura, Kotbari Mura, Rupban Mura, Shalban Vihara, Hatigara Mura, Ujirpur Mura, Pakka Mura, Chilla Mura, Rupbani Mura, Balagaji Mura, Chandi Mura, and Charatra Mura, as well as Rani's Bungalow. Between 1963 and 1966, large-scale excavations were carried out at three sites: Shalban Vihara, Kutilamura, and Charpatra Mura. Additionally, experimental excavations were conducted at Rani's Bungalow on Mainamati Hill. Excavations at Anand Vihara were undertaken from 1974 to 1976. Until 2024, a total of 13 sites have been excavated by the Directorate of Archaeology. Most of the archaeological remains discovered through excavations in the Lalmai-Mainamati hills are related to religious institutions, with a limited number of residential sites. However, due to the vast richness of the region, it is not possible to excavate all the archaeological mounds. In some cases, sites that have been excavated are reburied to protect them. This is necessary because excavation is inherently destructive, and the exposure and display of these sites pose risks to their preservation. As a result, many resource-rich regions contain unexcavated mounds that hold potential for future urban development insights. Such

unexcavated mounds are common across the archaeologically rich areas of Bengal, including Southeast Bengal.

Excavated Archaeological Sites of Lalmai-Mainamati

The Lalmai-Mainamati region in the Cumilla district is rich with archaeological sites that have been excavated over several decades. The key excavations include: Shalban Vihara (1955–57), Kutilamura (1955–57), Charpatra Mura also known as the Ladhamadhav Temple (1955–57), Rani's Bungalow (1965, 1967–68, 1995–97), Anand Raja's House (1975–82), Rupban Mura (1984–85), Itakhola Mura (1990–92), Bhoj Raja's Vihara (or Bhoj Vihara) (1994, 1998, 2000), Mainamati Mound-01 (1984), Latikot Mura (1990–92), Hatigara Mura (2014–15) and Mahanamati Mura (2021–22 and 2022–23). These excavations have uncovered a wealth of artifacts, many of which are religious in nature, highlighting the importance of the Lalmai-Mainamati region as a religious and cultural center in ancient Bengal. Each of these sites provides valuable insights into the architectural, cultural, and religious practices of the time. Shalban Vihara, in particular, remains one of the most significant archaeological sites, offering a deep understanding of the monastic and urban culture of early medieval Bengal.

Lalmai-Mainamati and its Neighbors: An Exploration of Surrounding Ancient Sites

The Lalmai-Mainamati region, located in the Cumilla district, is rich in archaeological significance, with numerous ancient sites that provide insight into the cultural and historical development of early Bengal. Among the notable sites are: Basant Mura Hill Mura, Manter/Mahante Mura, Vaishnab Mura, Mather Mura, Taraf Ali's Bagan Mura, Monir Mia's house adjoining Mura of Adarsh Sadar Upazila; Deulbari Noapara, Ishanchandranagar, Rajendrapur and Rangamatia of Dharmapur village of Chauddagram upazila; Barakamata and Kailan of Chandina Upazila; Debidwar upazila gunaighar; Manduk of Barura Upazila, Barmesh's Raja Bari Pratoe Sthala, Pal Bari Pratoe Sthala, Math Bari Pratoe Dhibi, Kali Bari Pratoe Dhibi, Do-Ani Vita Pratoe Dhibi; Village of Odisha in Paharpur Union of Muradnagar Upazila; Jagatpur site of Burichong Upazila, Jammaddar Bari ancient mound, Brahmin Raja ancient mound, Ghilatala Dighi or Brahmin Raja Dighi, Ferm Harmuni ancient mound, Pathan Dighi, Champar Dighi etc. These sites reflect the historical depth and cultural richness of the region, dating back to early and medieval periods of Bengal's history. Many of the sites are linked to religious institutions, settlements, or local rulers and contain remnants such as pottery, bricks, and other structural remains.

These artifacts help to reconstruct the socio-cultural, economic, and technological aspects of life during this period. Basant Mura and Hill Mura are examples of locations where archaeologists anticipate uncovering more relics related to early religious and civic life. Similarly, the mounds in Dharmapur village and Chauddagram Upazila are believed to conceal valuable materials that could further illuminate the trade and urban development patterns in southeast Bengal. As with many sites in the Lalmai-Mainamati region, ongoing archaeological interest and ethnoarchaeological analysis, particularly in relation to pottery findings, could significantly enhance understanding of the early medieval urbanization process and the material culture of the people who inhabited this area. These investigations are particularly valuable for comparing the development of pottery techniques and their cultural significance across different sites.

Mainamati Museum: Preserving the Heritage of Ancient Southeast Bengal

The excavations at various important sites such as Shalban Vihara, Kotila Mura, Charapatra Mura, Rupban Mura, Itakhola Mura, Anand Vihara, Rani Bangla, and Bhoja Raja's Bari Vihara yielded numerous significant artifacts. To preserve and exhibit these valuable finds, the Mainamati Museum was established in 1965. It is situated on the south side of Shalban Vihara in Comilla's Kotbari, facing west toward Shalban. Initially, the main building of the museum lacked sufficient space to display all the important artifacts. Therefore, an extension was added to the southern side of the building in 1970-71. Further expansion took place on the northern side in the fiscal year 2018-19 to accommodate more displays. Currently, the museum contains a total of 42 display showcases, where the artifacts are systematically arranged and exhibited. When it was first established in 1965, the museum was classified as a local museum. However, due to the growing significance of its collection, it is now often referred to as a regional museum. This is because, in addition to the artifacts unearthed at Lalmai-Mainamati, the museum also houses archaeological finds from surrounding areas. The museum was specifically built to preserve artifacts from the excavations of Shalban Vihara, Kotila Mura, Charpatra Mura, Rupban Mura, Itakhola Mura, Anand Vihara, Rani's Bungalow, and Bhoja Vihara. As archaeological discoveries in the Lalmai-Mainamati area increased, the museum expanded to include artifacts from various other sites within the region. Given the wide range of archaeological material housed at the Mainamati Museum, it is more accurate to categorise it as an archaeological museum rather than simply a local or regional museum. In fact, the Directorate of Archaeology of Bangladesh officially refers to it as an archaeological museum in their records. Currently, there are 20 archaeological museums and one ethnological museum under the

supervision of the Directorate of Archaeology of Bangladesh, with the Mainamati Museum being classified as the "Mainamati Archaeological Museum" in official documents and publications, including the book Mainamati-Lalmai.

Shalban Vihara: Insights into Sribhavadev Mahavihara's Legacy

Shalban Vihara is located about 6 km southwest of Comilla city, nestled between the Lalmai-Mainamati hills. The site is named Shalban due to the abundance of Shal trees in the area. Excavations at Shalban Vihara uncovered a Buddhist monastery and other significant artifacts. The monastery is designed in a cruciform layout, with a central temple surrounded by four wings, creating a cross-shaped structure. The northern wing serves as the primary entrance, measuring 22.6 meters in width, flanked by two guard rooms on either side. The entire complex is constructed from brick and enclosed by a sturdy wall, 5 meters wide, suggesting that the Vihara was fortified to protect against external threats. Each side of the square-shaped monastery measures 167 meters, housing a total of 115 rooms for monks. These rooms, each measuring 3.66 meter by 3.66 meter, are separated by 1.5-meter-thick walls. Every room features niches, an entrance, and a 2.5-meter-wide front porch. Beyond the porch lies a courtyard. The Vihara shows evidence of six distinct construction phases, with the first four being clearly defined and the latter two less discernible. Throughout these phases, the overall structure of the Vihara remained largely unchanged, although during the final phase, the back walls of the upper-level rooms were reduced to 3.04 meters in width, slightly increasing the size of the open courtyard. One of the most notable architectural features of Shalban Vihara is its cruciform temple. The foundation walls of the temple are adorned with terracotta plaques, which provide valuable insights into the social life of the time. These plaques reflect the high level of artistic development in Bengal during the 7^{th} and 8^{th} centuries AD. In the later stages of construction, the central cruciform temple was transformed into a rectangular temple. Excavations at the site have also uncovered several additional structures, including a dining hall, kitchen, pillar-supported pavilions, and stupas, all located in the southeast corner of the monastery's courtyard. Additionally, there is a temple in the northwest corner of Shalban Vihara, surrounded by pillars on all four sides.

Among the numerous Buddhist monasteries in the Mainamati-Lalmai region, Shalban Vihara has been the most extensively excavated. Notable artifacts recovered from the site include eight copper plates, gold and silver coins, numerous terracotta plaques, terracotta seals, and sculptures made of stone and bronze. The Vihara is also known as Sribhavadev Mahavihara, named after

King Sribhavadev of the Deva dynasty. The construction of the Vihara and its associated structures is believed to have taken place between the 7th to 12th centuries AD. Shalban Vihara is currently preserved by the Department of Archaeology of Bangladesh.

Understanding the Pottery of Shalban Vihara: A Classification and Analytical Approach

The pottery samples excavated at Shalban Vihara and exhibited in the Mainamati Museum reveal a range of distinct shapes. The most common forms include pots, bowls, basins, dishes, storage jars, and *kalas* (liquid vessels). These artifacts demonstrate a variety of functional uses in both daily life and ritual contexts. This classification highlights the diversity and functionality of the pottery unearthed from Shalban Vihara and provides insight into the socio-economic and cultural practices of the time.

Cooking Pots

Fig. 1. Cooking pots from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

Fig. 2. Cooking pots from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

The cooking pots excavated from Shalban Vihara can be divided into three categories based on size small, medium, and large. The small and medium-sized pots generally feature a rounded, narrow neck, a bulging body, and a rounded bottom. These characteristics suggest they were used for everyday cooking purposes, likely for boiling or stewing food. In contrast, the large vessels, often resembling jars, have rounded edges. Some exhibit outwardly expanding rims, while others have inwardly contracting rims, with short necks and bulging bodies. These larger vessels were likely used for cooking or storing larger quantities of food or water. An exceptional artifact is on display at the Mainamati Museum, showcasing a unique cooking pot with six holes in the center of its base. This pot also features two round lid-like covers on top. The design suggests that it may have been used for steaming food, a rare and

innovative cooking method for the period. This particular artifact is displayed in Showcases No. 38, 40, and 41 at the museum.

Bowl

Fig. 3. Bowl from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

Fig. 4. Bowl from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

Smaller bowls with steep and convex slopes can be classified as cups. While all pottery categories share the general bowl shape, the design of their rims varies. The most common type has a plain or slightly indented rounded rim and a convex body. These vessels are generally open, meaning the diameter of the rim is equal to or larger than the maximum diameter of the body, which leaves the interior of the bowl almost fully exposed. This feature suggests they were likely used for serving or eating food. Examples of these bowls are displayed in Showcases No. 39 and 42 at the Mainamati Museum.

All dish-shaped vessels are open and relatively flat due to their rounded edges, leaving the interior of the vessel almost entirely exposed. Both bowls and dishes fall into the category of deep and shallow open vessels. A variety of dishes were excavated, suggesting their use in serving food. Some of these dishes were possibly used in ritualistic settings, offering food or other items during religious practices.

Dish and Lid

Fig. 5. Dish from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

Fig. 6. Lid from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

These dish-shaped artifacts are exhibited in Showcase Nos. 38, 41, and 42 at the Mainamati Museum. Additionally, several pots excavated from the Lalmai-Mainamati area have been identified as lids. A distinctive feature of these lids is the presence of *dharani* (grinding marks), indicating their functional use. Examples of these lids are displayed in Showcase No. 38.

Basin

Fig. 7. Basin from Shalban Vihara (8^{th} to 12^{th} Century AD), Mainamati Museum, Cumilla

Fig. 8. Basin from Shalban Vihara (8^{th} to 12^{th} Century AD), Mainamati Museum, Cumilla

The pots excavated from the Lalmai-Mainamati site exhibit notable variations in the shape of their rounded edges. In some instances, the rounded edges curve inward, while in others, they curve outward. Additionally, the ends of the body often thicken in parallel, taking on the appearance of rounded ends. Overall, the body of these vessels is typically spherical, though this is not universally observed. These wide and shallow vessels may have been used for washing, preparing food, or holding water during religious ceremonies. Their functional versatility is apparent from their size and structure. Examples of basin-shaped patterns can be found in Showcase Nos. 41 and 42 at the Mainamati Museum.

Storage Container or Jar

Several pots uncovered during excavations in the Shalban Vihara have been identified as storage vessels. It is believed that these storage vessels were used for holding both water and grain. The patterns of storage vessels can be viewed in Showcase Nos. 38, 41, and 42 at the Mainamati Museum.

These large storage jars were used for storing bulk goods, including grains and water. Their robustness highlights their essential role in both the household economy and monastic provisioning.

Fig. 9. Storage jar from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

Fig. 10. Storage jar from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

Miniature Pots and Spouted Jars

Fig. 11. Miniature pots from Shalban Vihara
(8th to 12th Century AD),
Mainamati Museum, Cumilla

Several pots uncovered during excavations in the Shalban Vihara have been identified as storage vessels. It is believed that these storage vessels were used for holding both water and grain. The patterns of storage vessels can be viewed in Showcase Nos. 38, 41, and 42 at the Mainamati Museum.

Miniature Pots and Spouted Jars

Fig. 12. Clay lamp from Shalban Vihara
(8^{th} to 12^{th} Century AD),
Mainamati Museum, Cumilla

Fig. 13. Lamp stand from Shalban Vihara
(8^{th} to 12^{th} Century AD),
Mainamati Museum, Cumilla

Several specimens exhibited in the Mainamati Museum are identified as clay lamps. These lamps are typically used for puja (worship) and are considered sacred objects in both Buddhism and Hinduism. In addition to the lamps found at Mainamati, terracotta lamps have also been discovered at other historical sites, including Chandraketugarh, Mahasthangarh, and Paharpur, dating from the early historic period. At the Mainamati Museum, clay lamps are displayed in Showcase Nos. 29 and 39. Most of these lamps are similar in size and are predominantly gray or red in color; however, one black lamp is showcased in receptacle No. 39. The tops of the lamps are short and curve inwards, designed to prevent them from tipping over when filled with fuel or oil. In total, 25 lamps are on display, reflecting the high demand for lamps during that period, both for religious rituals and secular purposes. Lamps served religious purposes for worship and secular functions for lighting. Lamp holders or pillars were utilised to support these lamps. During puja or other ceremonies, lamps were believed to be placed atop these stands, rather than being set directly on the ground. Alongside the lamps, a total of 10 lamp stands are exhibited in Showcase No. 40 at the Mainamati Museum. These stands are designed with a thickened base, a narrow middle, and a rounded top where the lamps were placed. The flat area of the stands is adorned with three concentric circular lines, created using a diagrammatic technique.

Censer

The censer is a significant religious instrument displayed in the Mainamati Museum. There is only one censer in the museum, which is notable for its black color. It features a circular flat base, providing stability, and a long, narrow handle attached to the base for easy handling. The middle section of the censer is

concave, designed to hold various materials, such as sandalwood, for the purpose of offering incense in the hollow space.

Fig. 14. Censer from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

Censers like this one can also be found in Pal Para, located in the Bijoypur region of Comilla. The use of such censers reflects the cultural and religious practices of the time, highlighting their role in rituals and ceremonies.

Pitcher

Fig. 15. Pitcher from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

Fig. 16. Pitcher from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

The pitcher-shaped vessels discovered during the Lalmai-Mainamati excavations typically feature long, constricted necks and flared, rounded rims. These urn-shaped artifacts are displayed in Showcase Nos. 38, 39, 41, and 42 at the Mainamati Museum.

Pottery Making Tools or Debber

The debber is a traditional tool used in the process of pottery making. This instrument shapes the clay by repeatedly striking the soil, allowing artisans to form various types of pottery, including dishes, pots, and other vessels. Artifacts associated with the use of the dabber have been unearthed during excavations at the Mainamati site and are currently on display in the museum. The presence of

such tools not only highlights the techniques employed by ancient potters but also emphasises the cultural significance of pottery in the region.

Fig. 17. Debber from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

Pottery Decorations from Shalban Vihara in the Mainamati Museum

In the Lalmai-Mainamati archaeological area, particularly at Shalban Vihara, the pottery artifacts currently on display at the Mainamati Museum feature a limited quantity of decorated pieces. However, even within this small selection, a noticeable diversity in ornamentation can be observed.

Fig. 18. Decorated pottery from Shalban Vihara (8th to 12th Century AD), Mainamati Museum, Cumilla

Various decorative techniques are evident, including grooved marks, incised marks, pinched marks, stamped marks, combed marks, and lattice patterns, which appear on both the interiors and exteriors of the pottery. Additionally, Devanagari inscriptions have been found on the remains of three large storage vessels and several potsherds. Unfortunately, the decipherment of these scripts

remains an ongoing challenge, leaving much about their meaning and context still unknown.

Insights into Historical Context and Cultural Significance

The primary objective of this study is to systematically analyse the morphological and technical characteristics of the pottery unearthed during excavations at the Lalmai-Mainamati archaeological site. The excavations revealed a wide variety of pottery types, including black, red, pale red, uneven red, dull red, and thick uneven red pottery, with red-colored pottery being the most abundant. For classification purposes, the pottery has been categorised into distinct groups based on their general morphological features, color, decorative elements, and surface craftsmanship. Among the pottery displayed in the Mainamati Museum, several specimens have been identified as Red-Coated Ware. Vessels in this category were coated in a bright red slip and varnished to give them a smooth, glossy surface. These vessels were both hand-made and wheel-made, with their surfaces coated in various shades of red, from reddish-yellow to light brown. This class of pottery includes a wide range of forms such as bowls, pots, plates, pots, pitchers, and storage vessels. Another significant group is the Pale Red Pottery, which also includes a variety of forms such as bowls, pots, plates, pots, pitchers etc. This category is further divided into three subgroups: Uneven Pale Red Pottery, Dull Pale Red Pottery, and Coarse Uneven Pale Red Pottery.

The primary distinction between the first two categories lies in the opacity of the dull pale red pottery. The surfaces of these vessels are typically unpolished, with visually uneven cores. The texture of these pots' ranges from coarse to medium, and while some were made on a wheel, hand-made vessels predominate. In most cases, the clay used was poorly tempered, with sand and paddy husk mixed into the clay as a tempering agent. Many of these vessels feature a hand-formed body with a solid, circular rim attached using a rolling wheel. The bodies are thick, uneven, and often have a thin coating only on the upper portions. In addition to red and pale red pottery, a few specimens have been identified as Gray-Colored Pottery. The gray color of these vessels may be due to the firing process or the presence of calcareous matter in the clay. However, these vessels are fragile and display a coarse to medium weave. They may have been hand-made or wheel-made, although it is unclear whether their gray coloration resulted from intentional manufacturing processes or accidental low-temperature firing. The most common forms in this class are pots and bowl-shaped vessels.

A Study of Traditional Techniques and Community Practices

Researchers often rely on ethnoarchaeological data to analyse ancient pottery, seeking clues to pottery manufacture and use that extend into the present day (Bala 1997, Alam 1999). The appropriate application of this data in archaeological research can yield significant insights into the cultural processes related to pottery (Sen and Haque 1999). In the context of this study, there is considerable potential for using ethnoarchaeological data as a guide in the analysis of pottery from the Bijoypur region. Notably, potters continue to reside in several villages within Bijoypur Union, near Shalban Vihara. During the present research, techniques for pottery making, the use of various pottery types, and the practices of potters from North Bioaypur, South Bijoypur, Madhyam Bijoypur (Bijaipur Rudra Pal Sambay Limited), Baropara, and Gangkul were observed. These observations provide essential background for analysing the pottery samples discovered in the Shalban Vihara excavations (Ahmed 2001). The pottery techniques utilized in North Bijoypur, South Bijoypur, Baropara, and Gangkul are generally similar and closely resemble the practices of potters from various regions of Bangladesh. This similarity underscores the continuity of traditional pottery-making methods and the cultural significance of these practices in the region.

Exploring the Socio-Economic and Cultural Context of Bijoypur Potter Group

Bijoypur Union is situated in Sadar Dakshin Upazila, Comilla District, and consists of 26 villages. This rural settlement is organized into para or micro-villages, with each village typically comprising both nuclear and joint families. The patriarch generally serves as the head of the family, indicating a predominantly patriarchal structure. The local economy is primarily dependent on pottery, agriculture, employment, and trade. In Palpara, many families rely on pottery, while in Teghuria Para and Gangkul, economic dependence on jobs and expatriates is higher. The standard of living for the Pala community in Bijoypur is generally low. There are two main groups within the potter community: the middle class and the poor, with the majority being impoverished. Economic challenges are exacerbated by inadequate pricing of pottery. Poorer potters often rely on donations from wealthier community members, with the condition that the pottery must be sold to the donor at a slightly lower price. Potters without their own kilns often have their pottery fired by kiln owners under special conditions, usually requiring them to give half of their production to the kiln owner. If kiln owners do not provide fair compensation, potters can remain trapped in a cycle of poverty and outdated technology for years.

In North Bijoypur, many families are engaged in pottery, but most are now also involved in agriculture. Pottery also plays a role in construction. The Bijoypur Rudrapal Pottery Cooperative Society Ltd. and Abhay Pottery Park are key institutions where people from nearby villages such as Teghuria Para, North Bijoypur, Middle Bijoypur, Gangkul, Nowapara, and Dhanmura work as pottery workers. Salaries at these organizations range from Tk. 4,000 to Tk. 6,000. Notably, women contribute significantly more than men to pottery production in Bijoypur, with their participation being particularly pronounced in Palpara and Gangkul. An observation of seven villages involved in the fishery industry within Bijoypur Union reveals diverse types of homesteads. Houses are primarily mud houses, tin houses, semi-paved buildings, and paved buildings. Mud houses are common in North Bijoypur and are often constructed with dochala and chouchala roofs. Tin houses, usually ramshackle and made with minimal straw or chaff, are more prevalent in other areas. Semi-paved and paved buildings are also present in Bijoypur. Historically, homesteads had mud walls and thatched or tin roofs. Currently, 48% of homesteads are mud houses, 32% are tin houses, and 20% are concrete buildings.

Settlement patterns in Bijoypur include clustered, row, and scattered settlements. Palpara exhibits clustered settlement patterns, Gangkul and Teghuria Para show row settlements, and Madhyam Bijoypur displays scattered settlements. Significant social events for the Rudrapal community in Bijoypur include Pahela Baishakh, Jamai Shasthi, Annaprasana, Shraddha, Nam-Sankirtan, and various pujas. Pahela Baishakh, marking the Bengali New Year, is particularly important. On this day, a fair is held around Bijoypur where potters sell their wares, providing a key source of income. The Jamai Shasthi ceremony is observed on the sixth day of Shuklapaksha in the month of Jaishtha, with rituals to honor the son-in-law. Annaprasana, or the first feeding of a child, is performed around the age of six to eight months for boys and five to seven months for girls. Shraddha is a ritual for appeasing the souls of ancestors and is performed after a person's death. Other customs include naming ceremonies, pre-marriage blessings, and the *Sadh Kheya* ceremony for pregnant women. Bijoypur is home to several Hindu communities, including the Pal, Dev, Sarkar, Shila, and Tagore families, most of whom are directly involved in pottery. Among the four Hindu castes, the Palas belong to the Vaishya caste. Their major religious festivals include Durga Puja, Saraswati Puja, Ganesh Puja, and Kali Puja, celebrated annually, while Lakshmi Puja is observed weekly on Thursdays, and Krishna is worshipped daily. In Madhyam Bijoypur, daily worship of Shiva is conducted by a local priest, and there are several temples dedicated to Durga, Shiva, Kali, and other deities throughout the region.

Pottery Practices in Bijoypur

In Bijoypur Union, located in the Comilla district, both traditional and modern pottery practices coexist and flourish. Modern pottery is produced at three prominent locations: Badal Chandra's house, Bijoypur Rudrapal Pottery Society Ltd., and Abhay Pottery Park in North Bijoypur. Simultaneously, potters in other parts of Bijoypur continue to create pottery using traditional methods.

Raw Material Collection and Preservation for Pottery Production

The primary material for pottery production is clay, with only a specific type being suitable for this purpose. The Rudrapal potters of Bijoypur source this clay from areas such as Nabur Jala, Shivar Dighi, Hossain Jalla, Parashpur Jalla, and from depths of 1 to 1.5 feet below the ground near Lalmai hill and the Dakatia river. The collected clay is stored in designated areas around their homes, often covered to prevent it from drying out over time. This method of clay collection and preservation is utilised in both traditional and modern pottery production in Bijoypur.

Preparation of Clay for Making Pottery

Clay preparation is a critical step in the pottery-making process, involving several stages depending on whether traditional or modern methods are employed.

Traditional Method

The clay is initially extracted from the soil pile using a spade, followed by the removal of stones, gravel, plant remains, and any iron particles. Water is added to the soil, which is then kneaded by foot. The amount of sand mixed into the clay depends on the desired shape of the pottery. After kneading, the clay is piled again and allowed to rest for a day or two, if necessary. The prepared clay is brought to the pottery-making area, where it undergoes further pounding by foot to create a homogeneous mixture, rendering it ready for shaping.

Modern Method

The soil is cut with a spade and mixed with water to soften it, after which it is moved using feet. The softened soil is processed through an auger machine to further loosen it. During this process, impurities such as stones, iron grains, and gravel are manually removed. The soil is transformed into workable clay through

repeated kneading by hand and with the aid of a jigger machine. This prepared clay is then used to create pottery products.

Shaping and Forming Pottery

In Bijoypur, the shaping and forming of pottery products are carried out through both traditional and modern methods, each with distinct processes:

Traditional Method

The prepared clay is placed on a flat surface covered with wood powder and shaped into a round form, similar to a loaf of bread. This loaf-shaped clay is then placed on a terracotta base called a *para* and manually pressed to form the *kanda* (base) and the round body of the pot. The shaped pot is dried in the sun to harden it slightly. Once partially dried, the pot is brought indoors and placed on an *atail* (a type of support). It is then shaped into the desired form using small and large tools like *dals* or *debbar*, *fingers*, and a pestle. A wet cloth or wool is used to smooth the surface of the pottery. The final shape is primarily achieved using hands and fingers. Traditional tools include the *pitna* (a kind of stick), *atail*, *pata* (a flat board), and *kathi* (a wooden stick).

Modern Methods

Molding Method: In this technique, clay is placed into a mold to give it a specific shape. Two types of molds are used in Bijoypur: Clay is pressed into a single mold to create a specific shape, often used for making parts like the front side of an idol's face. This involves using two molds to shape both sides of the object, which are then joined together. It is commonly used for making sculptures, toys, and other items.

Wheel Machine Method: This method uses a machine with a rotating, wheel-like plate made of iron. The clay is placed on this plate and rotated, either by foot or electricity, to shape the pottery. There are two types of wheel machines:

- Operated by feet to rotate the wheel.
- Controlled by switches to rotate the wheel. The potter uses wet hands to shape the clay as it spins.

Jigger Machine Method: This motor-driven machine produces pottery in specific forms. It has a rotating part and a handle. The clay is placed in a form, and the handle is pressed down to shape the pottery. This machine also includes a component for smoothing the pottery.

Tools Used: In modern methods, tools such as wheel machines, jigger machines, moulding machines, measuring sticks, knives, turning plates, decorating tools, and other specialized equipment are employed to shape the pottery.

Sun Drying of Prepared Pottery

The drying of pottery in Bijoypur relies heavily on traditional sun-drying methods, which are highly dependent on weather conditions. Under favorable weather, pottery products typically require 2-3 days to dry, while in less favorable conditions, drying can take 4-5 days. With modern techniques, the drying process is expedited, taking only 1-2 days in good weather and 2-3 days in poor weather. Once dried, the pottery is stored on wooden racks.

Application of Decoration and Color in Pottery

In Bijoypur, decoration and coloring techniques are integral to both traditional and modern pottery, applied at various stages of the production process, both before and after drying and firing. Cooking pots and storage containers are initially shaped using wooden molds before drying. Common designs include *khunchi*, *tuli*, *tanna*, as well as linear, geometric, leaf, mat, and concentric round patterns. To enhance their visual appeal, a thin coating of soda, catechu, or hill soil is often applied for added brightness. In traditional methods, toy dolls are painted in red, yellow, purple, green, and other colors after firing. In contrast, modern techniques utilize linear, geometric, leaf, mat, and concentric round designs, as well as appliqués, applied using molds and tin jute before drying. After firing, these pots are decorated with paint in shades such as ash, light brown, dark brown, and light purple. Additionally, some pots receive a thin coating of soda, *kheer*, or hill soil to enhance their brightness.

A Comparative Analysis of Bijoypur Pottery and Mainamati Museum Artifacts: Traditions and Techniques

There are notable similarities between the pottery produced by the Bijoypur Pala community and the pottery displayed in the Mainamati Museum. For instance, cooking utensils can be found in Showcase Nos. 38, 40, and 41 of the museums. The cooking pots from Bijoypur and those exhibited in the museum indicate their shared purpose for cooking. Bowl-shaped vessels are also commonly produced in the Bijoypur region. These bowls are utilized to serve cooked food and can be seen on display in Showcase Nos. 28, 39, 41, and 42 at the Mainamati Museum. Furthermore, storage containers, which have been used for grain storage since ancient times, are still made in the Bijoypur area, where potters

continue to produce barns or storage vessels. This continuity allows for interpretations of the past in relation to contemporary practices. The Rudrapal clan, residing in the Bijoypur region, is known for its traditional handcrafting of pottery using ancient methods. Among their pottery materials, dabbers are frequently found. After preparing the clay for pottery-making, these dabbers are employed to shape the vessels through kneading. Dabbers can also be seen on display in Nos. 28 and 41 at the Mainamati Museum. The dabbers from Bijoypur closely resemble those exhibited in the museum, suggesting that pottery-making techniques have remained consistent over time. The storage and cooking vessels displayed in the museum exhibit similar morphological characteristics to those crafted in Bijoypur. Additionally, the decorations on the storage vessels show remarkable similarities. The lids and bowls preserved in the museum also share complete morphological similarities with those produced in Bijoypur. This analysis highlights the enduring traditions of pottery-making in the Bijoypur region and its connections to the artifacts found at Shalban Vihara, reinforcing the cultural continuity in pottery practices over the centuries.

Conclusion

This ethnoarchaeological analysis of early medieval pottery from Shalban Vihara has provided a multifaceted understanding of the cultural and technological practices of pottery production and use in the region. By integrating contemporary potting techniques observed in the Bijoypur area with archaeological findings, this study highlights the continuity of craftsmanship and the socio-economic contexts in which these artifacts were created. The pottery displayed at the Mainamati Museum serves as a vital link between the past and present, illustrating the enduring traditions that have shaped the local pottery culture. Despite the uncertainties regarding the exact technological applications of ancient potters, the fundamental principles of pottery making, such as clay preparation, firing techniques, and decorative practices, remain consistent across time. This consistency underscores the shared knowledge and skills that have been passed down through generations, revealing the resilience of cultural heritage in the face of changing circumstances. Furthermore, the presence of decorated pottery and various vessel types found at Shalban Vihara enriches our understanding of the daily lives and rituals of the communities that once thrived in this area. The analysis of these artifacts not only contributes to the historical narrative of early medieval Bengal but also serves as a foundation for future research into the pottery traditions of Bangladesh. In conclusion, the findings from this study emphasise the significance of integrating ethnoarchaeological perspectives in archaeological research. By doing so, we can foster a deeper appreciation for the intricate relationship between pottery and the cultural

identities of the communities that produced and utilised these artifacts. It is hoped that this research will inspire further explorations into the dynamic interplay of ancient and modern pottery practices, enhancing our understanding of the rich cultural tapestry of Bangladesh.

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Studying Techno-cultural Context of Iron in South Asia: Case Study of Arunachal Pradesh of North-East India

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Abstract

The cultural heritage of Arunachal Pradesh reflects a repertoire of crafts specialization and skilled experts that serve the tribal society in one way or the other. This paper delves into understanding the craft of the blacksmith as well as its contribution to society. Moreover, the paper tries to understand the relationship between an artisan and his craft. It has been noted that iron was an important metal across the globe loaded with different meanings and purposes. Likewise, in the case of Arunachal Pradesh also apart from the technical aspect, the craft of blacksmithy is closely linked with the culture of the tribes. Hence, an attempt will be made to comprehend the process evolved by the tribes to manufacture agricultural tools and weapons while observing the blend of myths, legends, and superstitions in technological practices. Furthermore, the role of the blacksmith in contemporary times is highlighted to understand the transition of traditional craft practices in the presence of modern technology.

Keywords: crafts, iron, tradition, tribes

Introduction

The technological studies in India is largely dominated by the analysis of agrarian tools and war weapons. The Marxist approach of technological determinism towards social and political formations has been the main motivating factor in studying the technological past of the people of India during various dynasties. The aspects of the social construction of technology to understand the cultural or intangible dimensions of technology manifested in the forms of tools and weapons have not attracted scholars in India at large. Likewise, in the context of northeast India, the historiography of iron is mostly bound to the practical aspects of the implements. However, Verrier Elwin in the case of *Agaria*s writes that "…their iron is magic iron, vestal iron that is powerful to protect from earthquake and lightning and every assault of ghostly enemies; for centuries their simple ploughs and harrows have raised rich crops in the wild uplands of the Maikal Hills" (Elwin xxi). Elwin not only discusses the indigenous iron technology of *Agaria*s but also uncovers the deeper connotations associated with iron that run in *Agaria*'s belief system. This paradigm holds relevance even in regard to Arunachal Pradesh. In most of the studies in the region, iron technology is seen only in the background of agricultural tools and weapons, the cultural connotations related to iron such as taboos, myths, and

legends are hardly explored. Another interesting point to note is the state's strategic geographic connection with South Asian and South East Asian countries such as Bhutan in the west, Tibet in the north-east, and Myanmar in the east and south-eastern side which calls for a wider South Asian perspective. It is in this context this paper aims to examine the techno-cultural meaning of iron in Arunachal Pradesh.

Methodology

The paper is based on the data collected from field visits, archival data, colonial accounts, and secondary sources such as published books and articles. The first part of the paper outlines the conceptual approaches in the interpretation of technology and also provides an overview of the literature that is relevant to the paper. The next portion of the article elaborates on the studies on iron technology in a wider Southeast Asian context dealing with the case of Arunachal Pradesh in detail. The third part of the paper will be in the form of a conclusion.

Theoretical Concepts and Overview of the Literature

The interaction between technology and society has fascinated many scholars so to say is still the breeding ground for debates and discussions among scholars of varied disciplines. The relations between society and technology are best summarised by Wiebe E. Bijker:

> Today's societies, we then assume, are thoroughly technological and all technologies are pervasively cultural. Technologies do not merely assist in everyday lives, they are also powerful forces acting to reshape human activities and their meanings. The introduction of a robot in an industrial workplace not only increases productivity, but may radically change the process of production and thus redefine what 'work' means in that setting. When a sophisticated new technique or instrument is adopted in medical practice, it transforms not only what doctors do, but also the way people think about health, illness, medical care, and even death. In sum, we live in a technological culture.
>
> (Bijker 67)

Though Bijker said it in the contemporary context it is still relevant for the past societies. The study of technology is interspersed with various opinions and approaches hence it is important to discuss the different strands of arguments and the theories of other schools of thought to understand the stand of writing this paper. While some groups of intellectuals see technology as the moving factor behind the development of economic progress another group of intellectuals sees

it from another direction. In this light, the discussions and debates surrounding technological determinism, an important part of Marx's historical materialism, need to be outlined. The deterministic aspect of Marx has been explained by William H. Shaw that Marx's theory suggests that technological advancements drive historical progress, a view known as "technological determinism." This means that the evolution of tools and machines moulds society and its history which means that as technology and labour skills improve, the economic structure adapts accordingly. It is not just about specific inventions or tools, but the general progress in technology and skills. For example, the presence of a handmill doesn't directly create a feudal society. Rather, the broader technological and labor skills represented by the handmill influence the economic structure. Marx believed that the progress of human productive forces is the key to understanding human history and is the driving force behind societal development and historical change. These forces form the foundation of all social organizations, and their improvement drives societal progress. Some interpreters of Marx, Shaw believed to have downplayed this idea, but it is a consistent theme in his works. For example, in "*The Poverty of Philosophy*," Marx express that the mode of production and the relations in which productive forces develop are not eternal laws but change with the development of human productive forces. This idea is also reflected in a letter Marx wrote in 1846, where he emphasised that as people develop their productive abilities, their social relations must change accordingly. This view aligns with the materialist perspective that Marx and Engels shared (Shaw 1979).

On the other hand, Bruce Bimber presents a different picture of technological determinism in Marxism though not denying but substantially differs from the understanding of what Shaw shows. Bimber argues that in order for historical materialism to be technologically deterministic, the overall growth in human labor and the availability of technology and other means of production should derive from the internal characteristics of the technology itself. However, Marx does not associate productive power with technology in this way. According to Marx, the best way to understand the growth of productive forces is to divide economic history into two phases and consider the role of technology in each. The initial phase encompasses feudal, trade-oriented, and early manufacturing eras. As per Marx, economic change in this phase depends on the Smithian division of labour, with the most significant division being that between town and country. Technology is not a main factor in social change during this phase. In the second phase, which involves automation and the rise of industrial capitalism, technology takes on greater importance. Marx sees technology as a facilitator rather than a primary cause. The real significance of the shift towards a more technological production process lies in the increasing

separation of individual workers from their own labor, leading to their heightened 'alienation' from the productive process. Technology is used by the owners of the means of production to further distance the proletariat from their work. This strategic use of technology by the bourgeoisie for their own benefit underscores its importance in the capitalist phase of history. However, technology itself does not directly cause or require the class struggle that ensues (Bimber 1990).

However, it is important to remember that the study of technology is not solely based on technological determinism when examining the emergence of early states. It is also crucial to consider the cultural construct of technology. Classical philosophers viewed technology as universal and deterministic in their analyses until the 1980s. However, sociologists of science Trevor Pinch and sociologist of technology, Wiebe E. Bijker introduced a new approach to study technology (Bijker 2009). They proposed a social constructivist approach, extending the sociology of scientific knowledge to the realm of technology. This new approach discarded existing methods prescribed by historians, philosophers, and economists. The analysis of technology has shifted away from focusing on the individual inventor as the central explanatory concept. It now emphasises technological determinism and making distinctions among technical, social, economic, and political aspects of technological development. Critics of technological determinism traditionally placed human beings at the center of their studies and viewed technology as an outcome of human efforts.

The term 'social construction' was first introduced by P.L. Berger and T. Luckmann in their *Treatise on the Sociology of Knowledge*. Drawing from the phenomenological tradition and the work of Alfred Schutz, they argued that reality is socially constructed, and these processes of social construction should be the focus of the sociology of knowledge. The concept of the social construction of technology arose from a critique of technological determinism. To move away from this perspective, it became essential to emphasise the social aspect. The question was how to understand the development of technical artifacts in ways other than technology's internal logic. The three-step research process for analysing the development of artifacts involves: (i) sociologically deconstructing an artifact to demonstrate its interpretative flexibility; (ii) describing the artifact's social construction; and (iii) explaining this construction process in terms of the technological frames of relevant social groups. However, Bijker cautioned that constructivist studies of technology should avoid a realist ontology, as a realist view could easily reintroduce technological determinism. The core of social constructivist theory is rooted in the idea that technology is socially and politically constructed; society, including politics, is technically built; and technological culture comprises a sociotechnical ensemble. The social

construction of technology provides a conceptual framework for politicising this technological culture, which involves revealing hidden political dimensions, placing issues on the political agenda, and opening them up for political debate (Bijker 2010).

Sumitran Basu traces the evolution and challenges of the Social Construction of Technology (SCOT) theory over the past three decades. SCOT started with broad interpretative flexibility, allowing for various interpretations of technology. Over time, it began to address the persistent and resistant nature of technology. Initially aimed at refuting technological determinism SCOT evolved to transcend both technological and social determinism. The focus expanded from studying single artifacts in local contexts to examining broader normative and political issues in modern technoscientific society. SCOT has been continually shaped by responses to concerns and critiques, demonstrating its openness and adaptability. It has become more diverse in content, flexible in approach, and inclusive in its agenda. SCOT consistently refuses to commit to a realist ontology (the belief that reality exists independently of our perceptions). This is to avoid undermining its constructivist premise, which argues that technology is shaped by social factors. Despite its strengths, SCOT faces some intractable methodological dilemmas that need to be acknowledged. In short, Basu highlights the evolution of SCOT from a simple, methodologically distinct theory to a more complex and less clear one, which has faced challenges in maintaining its original empirical testability and methodological uniqueness (Basu 267).

Therefore, the studies on technology are elaborated with myriads strands of theory. As a consequence, new critiques emerged on the studies done on technology earlier creating a whole new pattern in the historiography of technology studies. Hence studies on iron technology came to focus. In this context, the studies on iron technology need to be centralised for this metal has a history of its own in the evolution of technology, thus contributing a major factor in the rise of human civilizations all over the globe except the Indus Valley civilization.

In the European context, Lynn White Jr. refers to Marc Bloch and discusses how in Northern Europe, a new heavy plough was created to take advantage of the dense, fertile alluvial valleys. This advancement led to increased food production and the ability to store surplus food, which was crucial for the growth of the population, specialization of roles, urbanization, and the rise of leisure activities. White argues that the use of the heavy plough in the Frankish heartland in the 7th century led to the advancement of the three-field system and communal agriculture, increasing production through better crop rotation and the

use of horses instead of oxen. In his book "*Medieval Technology and Social Change*," White argues that the introduction of the stirrup to the Franks in the 8th century revolutionised their combat methods. The stirrup provided better support for riders, enabling more effective mounted shock combat. White claims that this new combat technique led to a significant shift from infantry to cavalry, which in turn accelerated the development of feudalism. He suggests that the duty of knight's service, which was central to feudal institutions, originated from this military innovation (White 1962). White's technical determinism approach is criticised for oversimplifying complex historical changes by attributing them to technological innovations like the stirrup by P. H. Sawyer and R. H. Hilton and for being based on scant evidence and dubious deductions, giving an adventurous but misleading interpretation of historical developments (Sawyer and Hilton 1963).

In Southeast Asia, the studies on iron technology reflects a pattern that is unique from western perceptions. K. Basa's analysis of the Iron Age in mainland Southeast Asia suggests that iron was associated with the Chinese takeover of Giao-chi in 111 BC and the presence of Han Chinese tombs in North Vietnam. Evidence of iron in "Nam-Viet" could be traced back to the 3rd century BC, found in Dongson Culture and Sa Huynh Culture. The Dongson Culture evolved from earlier periods of bronze craftsmanship and had interactions with South China. Iron use in the islands and Peninsular Malaysia began around the 3rd century BC. The origin of iron technology is uncertain, but it might have developed independently in Southeast Asia. Iron industry expanded through trade with India from the late centuries BC, and iron tools across Southeast Asia exhibit distinct local forms (Basa 1991). Thomas Oliver Pryce discusses the historical significance of iron during the Iron Age and the difficulties that archaeologists encounter when studying iron and steel metallurgy, especially in the context of Mainland Southeast Asia (MSEA). Pryce argues that although iron played a crucial role in agriculture, industry, and warfare, its study is complicated by various factors, including its lack of prestige, preservation issues, and the complexities of research methodologies. Despite these challenges, ongoing studies continue to illuminate the importance of iron and steel in historical contexts. The author suggests that MSEA's iron and steel metallurgy was influenced by technological transmissions from India and China, with India playing a more significant role in the lower regions and China in the upper regions, particularly northern Vietnam (Pryce 2008). Ian Glover traces the expansion of iron technology throughout the ancient societies and highlights the drawbacks of conventionally accepted frameworks by pointing out that the transition from bronze to iron in certain regions did not follow the models proposed by Needham for Western Europe. In areas such as western and

southern Thailand, and southern Vietnam, iron came in regions without a well-developed "High Bronze Age." In these regions, bronze was scarce and mostly imported, leading to a direct transition from stone to iron, similar to Peninsular India. The native communities in these areas were small and not organized into influential states or chiefdoms, but they were active in trade. This social and political context played a more significant role in the adoption of iron than the accessibility of raw materials or the technical mastery of ironworking. In regions like the southern Thai-Malay Peninsula and southern Vietnam, where there were no powerful chiefdoms relying on bronze for status and legitimacy, iron was rapidly accepted once it was known. Overall, the spread of iron technology was influenced by a complex interplay of social, political, and economic factors, rather than just the availability of resources or technical knowledge (Glover 2015).

The Angkorian Khmer Empire possibly utilised iron to grow its land and construct extensive temples and hydraulic systems. Iron was likely crucial for agricultural, architectural, and military purposes. Artifacts such as iron weapons and tools have been unearthed during excavations of settlements and temples, and iron armatures have been identified within bronze religious statues crafted using the lost wax technique (Hendrickson et al. 2017).

In the context of India, D.D. Kosambi traces the history of iron back to 800 B.C. Iron played a decisive role in the surplus production of ancient Indian societies. It was a significant source of power for Magadha, as the state systematically used iron to clear land for agriculture (Kosambi 1970). R. S. Sharma supports Kosambi's view and suggests that by the middle of the sixth or possibly the fifth century B.C., the region had developed iron metallurgy and produced mild steel on a large scale. According to Sharma, iron played a key role in creating surplus, which led to rapid specialization in arts and crafts during the time of the Buddha. Additionally, more cities emerged during the Iron Age urbanization contrast to the Bronze Age urbanization. However, A. Ghosh argues that the emphasis on iron in the Aryan occupation of the Ganga plains is misplaced, as there were other alternatives such as copper-bronze implements and burning to clear the jungle. Ghosh insists that the production of surplus was connected to rising needs, and it is essential to consider political and economic changes to understand the impact of iron technology (Ghosh 1973). In contrast, Southern India had an agriculturally based society during the megalithic age, despite using iron more extensively than the north, particularly in the extraction and smelting of iron and stone-cutting for building sepulchral monuments. This highlights that possessing technology does not guarantee its widespread application unless encouraged by social institutions. Similarly, Vijay Kumar Thakur proposes that the examination of technology should encompass the social

environment, as both the essence of technological expertise and the extent of social progress influence civilization (Thakur 1993). Thakur proposes three stages for the evolution of iron technology in India in relation to its social context: the technology's inception during 1300-1000 BC, its adaptation during 1000-600 BC, and its role in production and expansion between 600 BC and 200 BC.

Keonjhar district in Odisha is rich in high-grade iron ore, contributing significantly to India's iron production. Ancient mining and smelting sites indicate a long history of iron technology. The availability of iron ore and suitable ecological conditions supported the settlement of tribes who practiced iron smelting, influencing their lifestyle and economy. The region's iron technology evolved over time, improving agricultural and craft tools, which contributed to urbanization and economic growth (Pradhan 193-194). Another thesis explores various aspects of iron technology in southeast Rajasthan, focusing on its history, archaeology, and chronology. Iswal was chosen for its significant iron deposits and proximity to iron ore mines. Nathara-Ki-Pal site is known for large heaps of iron slags, indicating extensive metallurgical activities. The site has substantial iron ore deposits with high iron content. The thesis combines archaeological evidence and experimental work to reconstruct ancient iron smelting technologies (Udayakumar 2016).

Reciprocating the framework propounded by D.D. Kosambi, Amalendu Guha writes that the alluvial plains of Kamarupa were densely forested due to heavy rainfall until they were cleared by newcomers using iron tools for extensive wet rice cultivation. This led to a significant population increase due to the abundant rice supply (Guha 1991). Two Polish scholars viz., Pawel Prokop and Ireneuz Suliga, attempted to track the beginnings and development of iron culture by exploring the sites of Nongkrem and Raikteng in the present East Khasi Hills district. They found no indication of any change in the technology during the two thousand years of ironworking and concluded that ironworking was of indigenous origin however their treatment of iron is from a scientific standpoint hence the socio-cultural dimension of iron has been not mentioned (Prokop and Suliga 2013). Other researchers have also studied iron in the Khasi-Jaintia Hill of Meghalaya (Masaharing 2018; Kupar 2016).

In the case of Arunachal Pradesh, the literature on iron technology is scarce and less dynamic in approach. The government has made an effort to salvage the cultural heritage by publishing books, journals, and *District Gazetteers* which gives us a cursory idea about the direction of research in the state. The people of Arunachal Pradesh are skilled in various crafts such as paper making, smithy work, carpentry, pottery, and ivory work. Smithy work is widespread in the region, and most tools and implements are made by the people themselves. Some

blacksmiths in Arunachal Pradesh are skilled in gun making, while the Adis were previously known for their expertise in casting in brass. The Nishi smiths continue to make brass ornaments, dishes, and sacred bells (Dutta 1985). Some passing reference of iron can be seen in some of the articles of *Resarun* (Agarwal 1991, Dutta 1991, Chakrabarty 1991, Koley 1991).

In Tirap district, a few people practice smithery, crafting agricultural tools and ceremonial weapons. The Tangsa, Noctes, and Wanchos specialize in creating various iron implements, while the Singphos are known for their skill in iron smelting and weapon forging using basic tools. To quote Dalton, "The Singphos understand the smelting of iron, and their blacksmiths with no implements, but a lump of stone as an anvil, and a rude hammer, forge weapons, especially *dao*s which are highly prized all over the frontier for their temper and durability" (*Gazetteer* 123).

In the East Kameng, West Kameng, and Tawang district areas, blacksmithing is an exclusive craft passed down through specific families or villages. The Monpas relied on itinerant blacksmiths from the north, while the Sherdukpens of Jigaon village were known for their skill in smithery. They make *dao*s, knives, hatchets, and sickles with iron imported from the plains. Pig iron and scrap are used. The anvil is either iron or stone. Akas and Sherdukpens are known to be actively engaged in trade and exchange with Tibet, Bhutan, and Assam. Pig iron, sword, and *dao*s were important commodities of exchange (*Gazetteer* 159-160).

Tai Nyori gives a glimpse of the occurrences of iron in the Adi area which has been traced recently by the Geological Survey of India. Though, he mentions that findings are reported to be economically unimportant but of academic interest only. Also, he mentions Adi blacksmiths who know how to make swords (*yoksa)*, *dao*s, kurpis (*lolom)*, and knives (*yoksik)* of iron which were brought either from Tibet or Assam markets (Tai). Finally, it is of interest to note the works done by A.K. Thakur on iron technology and its impact in northeast India, including Arunachal Pradesh, which outlines certain characteristics of iron in the region (Thakur 2011, 2014). The author also discusses how the studies on the technology of the region have been neglected by mainstream historians.

Glimpse of Iron in Northeast India

As mentioned above the literature available on northeast India, the work on iron technology is slow as compared to other areas of research. Traces of iron ore have been found and mentioned many times in northeast India, from the records, it emerged that some regions were blessed with native iron ore while others had to procure it from their neighbouring villages in the form of pig iron or used hoes

which they forged and fashioned as per their needs. The principal articles manufactured and exchanged are axes, hoes, ploughshares, spearheads, arrowheads and *dao* by the tribes of the region. (*Report on Administration* 1877, *Physical and Political* 1896, M'cosh 1837).

In R.B. Pemberton's account, it is mentioned that iron was the only metal found in Manipur, occurring as titaniferous oxydulated ore. It was primarily obtained from the beds of small streams south of Thobal and the hills near Langatel. The ore's presence was identified by the withered appearance of the grass growing above it. The loss resulting from smelting the ore amounted to nearly 50 percent, and the Manipuris were aware of the increased difficulty in fusion with the higher purity of the metal. The iron works were carried out in villages such as Kokshinglungsaee, Kokshingkhoonao, Kokshingkhoolel, and Langatel under the direction of a chieftain named Boodhee Rajah who claims for his ancestors the merit of having first discovered the existence of iron ore in the valley, and of rendering it subservient to the use of man (Pemberton 1835). B.C. Allen mentioned that Manipuris used to extract ore particles, cleanse and heat them, and then smelt the powder in a charcoal fire. This industry is now almost extinct, with local blacksmiths mainly using foreign ore (Allen 1905).

In Meghalaya, Lt. Yule observed extensive iron ore excavations in the villages of Nongkrem and Moliem near the Umiam river. The mining process involved diverting a small stream to the excavation site, where workers used long poles with iron spikes to remove soil and extract iron ore. The ore was washed, dried, and then smelted using bellows made of cowskin and a clay furnace. The impure iron was then shaped, cooled, and sold in the market. The impure metal was distributed for sale across the hills and plains of Sylhet. Approximately three-quarters of the iron were lost in this state. The only additional purification steps involved heating in the furnace and hammering. Following smelting, the metal was typically sold in the hills in sets of pieces. At Mongkrem, it was sold at one rupee or one rupee two annas per set. Roughly a dozen of these pieces constituted a *maund*. In the Pandua bazaar at the base of the hills, it was sold by weight at rupee four *annas* a *maund*. One furnace could produce fourteen or fifteen of these pieces in a day's work, or up to twenty-four or twenty-five in twenty-four hours when work was conducted continuously, as was common in some places. It was also sold in pigs, fetching three rupees four *annas* to three rupees eight *annas* in the Cherra bazaar. The mining operation lasted for about twenty days during the heavy rainy season, and miners were paid four *annas* a day. The annual rent for a mine ranged from four to ten rupees, and miners could earn up to thirty rupees in a good mine over the course of twenty days (Yule 1842).

The method described by Lt. Yule for extracting and processing ore in the hills remains unchanged from 20 years ago. The iron produced in the hills is mainly crafted into *codalee*s, large knives, and other tools, with different individuals and villages specialising in each type of manufacturing. While a large number of *codalee*s are exported from the hills to Assam, English-made spades of superior quality and lower price are also available in the vicinity. The Khasi iron is of excellent quality and could even be used to make steel of superior quality. However, the impurity of the blooms sent to the market is a significant drawback, making it expensive to use. There is potential for significant improvement and expansion in the manufacturing process, particularly in sustaining a high and equal temperature in the hearth to separate slag from the purer metal more effectively and in finding more powerful methods to remove slag from the metallic mass (Non dated file 70-6).

In Mizoram, every village has a simple yet clever forge, which is reminiscent of those found throughout lower Bengal. It is likely that the Mizos learned how to construct and use it from Bengali prisoners. The forge comprises two wooden cylinders, each about two feet tall and eight or nine inches in diameter, equipped with wooden pistons. Feathers are attached to the pistons' circumference to prevent air from escaping. The cylinders are placed upright in the ground, partially buried. In front, a small fireplace made of stones is built, and two slender bamboo pipes connect this to the cylinders underground. The forge is operated by a person who holds the pistons, one in each hand, and moves them back and forth to maintain a continuous supply of air. Charcoal is the fuel used in this forge (Woodthorpe 1873).

In Nagaland, blacksmithing was a significant occupation among the various tribes. They used only soft iron obtained from the plains in the form of old tea-garden hoes. The Angami blacksmith's anvil was a large flat stone, and the hammer was made of smooth oblong or egg-shaped stones of different sizes bound tightly to a short stout stick. They used split and flattened bamboo as pincers, and their bellows were made of bamboo sections or hollowed tree sections. The fire was fueled by charcoal heaped against a flat sandstone, and the air was pumped by two pistons worked alternately by a man standing behind the bamboo. The finished products were tempered by cooling with water mixed with salt, chillies, bamboo pickles, or a combination of the three, and old weapons were treated in the same manner to renew them. Additionally, the process involved sharpening spear-heads on both sides and edges, while a dao was only sharpened on one side and could only be effectively used by a right-handed person. Sickle blades had a serrated edge, notched with a dao after the blade had cooled. The blacksmithing methods in the Sema and Rengma tribes were similar to those of the Angamis, with slight differences in staining black bases of

spearheads and the use of the sap of a wild fig called *khero, akowo, achichu* among the Rengma Nagas to fix dao blades in their hafts (Mills 1937). The Lhota blacksmiths primarily use tools purchased from other regions, but they still use a traditional type of bellows called *yongphophen*. This bellows consists of two sections of bamboo set up perpendicularly in a clay base, each fitted with a piston bound with hen's feathers. The pistons are operated alternately by an assistant, and the tubes attached to the pistons emerge together at the fire. The finished product is tempered by dipping it in water, but this tempering is not final. The purchaser can further temper the item by heating it in a fire and then tempering it in salt and water or bamboo-pickle and water according to their preference (Mills 1922). Apart from the ordinary Naga type bellows (Smith 1925) the Aos also have single piston bellows which have not yet been seen in any other tribe, but Woodthorpe saw and sketched it in a Miaotsu (a tribe that exposes its dead like Aos) village on the Siam frontier in 1895, the only other reference to this form that J.P. Mills have ever met. This Ao piston is horizontal instead of vertical, and as far as Mills remembers the piston drives the air through one hole upon being pushed in and through the other on its return journey, so that the cylinder, which is made of wood, must be closed at both ends instead of at one only (Mills 1926).

Social Norms and Mechanisms Surrounding Ironworking in Arunachal Pradesh

In this section of the paper, the mechanism of iron technology practised by the tribes of Arunachal Pradesh is examined. The stages in the manifestation of iron ore into tools and weapons are loaded with different cultural meanings however in most of the studies it has been reduced only as an item of trade, a raw material for making tools. In this context, it is worth noting the work done by Gunnar Haaland and others. They argued that it is important to consider how people in specific communities connect the relationships formed at different stages to each other in conceptual similarities and differences. Initially, iron ore is separated from its natural location and then taken to the smelting furnace, where the ore is smelted into iron bloom. Across different cultures, the objects and activities involved at this stage carry subjective and symbolic meanings, which can be metaphorically linked to various aspects of social life. The movement of iron ore is driven by specific actors who transport objects according to a plan to achieve a goal. What was once natural ore becomes bloom after smelting in the furnace, and then becomes iron objects for practical and symbolic use after forging in the smithy. These transformations at the smelting and forging stages represent instances of creation, distinct from the direct manipulation that occurs at the usage and storage stages. This process involves changes from one state to

another (Haaland, Haaland and Rijal 2002). Having said this, it is important to keep in mind that the geographical boundaries of modern Arunachal Pradesh are not applicable to the current themes of the paper. This has to be observed from beyond the modern political boundaries because the movement of technology was along with the movement of people which was very common during pre-colonial as well as colonial days.

The presence of iron in the region has been noted by colonial ethnographers. Such as E.T. Dalton states that the Singphos possess knowledge of iron smelting, and their blacksmiths are capable of crafting weapons, particularly daos, using only a stone as an anvil and a basic hammer. These weapons are highly esteemed for their resilience and sturdiness throughout the frontier (Dalton 1872). Christoph von Furer-Haimendorf also notes that it was an interesting feature of the Apa Tani blacksmith's traditional equipment were bellows made not of skins but of wild banana leaves, which lasted for about a month. The bellow pots were of wood and the tubes of bamboo (Haimendorf 1980). Most importantly trade practices of the tribes of the region were one of the important sources for obtaining iron. Trade was flourishing during the pre-colonial period and many trade fairs and trade routes were traversing Bhutan, Tibet, Burma, and Assam facilitating inter as well as intra tribes trade relations. Arunachal Pradesh plays the role of connecting bridge for the merchants of all these regions hence later when the British came into the northeast they understood the strategic importance of the geography of the state. It is evident in the following:

> A memorial had been addressed to Government by some influential members of the commercial body, praying for the survey of a line of country from the north-east of Assam, through the Hookung valley to Bhamo, advocated by the late Mr. F.A. Goodenough and Mr. R.S. Mangles, with the view of making the Brahmaputra river the highway of a trade from China having its entrepot in Calcutta. The Indian Government decline to act on this memorial until the result of my journey from China towards India should be known.
>
> From Captain R.G. Woodthorpe
>
> … the route advocated by Mr. Peal would lie through the Singpho country, which it would be well to avoid, if possible; that advocated by Mr. Lepper would pass through the Khamti and Khunnung country, and we are assured by the Khamtis that no opposition would be offered to us, and that a very practicable route could be found in their country; this line would have the advantage of going direct to the trade-route between Artenze and Bathang.
>
> Chief Commissioner of Assam

The Chief Commissioner strongly recommends that survey party under Captain Woodthorpe, which has already penetrated and become known to the tribes who trade with China on the one hand and with Assam on the other, should complete their work of explanation.

The obvious advantages of a direct trade route if such a route can be found, between India and the western provinces of China, do not need to be recapitulated such a route need not interfere with the Bhamo route. As pointed out in the following extract from Mr. Peal's memorandum, the two routes have entirely different objects and will supplement rather than clash with each other:

To imagine that the trade to English from Western China would go by the valley of Assam, while the Irawaddi was open, would be absurd. It would be equally so to expect the Indian trade to go via the Irawaddi. Each would take what would legitimately belong to it, etc (Assam Secretariat 2-10).

The following passage encapsulates the commercial motives of taking up survey in the region by the Britishers.The following is an extract from the Mr. H.L. Jenkins notes on the Hukong Valley, 1869-70:

> Singphos pass my bungalow in numbers in the cold season, bringing *dao*s to barter for rupees and salt, etc. Surely they would be only too glad of a better path as affecting their own comfort. Now as the Khamptis are very civilised and on very friendly terms with us, and the Singphos so well spoken of, and these being the only two tribes between us and China, surely such an important objects as a road to China will meet with early consideration, being such a safe and interesting field to employ those officers who have had so much risk, for such a safe and interesting field to employ those officers who have had so much risk, for such a minimum of profit, in the Naga Hills.
>
> Just think of the advantage of Chinese labour to Assam- a want every year becoming more and more necessary to the development of its vast resources; think of the fresh markets for European merchandise that would be suddenly opened up; think of the field for European enterprises in the gold and silver hills of Khampti, within a few days of Sadiya. Yet I am far from wishing the latter to prove as attractive as the frontier two reasons for opening up the road (15).

Once the Britishers realised the potential benefits of opening trade relations with China, they started mapping Arunachal Pradesh from every nook and cranny in search of a better route to China.

Remarks on memoranda furnished by Mr. R.D. Mangles and Mr. F.A. Goodenough on the opening of a communication between western China and Assam on the left bank of Brahmaputra:

> But, though I do not share in the sanguine expectations entertained by Mr. Mangles and Mr. Goodenough of any important commercial benefits resulting from the opening out of the particular routes which have fixed their attention, the main ideas of opening a communication with China may I think be very possibly realised in a different direction, and it is on the north or right bank of the Brahmaputra, and by one or the other of the passes leading into Thibet, that I would recommend the attempt to be made. I would in particular invite attention to the route from Towang through Koreapara Duar, which does not in any part enter the territory of the Deb and Dhurm Rajas of Bhutan, but lies entirely across a country dependent up Lassas and forms an integral portion of Thibet; so that as was most happily and accurately observed by Pemberton, "we have literally the Chinese and British frontiers in immediate contact with each other at a duar in the valley of Assam, not more than fifteen miles from the northern bank of Brahmaputra."
>
> Sixty years ago the trade between thibet and assam by this route was estimated to amount to two lakhs of rupees per annum, and this, though assam was then in a most unsettled state; and up to the time just prior to the Burmese invasion the lassa merchants brought down gold to the value of Rs 70000. The occupation of the country by the Burmese however, killed the trade and in 1833 only two Thibetan merchants are said to have come down, but since that period there has been a gradual revival of it, which even our late quarrel with Bhutan did not interrupt, and it has now every appearance of being flourishing and on the increase.
>
> The trade is carried on principally through the instrumentality of a fair held at a place called Udalgooree, situated at the mouth of the Koreapara pass. I visited this fair in 1867, and again this year, and was much interested by what I saw there of the Thibetan traders. I found men among them from all parts of Thibet, from Lassa, and from places east and west of it. Some of them looked like Chinamen, they wore Chinese dresses, ate with chopsticks, and had about them various articles of Chinese manufacture, as pipes, strike-a-lights, and embroidered purses, such as I have seen in use among the Chinese at Rangoon and Moulmein; they were accompanied in some cases by their families and carried their goods on sturdy ponies, of which they had a great number, I should think some hundreds. Besides the Thibetans who attend this fair, there are some,

> who still take the alternative route through Bhutan via Tassgong, to Dewangiri (18).

The Britishers were determined to survey whether it bore commercial success or not because apart from the commercial motive they wanted to rule the region hence they set out these surveys to obtain knowledge about the tribes who reside in the region in order for the colonialism to penetrate more smoothly. It is quite evident from the following passages:

From Lieutenant-Colonel H.H. Goadwin-Austen, late superintendent, Khasi, Garo, Naga Hills survey

> …but if such intimacy be allowed to drop, in the course of a few years, the officer is gone, and his successor does not when the time comes, possess the same experience of the country and the people, in fact, does not know what can be done or attempted. Friendly relations, once made, should be followed up with headmen and chiefs further on.
>
> Although the survey may be expensive, and exploration here may not discover or open up a large trade-route, the good results are numerous; not only do we gain a knowledge of the topography very valuable to the military authorities, when, from some cause or another, an expedition has to be sent into the mountains, but the extent and power of the hill tribes is accurately ascertained, and this knowledge of our Assam frontier gives us greater strength; half its formidable nature disappears; it is our terrible ignorance hitherto that has made it so weak, and so difficult for the government to deal with many questions regarding it (27).

The historical trade relationship between Tibet and the natives of central Arunachal Pradesh is an area of study that has not been thoroughly explored by scholars. A.K. Thakur notes that trade and cultural exchanges were occurring prior to the arrival of the British, but colonial intervention disrupted this pattern of behaviour. In the Adi area of Arunachal Pradesh, there were two main trade routes from Tibet: one passing through the Bori and Bokar areas and another through Gelling. Trade was also conducted by the Adis to places like Along, Pangin, and Pasighat. Previously, the Adis below Pangin used to trade as far as Sadiya. The Boris, due to their proximity to Tibet, primarily engaged in trade across the border. They traded raw hides, chili, and other goods for rock salt, woolen cloth, Tibetan swords, vessels, and jewelry. They also bartered for salt, iron, and utensils with other Adi groups. Tibetans came through the Kepung La Pass with various goods, exchanging them for mithuns, hides, rice, and other products (Thakur 2017). The Membas and Khambas also had a major impact in

trade, obtaining various commodities from neighboring tribes and exchanging them with Tibetans. The Membas exported rice, corn, ginger, chillies, bamboo, hides, silk cloth, and butter to Tibet, while importing wool, cloth, salt, tea, weapons, fruits, and other items (Thakur 2016). Some M.Phil theses from Rajiv Gandhi University sheds light on the trade relations on the specific region giving us detail understanding of the trade network during pre-colonial period (Magra 2010; Bagang 2018; Thekcho 2016).

After obtaining iron, the blacksmiths of the village convert it into tools and weapons as per their needs. Y.P Kholi described about working mechanism and infrastructure of the smithy. The writer mentions that a metallurgical operation consists of two parts: (1) locating and extracting metallic ores, and (2) working on these ores to produce objects, known as applied metallurgy. There is no information among these people about the extraction of metallic ores, but they do possess substantial expertise in crafting alloys and creating intricate metal items like decorations, weapons, and other artistic pieces. By examining the metallic/alloy objects possessed and preserved by these people, we may conclude that they were likely made by expert and skilled craftsmen known as *Loma*/*Lomang*, who were considered as gods of construction work. Among the Adis, a small hut with stone walls, a thatched roof, and a mud plinth is typically built in a corner of the village for smithy work. There is some space left open between the walls and the roof to allow light and air to pass through. The implements and other accessories used by the smith are:

a. A thick piece of wood scooped out for storing water
b. Pincers (*Megap*) made of iron and split bamboo
c. Hammers of different sizes with wooden hafts
d. Anvils
e. A *dao* for the purpose of chisel, and
f. A basket containing charcoal (Menir) of wood like *Taja, Tapil* etc.

The hearth is a circular shallow depression in the center of the room and is filled with charcoal. The bellows consist of a pair of vertical hollow bamboo tubes, each about four inches in diameter. The lower ends of the tubes are buried in the ground. From the bottom of each cylinder, a bamboo tube sticks out and connects to the other tube a few feet above the hearth. The handle of the piston is made of bamboo, and at the lower end, feathers are fixed so that when the piston is pulled up, air easily enters the tube from the open upper end of the cylinder. When the piston is pressed downwards, these feathers prevent the air from escaping and push it into the furnace. The four basic requirements for metallurgical operations are: (a) ore, (b) fuel, (c) air blast, and (d) tools, crucible,

and furnace. Wood was the popular choice for fuel, and intense heat was typically obtained by burning *Taja* tree. Air blast is preferred for smelting ore and making alloys. A furnace is a device in which metallurgical work is carried out under heat derived from the combustion of fuel. A furnace consists of two essential parts: (1) the firebox where the fuel is burned, and (2) the hearth where the actual work is done. According to Adi folklore, the expert first creates a desired model from honeycomb and applies a paste of soil, leaving the mouth open. This model is heated indirectly in a big pan, with the soil paste/mud. Raw materials in the form of broken pieces are added into it, and intense heat is given. A long stick is immersed in it to confirm whether the raw material has come into the molten state. The molten metal is allowed to fall on the model of the desired object. The adjacent fire is put out for cooling, and the clay is carefully broken to obtain the desired object. In Adi society, individuals skilled in craftsmanship are referred to as *Yongmo* or *Rangmo*. Within the Padam Minyong communities of the Adis, there is a belief that *Ninur Lomang* was the older brother of their ancestor, Abotani (Kholi 1992; Kholi 1996).

The end products of the blacksmith are usually arrowheads, spearheads, *dao*s, however, these are not just tools or weapons out of a factory. These tools carry cultural connotations so much so that some artefacts mainly *dao* is part of the ethnic attire which symbolises the tribal identity. These tools are manifested in the myths and legends of the tribe so much to say that they are part of their culture not only as agricultural tools and warfare weapons but display certain spiritual meanings. To be precise, *dao* or machete is an all-rounder tool and is used by every tribe of the region in different shapes and forms. This particular tool is associated with many meanings. For example in one of the interviews, a middle-aged male Talut Siram of Pasighat recounts one of his dreams before the birth of his son saying he had a dream in which he obtained a *dao* that was slanted with serrated edges, hence when his son was born he was not that good looking and as he grew up his teeth were crooked and Mr. Gandhi Daring and Mrs. Opit Tamuk Darin an elderly couple from Pasighat also affirmed the meaning of seeing *dao* in a dream that it is always related to a son (Field work). Despite being converted to Christianity they still strongly believe in the spiritual meanings attached to metal artefacts. Likewise, Shri Jengwa Langching an 88 years old blacksmith from Changlang District explained that seeing a broken *dao* in a dream means the loss of something valuable or life. One of the important things to point out is that the *dao* is always associated with the soul of a son or a boy in general. Joram Umang highlights the role of *dao* also known as *oliyo* in the Nyishi dialect in marriage, death, and rituals has been mentioned reflecting the socio-cultural value of *dao*. The Nyishi people believed that the origin and the use of *oliyo* started far back but the factual reality is unknown till date,

though it is believed that it was started by the *Bida Loma, Hui Loma and Pinjh Loma*; the half-human and half spirit (as per Nyishi mythology). They started making *oliyo* somewhere in *Nyem Nyepak* (Tibet: region on the Tibetan Plateau in Asia northeast of the Himalayas) and later on it was supplied or spread to Arunachal Pradesh (India) as well. But still, the specific *oliyo* named as *lyor oliyo* were found and collected only from Tibet. As per the oral literature the spread out of *oliyo* from Tibet Region to the indigenous people of Arunachal Pradesh was collected through the process of barter system. The key raw materials that were used for making *lyor olyo* were valued equivalent as gold and only some people has the potential and had idea how to make *lyor oliyo*. The makers of *lyor oliyo* were considered as god. According to oral literature the *oliyo* culture amongst Nyishi started with *Aath Nyia* (the very first human on this earth and the son of Abu Tani). *Aath Nyia* felt the need of tools or weapons to sustain on this earth i.e. the tools or equipments for agriculture, gift to exchange during marriage or other social or culture activities etc, so he made a friendship with the above stated makers viz., Bida Loma, Hui Loma and Pinjh Loma to get *oliyo* from them, because he lacks the knowledge about the process of making *oliyo* to fill his basic requirements. Still the raw materials used for making *lyor oliyo* are unknown to us, many people tried different creativity to make these particular *oliyo* but they failed to give the perfect finishing and the same antique look as used by earlier makers. At present days there are some makers of *pope oliyo* or other ordinary *oliyo* in some parts of Arunachal Pradesh those are Palin, Chayangtajo, Seijosa, Seppa, and Nyapin. But they don't make *lyor oliyo* because it seems that the making of *lyor oliyo* and furnish to give an antique form is beyond their limit (Umang 2016).

Another thing worth mentioning is the taboos and myths related to the blacksmiths. Generally, blacksmithy is a male-dominated craft specialization amongst the tribes of Arunachal Pradesh, and the presence of women in this field is associated with taboos and cautionary tales. Women are strictly prohibited from stepping over the *dao* which they believe will weaken the spiritual strength of the *dao*. In the old days, women were not allowed to go near the smithy workshop fearing her presence might hamper the manufacturing of the tools. In the Nyishi area blacksmiths are usually addressed with the suffix *Nyibu* which means priest/shaman. This shows that blacksmiths are accorded with a respectable position in the Nyishi society. While this may be the case in Nyishi tribes, however in the case of Mishmi blacksmiths they can not continue the dual role of being a priest as well as blacksmith. If one becomes a priest then he has to renounce the smithy work *vis-à-vis*. There are taboos related to the birth of children of the blacksmith. If it is a boy he has to observe 7 days *genna,* and if it is a girl then he has to observe only 4 days of *genna*. *Dao*s are decorated with

ivory and other animal bones with the belief that it will act as a shield from evil spirits. In the old days, blacksmithy was done quietly away from the prying eyes that is because Mishmi blacksmith believed that a person with an evil eye could disrupt the *dao* making such as the casting of silver as the handle of the *dao* might not sit well as per the desired design. However, present-day blacksmith Shri Agenso Gambre says he has done his work for the past four years irrespective of the number of people present in his working space. This might be one of the reasons why the blacksmiths of the Tezu region usually do their work at night but when asked about this they simply said it is too hot to work during the day time since blacksmithy requires the constant presence of fire (Field work). Another strand of superstitions observed amongst the Tangsa tribe was when the wife of the blacksmith was pregnant, the blacksmith was supposed to stop working or else the child might have difficulty breathing issues like the wheezing sound of the bamboo tubes and might endowed with other disabilities (Field work).

There are various strands of myths, legends, and superstitious beliefs across the different tribes. All these suggest a pattern of social relations and rules that guide the manufacturing process of iron into practical implements. However, with the reduction of agricultural practices among the tribes, the need for agricultural tools subsided naturally. The relevance of the modern blacksmith is primarily in *dao* making because *dao* is culturally significant as an exchange gift during matrimonial ceremonies and also for domestic use. Contemporary commercial blacksmiths are now replacing the general notion of blacksmiths being a storehouse of indigenous technical knowledge. Adding to this with the coming of white colour job opportunities many youth of the region preferred this new lifestyle to blacksmithy. However, people from outside of the state find themselves in a very lucrative business. Shri Harihar Sharma and his son Rames Sharma originally from Gopalganj district, Bihar have been doing blacksmithy in Namsai district for the past 50 years. Harihar Sharma mentions that no Singpho-Khampti blacksmith were in Namsai when he came (Field work).

Conclusion

On the basis of above discussion, we can observe that the iron technology in Arunachal Pradesh had the influence of neighbouring areas and neighbours have contributed to its growth. Modernization is taking place and the use of modern machines and tools are coming up fastly. This can be observed in the forms of different kinds of hammers, air pumping mechanism, anvil, tongs and pincers. Thus, integration of modern tools with ancient smithing techniques are found. In one of the studied villages in Arunachal Pradesh one family from Bihar is

working as blacksmiths. This indicates lack of interest in traditional blacksmithy among the villagers. However, it is important to note that traditional social and cultural values are also fading as new socio-economic and political opportunities have become more prevalent. Blacksmithing is now primarily an occupation for earning a living, emphasizing the need for technical expertise over traditional knowledge which binds the craft with culture and identity formation, working beyond the agrarian tools. Even though modern industrial products are quite persistent in replacing traditional tools and weapons some artefacts still retain traditional roles and encapsulates cultural significance such as *dao*. Another important thing is the monopoly of technical knowledge by the male of the society. It is interesting to note that women are usually associated with taboos and superstitions however the dispersal of knowledge is only limited to the men of the society. This aspect of gender dynamics in the technological study deserves in-depth research which will form the part of other paper in future. Due to limited scope of this paper this aspect is not detailed here.

Fig. 1. Shri Harihar Sharma

Fig. 2. Shri Rames Sharma

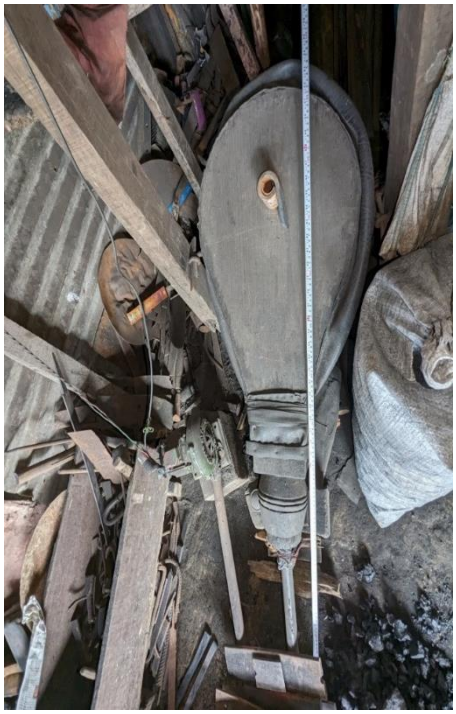

Fig. 3. Bellows made of rubber

Fig. 4. *Dao* in the making process laid over a pile of charcoal

Fig. 5. Shri Agenso Gambre furnishing the handle of the *dao*

Fig. 6. Shri Namsangso Drai with traditional forge with a modern pump

Fig. 7. Ivory for *dao* handle

Fig. 8. Types of *d*aos furnished with copper-casted wooden handles

Fig. 9. Tools

Fig. 10. Shri Jengwa Langching showing his old forge

Fig. 11. Anvil

Fig. 12. Tools

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Indigenous Craftsmanship of Terracotta Animal: An Ethnoarchaeological Approach

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Abstract

Craftsmanship is the quality, potential, and skill of a person that results from creating something with care, patience, attention, and passion. The craftsmanship remains important to the nation's cultural heritage and it contributes unique identities to its artists. Ancient India has a rich heritage of craftsmanship that goes back thousands of years. Different forms of handicrafts including stone, metal, weaving, textiles, and pottery making have been practiced by different communities in specific regions across the Indian subcontinent. Among various archaeological indigenous crafts, a large number of terracotta animal figurines have been found from multiple archaeological sites in Eastern India. An attempt in this direction has been made by the present author in the course of the study of the ancient craft of terracotta animals. It is necessary to document them from the beginning to acquire knowledge of how they are made as techniques mediated between man and craft. Archaeologists carry out ethnographic surveys in contemporary societies to interpret archaeological problems and to develop and refine analogies; therefore, ethnography is turned into one of the main methodologies of archaeological analogies. Interestingly terracotta animal manufacturing is still an ongoing tradition continues at the Birbhum district of West Bengal in India. So, the study of contemporary potters became imperative to comprehend the continuity of the tradition of making terracotta animals and provided us with ample scope to draw an analogy for better understanding the technology of archaeological terracotta animals. Detailed documentation and an ethnographic survey of the potters have been done to realise the different technological aspects. The final observation which is based on scrutiny of ethnographic as well as archaeological data is that many aspects of technologies have remained the same from the past to the contemporary.

Keywords: Birbhum, craftsmanship, ethnoarchaeology, technology, terracotta animal

Introduction

Indigenous craftsmanship around the world has preserved distinctive knowledge about their specific culture which is deeply rooted in their experience of nature. This specific knowledge is popularly known as indigenous knowledge. This knowledge deals with the simple, basic, practical, and relevant to the social and economic affordability, sustainability, and minimum risk for future generations.

Crafts refers to a wide range of activities that involve producing or altering objects both manually and with the help of mechanical instruments, whereas technology refers to a methodical understanding and application, typically of industrial processes, but also relevant to any repetitive activity. It also works with tools and strategies to fulfil a specific function with knowledge and ability, making it strongly tied to science and the environment.

India is well known for its rich traditions of craftsmanship, dynamic cultural heritage, and skilled workmanship. The nation has always been home to a wealth of talented craftspeople who have devoted their lives to producing captivating handicrafts and handmade goods. The artistic talent and rich legacy that have been passed down through the generations are demonstrated by these masterpieces. Terracotta making is one of the oldest Indian handicrafts as it has been found in several archaeological excavations from prehistory to the early medieval period of Indian history. Among various indigenous terracotta craft traditions, terracotta animal making is of particular importance, as it has been enjoying a wider acceptance by societies since the remote past. The apparent reasons for this growing popularity and appeal are the raw materials' easy availability, low cost, and clay's flexibility, making modelling with the hands and fingers possible without requiring multiple instruments. The fragile nature of the clay objects can easily be avoided, to a certain quantity, just by firing the specimens or drying them in the sunlight.

The recognition of the relevance of the ethnographic material to the study of the past society gave rise to a sub-discipline: ethnoarchaeology. It is a research methodology that aims at understanding the relationship of material culture with the culture as a whole both in living and archaeological contexts as well as improving the quality of archaeological interpretations and concepts. Archaeologists have carried out ethnographic surveys in indigenous societies to help answer the questions regarding the interpretations of the archaeological record and to develop and refine analogies: therefore ethnography was turned into one of the main sources of archaeological analogies.

The present work attempts to understand the technological aspects of terracotta animals from raw material collection to the final decoration. It will also aim to comprehend the regional and local differences in manufacturing techniques of terracotta animals. This has involved intensive ethnography in the villages under the study area of Birbhum district of West Bengal in India. Careful systematic documentation of the stages of manufacturing of terracotta animals has been carried out. Methods like interviews and participant observations, extensive photography were utilised extensively. The interview of

the potters was based on an exhaustive questionnaire, which covered, by and large, enquiries related to all major aspects of terracotta animal manufacture.

Study Area

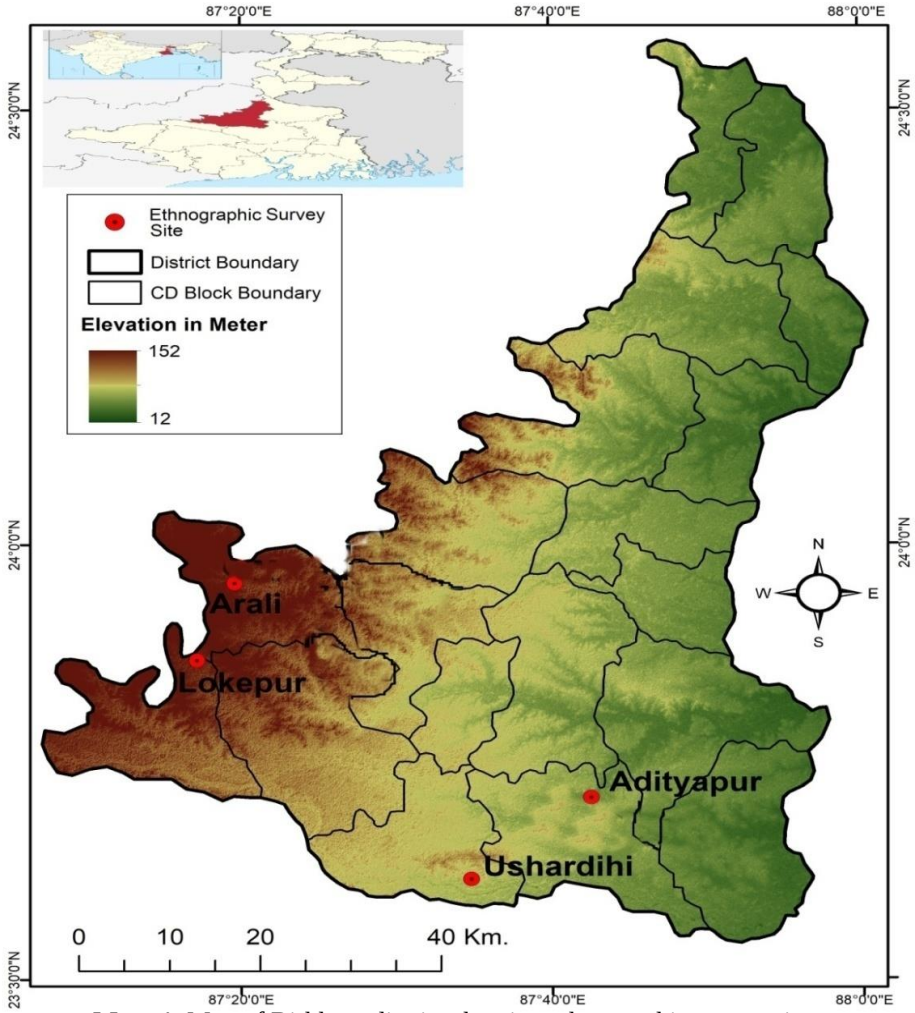
The terracotta animals have played an important role in the indigenous cultural tradition of Birbhum district. The villages that have been studied for ethnographic documentation are Adityapur, Arali, Lokepur and Ushardihi. Adityapur is a village coming under the Bolpur Sriniketan tehsil. River Kopai serves its northern boundary. Arali is located in Rajnagar tehsil in Suri Sadar subdivision. River Kushkarnika which is a tributary of Mayurakshi, flows near this village. Lokepur is situated in the Khoyrasol community development block in Suri Sadar subdivision. Shal is a nearby river. Ushardihi is located in Illambazar tehsil and river Ajay is close to this village.

While examining the ethnographic data thus collected, it was realised that many observations may provide important clues to the interpretations of baked clay figurines found at various archaeological sites. From the very beginning of civilization up to the contemporary day terracotta is the best exponent of popular life and mind of the contemporary society by supplying valuable data on the various aspects of society. The figurines of animals are one of the very popular themes of Indian terracotta art.

Archaeology of Terracotta Animal: A Brief Discussion

Archaeological evidence of terracotta animals shows a wide vogue of the craft in India, associated with almost all periods. From circa the seventh millennium B.C.E., the tradition of terracotta animal-making has survived until today. This section of historical background is intended to provide a brief understanding of the clay animal figurines of the Ganga-Yamuna Valley, specifically Bengal, through the ages.

The earliest example of a terracotta animal is of unbaked recovered from Mehrgarh period I, assigned by the excavators to the fifth millennia B.C.E, while the evidence of baked clay animals occurred for the first time at Mehrgarh in Period III (second half of the fifth millennium B.C.E) (Banerji 1994; Jayaswal & Krishna 1986). The decline of the Harappan civilization was followed by the emergence of regional copper-using cultures, based on an agrarian economy in the Indian sub-continent. The chalcolithic culture in India witnessed the emergence of various local cultures in the second millennium B.C.E. in the river valleys of Eastern India along with Bengal. Handmade horse and elephant figurines have been noted in these cultures.



Map. 1. Map of Birbhum district showing ethnographic survey sites

The important archaeological sites of the Ganga-Yamuna valley are-Bhita, Kaushambi, Mathura, Prahladpur, Rajghat, Buxar, Pataliputra, Sonpur, Hastinapur, Sravasti, and Ayodhya, Ahichchhatra (see Fig.1). On the other hand, Bengal is also surrounded and watered by a magnificent river system providing ample material to produce terracotta art. Several archaeological sites of Bengal have yielded an enormous corpus of terracotta animal objects belonging to different periods of history, ranging from the chalcolithic to the early historic and early medieval ages. The important archaeological sites of Bengal which contain terracotta animals are Bangarh, Baneswardanga, Chandraketugarh (see Fig. 2 & 3), Gobardhanupur, Harinarayanpur, Mangolkoat, Tamluk, Tilpi etc. Horse and elephant figures have been found in large numbers in the period after 600 B.C.E. The figures are solid and generally heavy (Banerji

Fig. 1. Hand-modeled and ill-fired clay Ahichchatra
(Courtesy Jayaswal & Krishna 1986)

Fig. 2. Hand-modeled and ill-fired clay Ahichchatra
(Courtesy Jayaswal & Krishna 1986)

Fig. 3. Tiger rider, Chandraketugarh
(Courtesy- Sengupta et al. 2007)

1994). It may be mentioned that during the 600-300 B.C.E. all the figures were made by hand. No evidence of the use of mould has so far been reported from sites belonging to this period (Prakash 1985). During the early NBPW (Northern

Black Polished Ware) cultural period, the treatment of figures with some kind of slip or wash became a common feature in the case of animals (Banerji 1994).

The period between 300 B.C.E. and 50 C.E. is of considerable importance for the development of terracotta animal art. It is interesting to note that the terracotta animal figurines unearthed from the PGW (Painted Grey Ware) levels and early NBP are fewer in number, whereas the number of animal figurines from the late NBP period is comparatively larger. The period from 50 C.E. to 300 C.E. under review was generally made of larger size than the preceding period (Prakash 1985). This period saw the emergence of a new technique i.e. use of double mould. White paint is also used on the body of the figure. The hand-modelled figures with moulded faces, the figures, and many toys made by double mould were obtained from different sites. The figures of horse, elephant, and animal rider figures were prepared with the help of double mould (Prakash 1985). During the period 300 C.E. to 600 C.E., the above-noted trends continued. No major changes were introduced during the period (Prakash 1985). The double-moulded figurines of riders on horseback and elephants are found in abundance. Later, the traditions of both mould and hand modelling continued (Jayaswal and Krishna 1986).

Archaeologists have much to gain from recognizing the data and philosophies preserved within indigenous traditional knowledge (Bruchac 2014). They are doing excavations in the indigenous locales to get an idea about the specific cultural system of the ancient era and it recovers many physical evidence of indigenous knowledge e.g. various manmade artefacts. This indigenous knowledge contains crucial information that can properly explain and contextualise these excavated artefacts. Proper studies of artefact objects, besides exposed artistic and technological attainments, can also indicate useful clues towards understanding indigenous knowledge in general.

Present-Day Terracotta Animal: A Brief Discussion

Present-day terracotta animal figures are used for various rituals in the present study area and are characterised by an abstract stylisation. One type of animal may be used in a variety of different ritual contexts. The villagers come with a portrait of these terracotta animals on the occasion of worshipping at the place of the presiding deity of the village of Bengal. They called them as *Chhalan*. These figurines are not gods; they are vehicles or symbols of gods.

Such figurines are made very quickly in rural Bengal by pressing soft clay with fingers. The perfect application of solid, sharp, and linear textures is found in them. The entire modelling technique is minimal with the absence of decoration and is executed most simply, to give a most archaic look to the

objects. The archaic sense of the animals results from the disproportion in representation of the different parts of the animals. As a result of the interactions between gradual pressure and the resistance of the clay, a distinct form emerges which is more abstract than representational (Santra 2011).

According to Santra (2011) in rural Bengal, these sculptures are produced relatively rapidly by pressing fingers into soft clay. They exhibit the ideal use of sharp, solid, and linear textures. The entire modelling process is done in a very basic way, with no ornamentation, to give the pieces an extremely antiquated appearance. The disparity in how the various animal parts are represented leads to the antiquated perception of the creatures. Ritual terracotta animal figures are widely distributed throughout the area of present study and are marked by significant regional variations in compositions and form, according to their votive or hierarchic function in the lives of the community. The simplistic versions of horse, elephant, and tiger one used as offerings to various sacred regional deities. These are also offered as tokens of thanks in Muslim *Pir than* (where god/goddess has lived). All terracotta animals are handmade and are in a motionless position or a few in running postures. The handmade technique is primarily an old technique which has been continued since time immemorial. Semi-cylindrical shapes are given to the body and legs through hands and are anatomically joined by hand pressing technique. The neck is shown prominently. With the help of the hand, the muzzle portion (in the case of a horse) is formed and the mouth is achieved through an incised line. The eyes are expressed through an incised technique or a circular lamp is fixed into an eyeball. The decoration on these figurines includes multiple incisions, pinholes, appliqué pellets, etc.

The most popular is a horse. The range of sizes varies from place to place. Most of the images of horses produced for offering to the deities are of solid shape and small size. The ears and tail are made separately and joined to the body. The smaller ones are not depicted with eyes and mouth. It has a short tail and two short ears. Sometimes eyes are attached with two appliqué dots. The archaic form is recognisable by a short neck and can be more related to a dog than to a horse (see Fig. 4). These were plain and undecorated. Sometimes the horse's neck is decked with ornamental designs, which look like a necklace or garland. The Adityapur's horses are so decorated with appliqué and incision designs. They are applied post-firing red colour and bearing polished surface. They are smaller in size. The proportion of the body and the various parts of the horses is beautifully maintained at Ushardihi village. The muzzle portion of the horses is beautifully depicted by a simple incision design or pinch hole with the help of pointed things. The only ornamental design that it carries is a series of

Fig. 4. The horse is looking like a dog, Arali

Fig. 5. Horse specimens, Ushardihi

dots around its neck. The long-size horse is made with the pipe in the base at Ushardihi. After the firing, they are coated with chemical red colour and features like various parts of the animal are highlighted with silver and golden colours (see Fig. 5). Simple white-pigmented specimens also have been found. Horse rider figures have been only found from Lokepur (see Fig. 6). The male rider is modelled by hand by pressing and pinching the clay.

Fig. 6. Horse rider, Lokepur

Fig. 7. Different elephant specimens
Arali & Lokepur

Fig. 8. Decorative elephant, Ushardihi

The rider is small, slim, and archaic in appearance. He sits rigidly on the animal's back and is depicted holding the animal's power with his hands. The hands are extended towards the animal's neck. No leg is depicted. He is wearing a crown and chain with a pendant designed by incision technique. This figurine is also devoid of painting or ornamentation besides being archaic in feeling.

The only difference between the horse and the elephant is the depiction of the trunk and ear. Elephants are all in standing postures. It is normal practice to make the trunk ears and tail separately and fix them to the bodies. In some places, the potters choose to make the trunk stretched upwards and at other places, it is pointed downwards. Then in, some elephants are seen to possess tusks, and some are without them. Either eyes are not depicted or otherwise depicted with simple hole and appliqué designs. The trunk is usually small, the legs flaring in cylindrical forms of uneven thickness. At times it may be difficult to recognise the true characteristic features of an elephant. But the entire modelling technique seems, to maximise the effect of minimal treatment (see Fig. 7). Though the potters of Ushardihi generally do not make this animal for decorative purposes, the researcher has been able to get one handmade specimen that is made for decorative purposes. The potter made it for his grandson. This animal can draw a clear difference from the ritual ones. This figurine is very artistic and realistic (see Fig. 8). The proportion of the body is perfectly maintained. The trunk is upwards. Two tusks, two big ears, and a long tail are skillfully depicted. The neck is decked with a pinch-hole design chain with a bell as a pendant. The eyes are expressed by a simple incision technique. The seated position is adorned with a simple dot design.

Among the three animals, the tiger is the poorest form of the category of figurines. The potters of Arali village make a very peculiar type of figurine

which is popularly known as *baghrai*, meaning tiger. The lower part of the figure has a resemblance to a horse and an elephant but the face and tail are different. The round face has two dots of soil in the upper part with one dot in the lower part, probably indicating two eyes and a mouth. The tail is joined with the head in a semicircular shape. They have short rigid legs. The entire body has no decoration. White pigmented tiger figurines have been used in various rituals at Arali (see Fig. 9). The Lokepur tiger's eyes and moustache are depicted by appliqué

Fig. 9. Decorative elephant, Ushardihi

Fig. 10. Decorative elephant, Ushardihi

designs (see Fig. 10). The body has no decorations. The mouth is open. There are no elaborately appliquéd bands, circlets or attempts at painted decoration on the tiger.

a) Communities: Manufacturers of Terracotta Animals

Different group castes have been associated with different craft activities as their profession since ancient times. The baking and modelling of clay though is a potter's workmanship, there are, however, quite a few exceptions to this general rule that have been found in the present study area.

Kumbhakar or kumor

In Bengali *'kumbha'* means pot and *'kara'* means maker. They are an important case-guild, that is engaged in manufacturing clay-made utensils, pots, and dolls (Manna 1993). They have synonyms like *kumar*, *kumbhakar*, *kumore* (Bajpai 2022). The work of manufacturing terracotta is monopolised by this caste where both sexes are engaged. The terracotta craft is continued by the *kumor* at Arali, Lokepur and Ushardihi. Generally, their title is Pal. Their living area is popularly known as *kumorpara.*

Karmakara

The term originated from the Sanskritic word *'karma'* from which the Bengali term *'kumar'* has come into existence (Manna 1993). The *karmakars* are traditionally blacksmiths or goldsmiths by trade. Leaving their parental profession or simultaneously with their parental profession some members of *karmakara* of Adityapur village have adopted clay modeling. It was recorded that; clay modelling craft is found more lucrative than their inherited occupation. It may be significant to notice, that, though these new craftsmen are successfully producing toys and decorative items, everybody has not taken up the task of making ritualistic forms. Just one to two of them are making ritualistic forms in a very meagre quantity. Most of the ritual terracotta animal figurines are coming from other places.

b) Communities: Users of Terracotta Animals

The custom of worshipping various village deities has a following in this area, irrespective of their socio-economic class and religious beliefs. There is no particular group of people adherent to a different folk deity or a religious sect belonging to a particular cult, but people of all categories, social orders and ethnic groups participated in the worship of the deities for specific purposes. Generally, this is associated with the people of the lower rungs of society like *Bauris* (cultivating, earth working and palanquin bearing) *Doms* (drummers, cultivating, and domestication of animals), *Hadis* (musician and agricultural labourer), *Bagdi* (palanquin bearers, fishing, and agricultural labourers), *Lodha* (agricultural labourers), *Mal* (cultivating caste), *Lohar* (metal fabrication), *Muchi* (leather dressing and cobbling) and so more. Even, makers like *Kumors* (potters), and *Karamakara* (metalworking) were also used in the present study area. The field survey reveals that this kind of celebration of the festival is not limited to only these classes but everybody including upper caste Brahmin, Kayasthas etc. also participates.

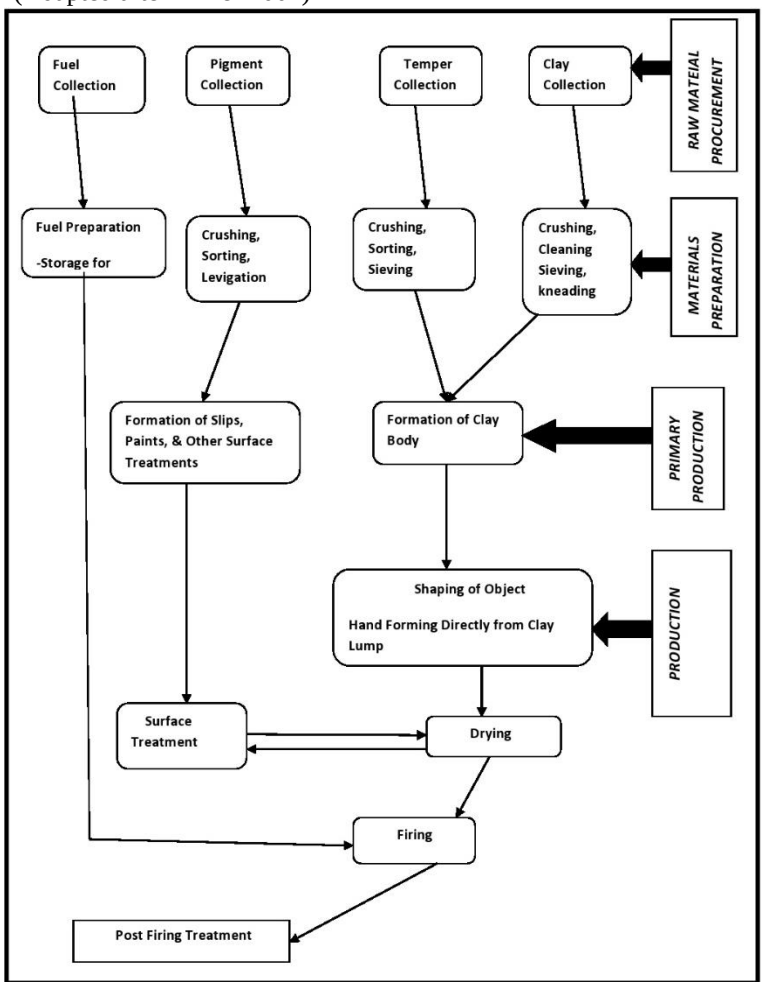
Manufacturing Techniques of Terracotta Animal

Technology mediates between man and artefact. The artefacts have been passed through various contexts and stages before deposition. The details of the manufacturing process of terracotta animals are also documented step by step in the present study area**.** One diagram is made for an easy understanding of the manufacturing process. The concept is taken from the *Archaeological Approaches to Technology* by Heather Margaret-Louis Miller (2007) with slight modifications according to convenience to the present study (Table 1). The general production of fired clay objects employs the following stages: -

1. Collection of clay, tempered materials, decorative pigments, and fuel.
2. Preliminary processing of clay (cleaning, soaking, sorting, kneading), preparation of temper, preparation of pigments.
3. Formation of clay body (mixing, kneading, maturing).
4. Shaping of clay objects, employing hand forming.
5. Drying of objects and surface treatments.
6. Firing of objects.
7. Further surface treatment i.e., post-firing paintings.

Table 1

Production Process Diagram for Terracotta Animal Figurines
(Adapted after Miller 2007)



a) Source of Raw Material

The availability of raw materials is a major concern for potters, and the supply of raw materials is often suggested as a method of control of production. Particularly well-sorted pockets of clay and sand, so that modern-day potters do identify preferred locations for the collection of clay (reflection of their knowledge of identification), but on the whole clay sources are quite abundant. The present ethnographic study makes it clear that clays and tempers are not just picked up randomly; they are consciously procured for reasons from particular places. These include the natural, chemical, and mineralogical variation in clay and temper sources, which are a result of local geology and topography; and a variety of factors related to procurement which reflects selection decisions made by the potters.

Clay is obtained from the river or canal and it is free of cost. Like Adityapur, the clay is collected from the Sonajhuri Khoai canal. In the case of Arali, it is obtained from the river Kushkarnika (see Fig. 11), the tributary of Mayurakshi. Potters of the Lokepur village collect their clay from the river Shal (local name of Kopai river) and potters of Ushardihi village collect their clay from a particular field known as Bil field. The potters always prefer river clay because this clay is a good combination of alluvial and sand which is perfectly suitable for manufacturing. In most cases, it is noticed that the clay source is about three to four kilometers away from the village. The figure is however made from the soil collected from the deeper section of the levee which is acquired by digging into it. The potters have their method of selecting good quality clays which also reflects their close associations with indigenous knowledge of their natural ecology. They have chosen the clays by observing their texture and colour. The *kumors* (potters) of a village obtain clay from the same field, pond, ditch, channel, or nearby river generation after generation. Selection of the suitable clay is very important for the durability and finishing of terracotta animals. For the firing, the firewood or dry grass, straw, coal, and cow dung are collected from the forest or the agricultural fields or sometimes from the market. The natural colour is obtained from the *banak mati* (the name of the clay) which is available in the borderland of the Jharkhand state. The clay used for terracotta making in Arali Lokepur and Ushardihi villages is locally known as *doansh mati* (loamy soil where soil and sand content are almost the same). In the case of Adityapur, they use *etel mati* (clay soil which is deep brown soil where the clay amount is stickier). The soil is sticky and clayey with considerably less sand content and more plasticity.

Fig. 11. The place of raw material from Kushakarnika River at Arali

Fuel is a major raw material required in quantity by all the high-temperature pyrotechnologies. The potter communities of Arali, Lokepur, and Adityapur used charcoal, straw, cow dung cakes, and wood for firing (see Fig. 12). These products are locally available on payment, whereas potters of Ushardihi villages only use dry leaves, locally available and free of cost (see Fig. 13).

Fig. 12. Wood for firing, Arali

Fig. 13. Dry leaves for firing, Ushardihi

b) Temper

Tempering materials are very important to make good quality terracotta objects. The potters use some tempering material to increase their longevity. Generally, they use sand as a tempering material. Sand is added and mixed with the soil in every village. The reason for using sand as a tempering material is that sand contains silica that prevents the products from cracking or bursting at the time of firing. These tempering materials generally do not require much processing before mixing with the clay.

Sand includes silica, which keeps the products from splitting or breaking during firing, so contemporary potters utilise it as a tempering material. Mica is

occasionally used by the potters in Lokepur to create glossy finishes. According to Mackay, Harappan clay modellers (mentioned in Jayaswal & Krishna 1986) employed a similar type of tempering substance. He emphasised that the same clay was used to make figures and ceramics throughout that time, and that sand, mica, and lime were combined with the well-levigated clay in both instances. The ethnographic investigation also noted that terracotta animal figurines and pottery were made with the same kneading clay.

c) Preparation of Clay

The preparation of clay is one of the most important stages in terracotta manufacturing technology. If the clay is not prepared well, then the figures will get destroyed during the time of firing. The potters have their workshop within their house. It is either in the backyard or in the front of the veranda or courtyard of the houses. The potters of Ushardihi store clay beside the pond because of the easy availability of water. After the clay is transported to the workshop, the preparation of the clay starts immediately.

The unprocessed clay which is brought from different sources must be processed and prepared for the actual manufacturing. Mixing, kneading, and cleaning are followed simultaneously. Firstly, the soil is cut into small pieces with the help of a spade. Clay is processed to the desired quality. A small quantity of sand is spread over the ground to avoid sticking, where the clay is to be kneaded after cutting. The amount of clay to be kneaded depends on the number of figurines. The proportion of sand and water varies from village to village according to the texture of the soil. In some cases, there is no measurement as such; water and sand are added as required. The preparation of clay is mostly done in the courtyard of the house or outside the house in an open space. The potter meticulously kneads the clay with his/her hand and feet so that if unwanted materials are detected they can be eliminated. When they knead this clay with the help of their hand, locally, it is called *sana* (see Fig. 14) and with the help of their feet is called *thasa* (see Fig. 15). The kneading process is locally called *mati pat kora*. The impurities are handpicked. Roots, ropes, grasses, pieces of bricks, and other impurities of the clay are taken out with the help of a thin sheet of iron rod (see Fig. 16). While kneading the clay with his/her foot the potters move his/her body in a circular motion. Thus, the potter kneads the clay several times. After that, the processed clay is just like a thin mat (see Fig. 17). The lumps of clay are then stored and covered with plastic sheets or gunny cloth to maintain dampness and moisture. The process of kneading and mixing clay is lengthy and it takes two hours or so to complete. Water is sprinkled from time to time in the required amount on it to maintain its softness.

Fig. 14. Kneading with hands, Lokepur

Fig. 15. Kneading with legs, Arali

Fig. 16. Removing impurities, Arali

Fig. 17. Processed clay, Ushardihi

d) Weather

Weather played a very important role in the making of terracotta figurines. Rain and wind, both have to be taken into consideration for the manufacturing stage. Usually, the potters collect their clay in the summer season and winter seasons as the bank of rivers and the canals are dry. They complete the clay collection before the coming of the rainy season. The clay is stored for a season (see Fig. 18). The dump of clay is covered by a polythene or jute bag to protect it from the weather and conditions to retain its plasticity.

Immediately after forming, the objects need to dry to a leather-hard state. This can be a lengthy process during wet and cold times of the year, which is one reason why terracotta making is often a seasonal activity. Firing as well as

drying of figures also becomes a problem during the rainy season. The climate inversely affects the process of drying the objects. Clay objects require shelter from both moisture and texture heat as they need caution because if the figurines are kept in very high sunlight, then it has a great chance of cracking (see Fig. 19). Drying of these figurines takes a week or more depending on the weather.

Fig. 18. Storage of clay in the courtyard, Arali

Fig. 19. Objects kept for drying in the Ushardihi

e) Forms

The most popular votive terracotta animal figurines like horse, tiger, and elephant, figurines are used in various festivals and are largely made by hand. Firstly, they make a basic structure of the animal by hand, then they fashion the clay to bring out four distinct legs of the animal (see Fig. 20). After that head is created by reapplying the extra amount of clay and lastly, they make the face. After that, the tail and trunk (in the case of an elephant) are made. Most of the figures do not depict eyes, ears etc. If they do so, they use nibs of the pen or small stick for depicting eyes, ears and so on. The whole process of creating the figure is done at one time, not separately (see Fig. 21). They are crude in appearance.

The previously described clay animal shapes from various stages found in different archaeological locations, along with specimens from present times, demonstrate that the method did not significantly change from the Harappan civilizations. From the Harappan era to the present, handmade animal miniatures have been seen throughout India (see Figs. 22 and 23). Based on an analysis of archaeological data from sites in Eastern Uttar Pradesh, Bihar, and Bengal it is helpful to note that the majority of animal terracottas from the past maintained their archaic appearance and that a sizable portion was still made without the use

of moulds even after moulds were invented to produce animal terracottas (Jayaswal & Krishna 1986). One of the discontinuous features of modern technology is the absence of mould-made terracotta animals. One of the discontinuous features of technology is the lack of mould-made terracotta animals in the current ethnographic survey, despite their widespread presence in archaeological discoveries (see Fig. 24).

Fig. 20. Basic structure, Arali

Fig. 21. Potter making a handmade figure, Arali

Fig. 22. Handmade horse, (Courtesy- Banerji 1994)

Fig. 23. Handmade horse, Arali

Fig. 24. Terracotta mould depicting two riders on an elephant, Chandraketugarh
(Courtesy- State Archaeological Museum, Kolkata)

f) Decoration

The clay objects can be incised or impressed with simple tools including complex grooved with fingers, combed in wavy lines, or incised with design patterns. But these terracotta animal figurines are mostly less decorated. It largely depends on the demand of the customer. Terracotta objects are decorated with the help of different tools like sticks, nibs of pen and comb. This is done just after the shaping of the objects when the clay remains soft. The animal figurines are simple though sometimes stylised with appliqué and pinch design. Generally, three types of designs have been found: -

a) appliqué design- this technique is used for attaching ornaments. Appliqué clay ribbon with a horizontal line is applied on the mouth and the base of the neck for decoration purposes, b) incision technique- this technique is also used for decoration purposes. On the figure incision or pinch are used for showing ear, eyes, hair and nostril and c) painting- it is done over slips or directly onto the clay surface while holding the object in the hand or while it is on a turning. Usually, painting is used for more highlight the ears, eyes, and designs that are made before firing.

During the ethnographic survey, it was also noted that the decorations and designs from the older era remained consistent. The other details of the clay creatures are indicated and decorated with the help of the appliqué, pinching, and incision designs. The ethnographic survey confirms that fewer tools are needed for the simple design. The Harappan culture is carried on in appliqué jewellery (Chakrabarti 2002). The appliqué style, which is consistently seen on all the figurines of the Ganga plain in early historical levels to signify various sorts of embellishments, or pierced holes or incisions, continued the pinching approach (Jayaswal and Krishna 1986). Therefore, in a way, the older style is still being employed to decorate these figurines; examples include incisions, punched circlets, appliqué, etc. (see Figs. 25, 26, 27, & 28). Additionally, some animal statues are devoid of any embellishments. The post-Harappan excavations at Rangpur have uncovered numerous horse sculptures, which are significant because they speak to the fact that the animal was already well-known to the local population. However, none of the figurines display any embellishments (Banerji 1994).

Fig. 25. Terracotta mould-made elephant with incised design, Ahichchatra (Jayaswal & Krishna 1986)

Fig. 26. Handmade terracotta elephant with incised design, Ushardihi

Fig. 27. Handmade horse with appliqué design on the mane, Rajghat, Kushan age (Jayaswal & Krishna 1986)

Fig. 28. Handmade horse with appliqué design on the mane, Arali

g) Repair

After terracotta animals are dried, their joints are checked to find out whether any cracks have appeared. If a figure cracks due to heavy sunlight before firing it can be repaired because after firing it cannot be done. For this, an extra amount of clay is mixed with water and applied to the cracked area, smoothening it well with the hand to conceal the crack.

h) Colouring Process

The potters of Bengal used to apply a variety of colours, produced in traditional methods, on their objects of art to make them look attractive. These colours were derived from natural and mineral resources and their production process was quite arduous. The minerals used for slips and pigments were sometimes the most difficult materials to acquire. Mainly two types of colouring techniques are used by the terracotta makers- 1) natural colour and 2) artificial colour. The first one is done before firing and the second, after firing.

Natural Colour

The potters of the study area generally use two types of colour clay to apply slip on the figurines. One coloured clay is popularly known as b*anak*. The name *banak* has been derived from the word *barnak*, which means anything to coat or smear with (Santra 2011). This clay is not available locally. They collect from the hillocks and forest area of the Jharkhand border. The potters of Lokpur and Arali have also collected this material from the place named Tilebad, situated near the Jharkhand state border.

The soil collected is first dried up thoroughly and then allowed to soak in water in a shallow hole or cistern for several days (see Fig. 29). When the soil is properly soaked, more water is added as per requirement. Once the clay, containing sand and gravel, gets settled at the bottom, the fluid portion is taken out from the top in small earthen pots and allowed to dry in the sun, when the fluid collected in the earthen pots dries up, the sediment left at the bottom is taken out and it is which serves as the *banak* colour. The clayey matter is kept soaked in water for about a week before it is taken out, dried, and mingled with the requisite quantity of water (see Fig. 30). The artisans mixed the *banak* with water as required for preparing the slip, which they then apply on the figurines with brushes or cloth. Great care is taken about the source of water used for mixing the *banak*. The water should be clean (Santra 2011).

Another colour popularly is known as *lal mati* or *ela mati*. It is usually available in the local market. After collecting the clay, they remove the unwanted impurities. Then they grind this clay with the help of a stone slab flat mortar. Then they mix water with these and filter by boiling with the water. The weight of clay becomes lessened from 10 kilos to 2 kilos. After that, the clay looks like a disc which becomes a perfect colour after adding water. The potters of Ushardihi used this Lal mati with a mixture of *khoyer* (catechu). With the help of cotton cloth, they apply this colour to the figurines (see Fig. 31). Two coats of colour have been applied. Ela mati gives a reddish-orange colour. On a few occasions, no colour is given; objects are directly burnt to get reddish brown.

Fig. 29. The *banak* clay used for colour, Lokepur

Fig. 30. The processed *banak* clay, Lokepur

Fig. 31. Potter is applying the colour of red clay with *khoyer*, Ushardihi

Artificial Colour

Nowadays, post-firing colour is used to make the figures more attractive and colourful. These colours are not handmade but collected from the local market. Several colours like blue, red, green, and yellow are used according to the demand of the customer (see Fig. 32). Kharimati (kaolin) is used for the white colour. The most common colours they use are different shades of red, yellow, and brown. The chemical red colour is used for painting purposes. The potters of Ushardihi and Adityapur use red chemical colours after firing which gives a glossy finish (see Fig. 33). Gold and silver colours are also used for highlighting. Most of the terracotta animals bearing red or white or simple terracotta colour

Fig. 32. Various chemical colours, Arali

Fig. 33. Red chemical-coloured horse, Adityapur (Courtesy- Nepal Ghosh)

has been found in the present study area. The white colour comes from kaolin and the red colour from *banak* clay or *lal mati*. Elgood (1999) thinks some figurines are painted white after firing to reinforce their ghostly qualities.

Ethnographic field studies have noted that kaolin and the red colour are primarily used to colour terracotta animals, because of this practical association kaolin has a potential symbolic meaning of purity; blood and red are of great importance in magical rituals. Mackay mentioned that most of the Mohenjo-daro terracottas were painted with red paint or wash (Jayaswal and Krishna, 1986). A significant number of Kushana period terracottas appear to have been coloured with a variety of pigments, with red ochre clay (hematite, a clay containing iron oxide) being common, and white and black also common. To obtain white pigment, calcium carbonate known as *khadi* or *khariya* was used (Mukherjee 2008). During the later period of NBPW in the northern Ganges valley, red

terracotta animals were generally more numerous than grey and black faunas (Jayaswal and Krishna 1986).

Firing Technique

The next step is to load the figurines into the firing structures. The placement of artefacts in the firing structure is an extremely important stage of the process, as incorrect placement can result in poor firing, marring of surfaces, or even the destruction of the products. The Bengali *kumors* call their kiln *shaal* or *bhanti.* Firing is done in closed kilns. There are two types of kilns –a) circular kiln and b) rectangular or square kiln. However, only a vertical kiln is seen in the circular study areas. Only one square kiln has been found in Arali village. Kilns are covered with roofs. Generally, kilns have been arranged at the corner side of their houses. Every potter has a kiln.

The most important feature in a circular kiln firing is that here the flames go up straight through the perforation in a vertical direction and then circle and diffuse into the pile. In the process of oxidation, the vessels are baked well. It is observed that the potters always refer to circular kilns because the fires can emanate vertically upwards and can contain large amounts of vessels. The size of the kiln varies from village to village, even from potter to potter. A kiln has two parts – a fuel chamber for supplying fuel and a hearth on which the pots are arranged. A platform is made of vertically and horizontally bamboo sticks plastered with clay, sand, and rice husk. The structure of the platform is such that it gives enough space between the hearth and the platform. The cakes of cow dung are arranged in a circular orientation along the circular sides of the kiln and it becomes less quantity in the middle portion of the kiln. The coal and dry straws are given between each layer to provide buffer and aid to the fire is also used step by step. The layer depends on the number of objects used for firing. Then the terracotta objects are placed inside the kiln with the various other pots and vessels along with pieces of broken pottery. The terracotta objects are placed even inside of the big pot. The fuel, such as wood pieces and cow dung cakes are arranged simultaneously along with the pots. When all the pots are arranged in the pile, several broken pots are kept. Cow dung cakes are also put between all the broken pots arranged at the periphery. On the upper part of the arrangements, a layer of broken pots is given which gives support to the outer layer of the kiln. On the top of the broken pots, a layer of straw is given and then it is plastered with mud and clay to cover the whole kiln. The clay has medium thickness. It then looks like a mud dome. This dome is provided with perforation. These

perforations allow the hot gases to escape. Smaller holes are made on the surface of the dome to provide passage to the smoke inside the kiln. The colour of the terracotta objects depend on the conditions of firing. If the colour of the firing becomes red then this gives the perfect terracotta colour of the objects. The red colour fuel flames are noticed from the perforation. The fire is built below the platform with cakes of cow dung, dipped with kerosene oil. Then the potter gets some burning charcoal pieces. The fire slowly catches the fuel inside and starts burning. A square big mouth is created for the supply of fuels. The fuels used for firing the terracotta objects consist of straw, bamboo, cow dung cakes, wood, sticks, dry leaves etc. and are inserted through the mouth of the fuel chamber. A bamboo stick is used to insert the fuel into the hearth. The temperature is then gradually increased to a peak, where it would be held to allow penetration of heat into the products. This might happen in several stages until the maximum desired temperature is reached. Temperature decisions are usually made based on the colour of the objects, as the clays glow with particular colours which a potter learns by experience. The firing structure is then even more gradually cooled. The potters can understand the progress of firing. After some time, they stop giving extra fuel. The whole process takes 12 hours. After 3-6 hours of firing, it takes time to become cool by itself or with the help of the fan. It is left untouched till that. The size of the kiln ranges from 6 to 10 ft. (see Fig. 34)

The formation of certain habits and practices persists due to their ability to fulfil specific needs and offer particular advantages. Ethnographic fieldwork has revealed a preference for using circular kilns to fire terracotta objects (see Fig. 35). Two instances of kilns have been identified in archaeological contexts. J.F. Jarrige reported the discovery of a round potter's kiln with a layer of pebbles at its base beneath period VII at Mehrgarh (Jayaswal and Krishna 1986). Agrawal (1984) also noted the unearthing of a remarkable and unique pottery kiln at Inamgaon from the Jorwe culture (see Fig. 36). This kiln, built on stone foundations, resembles a large trough of clay approximately 1.7 m in diameter. Oval clay cushions with a hole in the centre and grooves on the side were placed over the fire chamber at a depth of 60 cm to provide outlets for the hot gases. Air ducts radiated from the centre of the kiln.

Fig. 34. The whole process of firing technique, Ushardihi

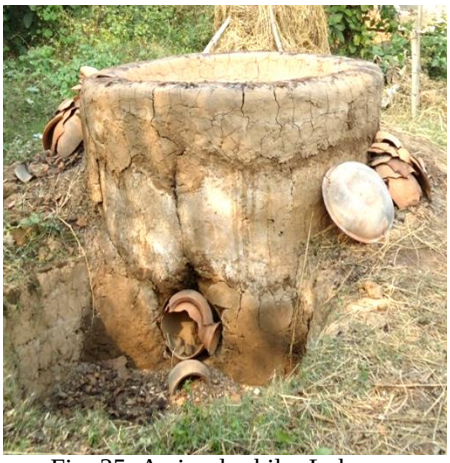


Fig. 35. A circular kiln, Lokepur

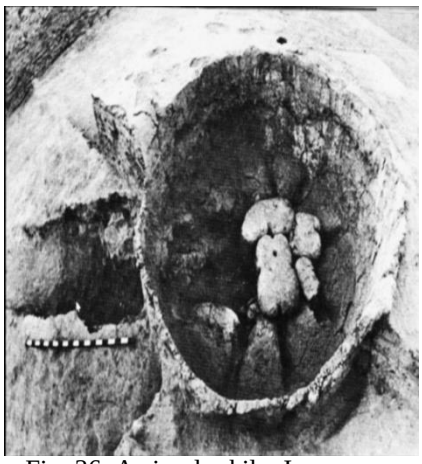


Fig. 36. A circular kiln, Inamgaon, Jorwe Culture
(Courtesy- Dhavalikar 1997)

Sacred Relationship between Technique and Nature

Material and spiritual worlds are woven together in one complex web, all living things imbued with a sacred meaning. Traditional ecological knowledge can inform everyday and ritual activities, in public and private venues (Bruchac 2014).

There are some taboos when the potters stop their work and do not touch the soil. This varies from village to village. Such as-

i) In the Bengali month *baisakh* (april-may), potters stopped their work. This period is marked by the holy time of *baisakh* (april-may) when the potter's wheel is stopped as it is believed by the potters of the present study area that during this time Lord Shiva appears from the wheel. Many others justify it with a scientific reason that terrible heat exhausts the potters easily and develops cracks in the pottery items. The reason is that during this month the potters prefer to collect source materials because, during the rainy season, it is difficult to do.

ii) During the time of Vishwakarma puja, the potters stop pottery making. The wheel is the main component of their profession. They celebrate the *Chaka* (wheel) festivals during this time.

iii) At the time of the Durga puja festival, the potters don't engage in work because it is the main festival of the Bengali people. According

to potters' belief, the *baisakh* (april-may) month is dedicated to lord *Shiva*, whereas Durga puja is dedicated to Lord Durga.

iv) Most of the potters stop working during their worship of a main ancestral deity. It varies from village to village. Arali potters do not engage in pottery making during the three days of the month of *chaitra* (march-april) because they are busy with the celebration of their main deity *Maa* Manasa. During this time, they obey the *nunpala* ritual. The Bengali term for salt is *nun*. A particular one day of *chaitra* (march-april) month is considered as *nunpala*. This ritual is closely associated with Manasa *puja* during one Monday or Friday of *chaitra* month. On that day the villagers of Birbhum eat vegetarian food without giving salt, turmeric, and oil (Mitra 1957; Chattapadhyay 2018). Lokepur potters celebrated their Manasa puja during the *shravana* month (july-august). They also do not touch soil on the day of *chaitra samkranti* (march-april), the last day of the year of the Bengali calendar. They celebrated *hompuja* (worship with *yajna*). It is dedicated to Lord Shiva.

v) The earth is herself a goddess. The potters take the clay to make the figure bow reverently and touch his forehead to the ground before digging. The earth is also a source of their livelihood. The earth fosters them like children. In Bengal, it is believed that, at the first fall of the rains, Mother Earth menstruates to prepare herself for her fertilising work. During this menstrual period, there is an entire cessation of all ploughing, sowing, and other farm work. This ritual is known as *Ambuvachi* which is observed in Bengal on and from the seventh day of the third month of the Hindu calendar (Bhattacharyya 2005).

The Purpose of Making

The actual purpose of making this figure is not known to the potters. The long-established practice of placing the terracotta horses, elephants, and tigers as offerings of devotion before the deities and worshipping them as a symbol of deities has inspired the potter's community to continue the production of terracotta animal figurines. They are continuing this tradition which they learned from their earlier generations. The demand is still available and these figures are used for so many regional festivals in the present study area. Some terracotta

animal figurines have been also used as toys for children. The children of the potter family as well as others also use them as play objects. The making of terracotta figurines can be noticed by the one fact is that the maximum potters of Ushardihi village are part time workers. They engage in this work for only three months *kartika* (october-november), *agrahayana* (november-december) and *paus* (december-january) because of the demand for these terracotta figurines in various regional festivals after *paus* (december-january) month. In other seasons, they are working in another economic sector.

Dying Craft and Modern Dreams

The hopeless situations of this traditional craft emerged after the field survey where it has been noticed that the present potters are the last generation who continue this work. The future generations do not want to engage in this profession. Terracotta making is a laborious job with relatively low income and hence the younger generation is on the lookout for other professions which are economically more remunerative and relatively less laborious.

Observations

Studying the methods of manufacturing terracotta animals is crucial for comprehending the archaeological significance of animals in ancient societies. Additionally, it allows for an insight into the depth of local knowledge within a specific community and evaluating the effects of traditions and external influences on that particular group of people.

After examining the ethnographic and archaeological data, it is evident that many technological aspects have remained consistent from the past to the present day. It would be erroneous to consider indigenous knowledge as outdated, regressive, unchanging, or static. Traditions in craftsmanship may have evolved, with certain techniques or elements being adjusted or abandoned for various reasons, such as the need for mass production, improved efficiency, or overcoming material limitations. The use of electrical machines for clay work, as described by the Karmakara artisans of Adityapur village, has simplified the process of removing unwanted material from the clay. This has led to a shift from manual to mechanical techniques, resulting in the same outcome being achieved in a shorter timeframe.

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Ethnoarchaeology of Traditional Cast and Wrought Metal Technology of Bell Metal Craft Practised in Village Pukhuria of Bankura District, West Bengal, India

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Abstract

The tradition of brass and bell metalwork persists in different parts of eastern India. Rarh Bengal is one of the most important traditional brass and bell-metal crafts regions. These are non-industrial modes of technology and production, which are practised by several hereditary groups. As example Kangsbanik, Karmakar, Kansari and Dhokra Kamar etc. Pukhuria (22.9351°N, 86.9662°E) is one important traditional cast and wrought metal technology centre of brass of Bankura district as well as Rarh Bengal, West Bengal, India. The artisans of Pukhuria village are specialized in making different sizes of bell metal bowls and follow cast and wrought metal techniques. These are locally known as Jam Bati, Ci Bati, Sada Bati etc. They followed the cast and wrought metal techniques for making these crafts. They are familiar with bell metal or kansa (Bronze) (an alloy of copper and tin) for making the jobs. The author used to make the direct observation method here. In this paper, an attempt has been made to discuss the technological aspect of contemporary brass and bell metal work, which is practised by artisans of Pukhuria, Bankura district. It may also highlight the sources of raw materials, different tools, processing, finishing of objects etc.

Keywords: bowl, finishing, processing, raw material, traditional technology

Introduction

Ethnoarchaeology is the study of living culture. It is making the relationships between human behaviour and its archaeological consequences in the present. This study is mainly dependent on present ethnographic data and past archaeological data. The tradition of brass and bell metalwork persists in different parts of eastern India (Chattopadhyay and Sengupta 2011). The tradition of brass and bell metalwork persists in different parts of eastern India. The history of brass and bell metal craft is very glorious. Harappan bronze dancing girl is the first instance of fine metal craft in the Indian subcontinent. In the fifth century, CE, the Chinese traveller Fa-hien visited Bengal and noticed many brass and bell metal musical instruments and called the country- the land of music and dance. Ethnoarchaeology is the study of living culture. It helps to reconstruct history, society, and culture. It is making the relationships between human behaviour and its archaeological consequences in the present

(Chattopadhyay 2005). This study is mainly dependent on present ethnographic data and past archaeological data. The tradition of brass and bell metalwork persists in different parts of eastern India.

Copper is perhaps the first metal discovered by human beings. It changed the civilization. From metallographic and chemical observation, it is not always possible to identify the manufacturing technology of any protohistoric metal object. Because of corrosion, natural decay and paucity of enough materials, the remnants of evidence of the manufacturing technology become impossible to evaluate properly. The only alternative is to search seriously whether the manufacturing techniques are continuing in the present or not (Chattopadhyay 2006). Eminent archaeologist, Thompson opined that while studying a particular craft from the archaeological point of view, the entire culture with full context ought to be observed to draw any archaeological inference (Thompson 1991). In eastern India, bronze technology was first introduced in the last phase of the Chalcolithic period. So far, the basic elements known to the people are copper, gold, iron, lead, silver, tin, zinc etc. Before the advent of the concept of the element, unknowingly they had the practical idea about it and alloying with little tin is also noted in eastern India from the very beginning of human habitation that is between the Chalcolithic to Iron ages. The evidence of the use of pure metal has so far been discovered in Dhuliapur, Kushadwip, Narhan and Agiabir only. Agiabir is the only reported site about the high-tin bronze dating back to the 5th century BC (Singh and Chattopadhyay 2001-2002). In Eastern India, the natural resources of minerals and woods are very helpful to begin with the metallurgy. The ancient mining or smelting activities have been noticed in several places in Bihar, Jharkhand, and West Bengal. Copper extraction in Singhbum, iron smelting near Birbhum and gold searching on the banks of Subarnarekha have continued for several thousands of years. (Biswas and Biswas 1996).

From the beginning of civilization in Eastern India one may notice that the entire society was based on centering the village. At that time two artisan activities blacksmiths and goldsmiths are most important (Chattopadhyay 2006). Often, they used to make copper ornaments and plates. In the beginning, mainly copper was used as ornaments. The copper fishhooks were reported from a few sites in Eastern India, like Taradih (24º30′37.7″N and 84º43′02.6″E) of Bihar state. Needles were discovered from Mangalkot (23º31′36.8292″N and 87º53′58.3908″E) of West Bengal state and Taradih. Utensils were reported from Khairadih and other sites. In the ancient period, the discovery of many copper plates directly reflects that the copper smithy employed many artisans from India as well as Bengal and Orissa. The Nagari copper plate of Anangabhimadeva III refers to the term *tāmrākaras* (coppersmiths) who were the makers of the copper

plate (Epigraphic Indica, Vol. XXVIII: 235-58). Apart from the archaeological records much has been known about the metals and metallurgy of eastern India from the classical texts (*Silparatna, Manasara, Manasollasa*) (Chattopadhyay 2005).

Archaeological Sites Related to Metal Crafts in Bengal

The Archaeological Department of States (W.B), Archaeological Survey of India and the history and archaeology departments of various universities have excavated many sites in eastern India. All the excavated remains and finding objects reports have been published in Indian Archaeology-A Review (I.A.R.) and other journals. In eastern India, many archaeological sites were excavated and many metallurgical objects including copper and bronze objects were reported right from chalcolithic to medieval period. Most of the archaeological remains are preserved in different state museums and Indian museums. A brief report is as follows:

Most important excavated Archaeological sites of Rarh Bengal as well as West Bengal, which yielded metallic objects including copper and bronze artefacts, are known from Bahiri, Baneswardanga, Bangarh, Bharatpur, Dhuliapur, Dihar, Hatikra, Jagjibanpur, Kankrajhor, Laljal, Mahisdal, Mangalkot, Pakhanna, Pandurrajar Dhibi and Tamluk, Chandraketugarh etc. many metallurgical objects were reported right from the chalcolithic to the medieval period.

Copper and its Alloys

Chalcolithic people of Eastern India knowingly or unknowingly used ores and prepared bronze or brass alloys. The copper ore was mixed with the ores of tin as cassiterite, zinc as sphalerite or lead as galena. The brass or *pital* is the alloy of copper with zinc. The brass bangle, reported from the Kanjipani area of Keonjhor District (21º30′ N, 83º28′ E) in Orissa is the earliest evidence of brass in eastern India (Chattopadhyay 2006). Bronze or *kansa* is an alloy of copper with tin. It is also known as bell metal since it is the common alloy to make bells throughout Asia. According to the tin contents, bronze or bell metal is classified into three categories. In the first category, the percentage of tin is less than ten. Metallurgists call it ‘alpha bronze.’ In the second category, the percentage of tin is around 10 to 20. It is called beta bronze. In the third category, tin is above 20 per cent. It is called high tin-bronze. High tin-bronze is the most popular among the other two categories and is golden in colour and mostly used for making household utensils. *Bharan* is an alloy of copper, tin, and zinc. It is lower bronze or *kansa* and reddish. The technique of manufacture of this alloy is not shared

with someone, because the artisans maintain their trade secret (Chattopadhyay 2006).

From the early 20th century in eastern India, relatively a new alloy was used by the artisans for metal crafts named german silver. This alloy is a combination of nickel, zinc, and lead with copper. In Rarh Bengal, the artisans of Bishnupur and Patrasayer of Bankura district and Bali Dewanganj, Kolagachiya and Manikpat of Hooghly district are used to make pitchers from this alloy.

Area of Study

Village Pukhuria (22.9351° N, 86.9662°E) is the most important bell metal sub-cluster of Bankura district as well as *Rarh* Bengal, West Bengal, India. It is a small village in Bikrampur Gram Panchayat, Bankura district. The village is situated on the right bank of river Shilabati and Simlapal sub-division of Bankura district. It is located 15.5 km away from the sub-district headquarters in Simlapal and 65 km away from the district headquarters in Bankura. The artisans of Pukhuria used to make different sizes of bell metal bowls (locally known as *jam bati, ci bati, sada bati* etc) and followed casting and hammering technology. The artisans of Pukhuria at first followed the casting technique. They melted the raw metals (copper and tin) and cast them in a mould for bell-metal ingot.

Literature Review

The major publications and studies on this line are scanty in number. To understand the ancient crafts, technology and their implications on human cultures, an ethnographic study and survey were conducted among the present-day *Kansaris* and *Karmakar* of Rarh Bengal (especially among the artisans of Burdwan, Birbhum, Hooghly and Bankura districts). The serious academic research works, monographs about brass and bell metal technology in eastern India as well as Rarh Bengal was done by Barapanda (2002), Basu (2002), Chattopadhyayand Sengupta (2011), Chattopadhyay (2005), Mukherjee (1978), Roy Choudhury (1998), Santra (1998) and Mondal (2017). All those scholars have thrown light on the different aspects of traditional brass and bell metal crafts of this part of the continent.

Objectives

The objective of this paper is to understand the casting and hammering technology of bell metal craft in Rarh Bengal as well as in West Bengal, eastern India. We have very little idea of the manufacturing techniques of brass and bell metal images, household utensils and religious utensils of ancient to modern India. So, an in-depth study of technology of making, shaping, and finishing the objects of everyday use household utensils is to be also highlighted through the

ethnoarchaeological route. An ethnographic study among the present Karmakar groups, who are still producing these objects will be conducted. Raw materials, fuel, different equipment etc are also taken into account.

For the present study field survey, direct observation and interview methodology were followed. Observation, interview, and case study methods have been used for the collection of data from the field. Melting the raw metal, making the process of ingot, process of shaping the objects and finishing, all are studied by direct observation method. For the present study data have been collected in interviews with the artisans. Different tools for this craft are also studied in detail by direct observation method. I used to make a three-day field survey of these crafts villages on 27/03/2022, 13/04/2022 and 25/04/2022. The making process was observed step by step from start to finish and interviewed with artisans. Occupational and technological changes were also considered.

Ethnographic Observation at Pukhuria Village

An old artisan named Sunil Karmakar (see Fig. 1) aged 62 years has said that the village Pukhuria is an important traditional bell metal craft centre and its bowl has special characteristics for its making technique, shape, and design. Once upon a time, it had great demand all over Bengal, Bihar, and Orissa, especially among the tribal community.

At present whole villagers practise this traditional bell-metal craft and there are more than 100 production units (*sal*). We can analyse the ethnographic study of this traditional bell metal craft under the following points.

Fig. 1. Sunil Karmakar, an old artisan, Pukhuria, Dated 27/03/2022

A. Raw Materials

In the village of Pukhuria, different sizes of bowls are made from bell metal ingots. The primary raw material for this craft is copper and tin. The artisans melted the copper and tin in a crucible. Generally, the ratio is 7:2 that is seven parts of copper and two parts of tin are melted. The secondary raw materials required for these crafts are heating, melting, hammering, polishing materials and fuel and salt. Used engine oil is used during casting and hammering. Another important raw material necessary for the craft is red clay, which is used to make moulds.

B. Equipment

A variety of tools and equipment are used by the artisans of Pukhuria village for these traditional crafts. Except for modern electronic scraping mechanics, all these tools are indigenous and traditional. Each tool has a specific function, such as casting, hammering, scraping polishing etc.

I. Hammer (*humbar*)

The hammer is the main tool of these traditional bell metal works. The artisans generally used here four types of hammers and each hammer has a different function and name. A hammer with a square rounded head, comparatively weighty is known as a *hatora* (see Fig. 2). It is 6 inches long, both sides square and round-headed fixed to 12 inches to 14 inches wooden shaft. The diameter of the square working area is 1 to 1.5 inches. At first, the artisans heated the bun shaped metal on *garander sal* (furnace) and hammered it on an iron anvil by tapering a headed square hummer named *hatora* (see Fig. 3). A round one-headed hammer, the local name *shamuli haturi* (See Fig. 4) is used. It is 5 to 6 inches in length and 1 inch in width. The length of the wooden shaft is 10 to 12 inches. It is also known as *kana thasa haturi* or *khala haturi* (see Fig. 5). Another iron hammer, named *manna haturi* (see Fig. 6) used for concave areas and during finishing bowl. It is a rounded and tapering head measuring 4 inches to 6 inches in length with .5 inches in width. The length of the wooden shaft is 8 to 10 inches. A wooden mallet or hammer of round-headed is used for this craft. The local name of these wooden hammers is *mugure*. These types of hammers are used for the rising of flat surfaces. Generally, a wooden mallet is 10 to 12 inches in length and 8 to 10 inches in diameter. The length of the wooden shaft is 10 to 12 inches (see Fig. 7).

Fig. 2. *Hatora*

Fig. 3. Use of *hatora*

Fig. 4. *Shamuli haturi*

Fig. 5. Use of *Shamuli haturi*

Fig. 6. *Manna haturi*

Fig. 7. Wooden hammer

II. Pincers *(Sharasi)*

A pair of pincers are used for holding the bun shaped raw metal or bowl during heating and hammering. The size varies from 12 to 18 inches in length. Small pincers are also used during levelling the bowl on a stone slab 8 to 12 inches in length (see Fig. 8).

III. Anvil (*Lay*)

Iron anvil is used for hammering and is called *lay* in the local language. It is a flat and circular face and is inserted into the ground through a wooden block. At first, shaping is done on this anvil by alternative hammering method. Anvils are 12 inches high and 6 inches in diameter (see Fig. 9).

IV. Hollow stone

One circular face middle concave hollow stone piece is set up near the *garandar sal* for hammering and making the proper shape of the bowl (see Figs. 10, 11).

V. Blower and fan

A modern hand-operated blower machine (see Fig. 12) is used for fanning the furnace, especially *garan sal*. It works to increase the heat. Modern electric (13) fan is used to increase the heat mainly *galan sal* (furnace).

VI. Iron pan

Pan is made of iron and is locally called *tawa*. It is 16 to 18 inches long fixed with bamboo handles and used for pushing down the ash and pouring the fuel to the furnace during work (see Fig. 14).

VII. Iron stick

Two types of iron sticks with bamboo handles are used here. One is large with 5 feet long used for pushing down the furnace. It is locally called *koch*. Other is small with 2 feet long used for turnover of the heated bowl and coal. Its working end is slightly bent (see Fig. 15).

VIII. Ladle

Big ladle is used during casting of molten metal. It is used for pouring the molten metal on earthen dish. (see Fig. 16).

IX. Crucible

Crucible is used for molten the raw metal copper and tin (*rang*). It is like a container made of China clay (see Fig. 17). The size of the crucible varies in height from 12 inches to 18 inches and from 6 inches to 9 inches in diameter. Thickness is consistently 1 inch. An earthen lid is used to cover the crucible during firing. It also can preserve the heat created within the crucible.

X. Water tub

One water tub or bucket is kept near a suitable position so that the head artisans can easily use the water as necessary. Generally, water is used for tempering the product during heating and hammering (see Fig. 18).

XI. Wooden plank and tin farm

A wooden plank 2-3 feet long and 1 foot wide is used to protect against the heat during working. A square tin farm is also used during hammering (see Fig. 19).

Fig. 8. Used of pincers

Fig. 9. Anvil

Fig. 10. Stone piece

Fig. 11. Work on the stone piece

Fig. 12. Hand-operated blower

Fig. 13. Modern electronic fan

Fig. 14. Use of pan

Fig. 15. Iron Stick

Fig. 16. Use of ladle

Fig. 17. Crucible

Fig. 18. Water tub

Fig. 19. Wooden plank and tin farm

XII. Iron slab

A circle iron slab is used to label the bowl when necessary (see Fig. 20).

XIII. Lathe

Two types of lathes are used here for scraping the bowl. One is a modern electronic operated machine (see Fig. 21) and the other is a leg-operated machine (see Fig. 22). Modern scraping machine is operated by an electronic motor and the other is operated by both legs of a person and one person is scraping the jobs.

XIV. Iron farm

Mostly square but something curved iron farm is used for this craft (see Fig. 23). It is used for supporting the iron scraper at the time of scraping. Some scraped centres are used in square iron farms (see Fig. 24).

XV. Iron scraper (*Noalis*)

Different sizes of iron scraper are used for scraping various size bowels. The sizes of various iron scrapers are from 1.5 feet to 2 feet and all are with wooden handles (see Figs. 25, 26). The working end is slightly bent. Artisans are called *noalis*.

XVI. Iron files (*Ret*)

Square-shaped iron files of different sizes are used for rubbing the edges of the bowls (see Fig. 27). The size ranges from 1 foot to 1.5 feet with a shaft

measuring 4th inches to 6th inches. The width of the files ranges from .5 inch to 1 inch. Width iron files are also used for scraping the bottom portion of the bowl (see Fig. 28). Both have wooden handles.

Fig. 20. Iron slab

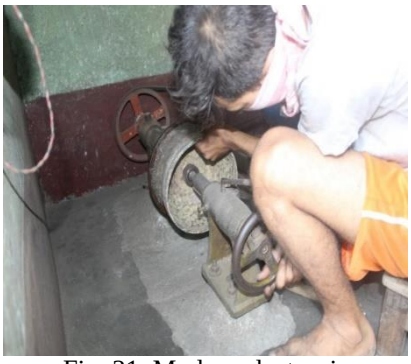

Fig. 21. Modern electronic scraping machine

Fig. 22. Leg-operated lathe

Fig. 23. Iron farm

Fig. 24. Use of iron farm

Fig. 25. Iron scraper

Fig. 26. Use of iron scraper

Fig. 27. Rubbing the bowl edge

Fig. 28. Scraping

C. Furnace (*sal*)

Two types of furnaces are used in the village of Pukhuria for this traditional crafting. One furnace, the name is *hawaya sal* or *galan sal.* It is a common-shaped furnace used all over Rarh Bengal and made of bricks and clay partly underground and partly raised above the ground. It is round 25 to 30 inches in diameter and raises about 12 to 16 inches above the floor level (see Fig. 29). A round about 10 by 12 inches diameter air duct is connecting with underground portion of the furnace for fanning. Casting is done on this furnace. Another furnace is called *garan sal* (see Fig. 30). It has a special character in the form of shape. The oven is a circular underground projection and is placed in the middle of the furnace. Its shape is round and cylindrical and its height varies 5 feet to 10 feet from the ground label. One round or square hole is there on one side of the furnace for work. A hand-operated blower machine is set up left side of this hole for fanning. Bun shaped metal ingot (local name *ruya*) and alternative heating and hammering of the bowl are done on this furnace.

D. Mould (*Chhanch*)

Red soil mixed with paddy husk is used for making the mould of ingot and is used permanently. Different sizes moulds are made and used various sizes moulds for making different size's ingots used to make different sizes bowls (see Fig. 31). These are round and look like flat bowls. Metal ingots are round and look like bun shaped (see Fig. 32).

Fig. 29. *Hawaya* or *Galan Sal*

Fig. 30. *Garan Sal*

Fig. 31. Earthen moulds

Fig. 32. Bun shape bronze metal ingot

E. Workshop

Workshops are generally situated far distance or opposite the site of their living house due to smoke and hammering sounds. Most of the workshops are mud-built houses with *asbestos* or straw roofing. Generally, the workshop's two sides are closed and two sides are open for ventilation of smoke during the hammering and heating of bowls (see Fig. 33). A furnace named *garan sal* is set up middle of the workshop. The workshop's floor is earthen because mud is suitable for hammering. The iron anvil and hollow stone piece (local name is *thasa*) are set up just opposite the *garan sal*. Generally, scraping is done separate small room or courtyard. *Hawaya* or *galan sal* is situated on the opposite side of *garan sal*.

Fig. 33. Workshop

F. Process of making bell metal bowl (casting and hammering method)

Different sizes of bell metal bowls are produced by alternative hammering methods from bell metal ingots. The whole process of bell metal bowl work is divided into three stages. These are making of ingots, shaping and finishing of bell metal bowls.

I. Making of ingots

The first stage for making bell metal bowls is making metal ingots. Local name of ingot is *ruya*. It is done on a big furnace called *gala or galan sal*. At first, the *galan sal* is half filled up with coal and cow dung cake and fired. It is done early in the morning. Then a China clay crucible is filled up with raw copper and tin (see Fig. 34). When the flame comes out from the furnace, the filled-up crucible is placed in the middle of the furnace and covered up with a perforated earthen lid. The furnace is fanning some time to increase the heat. After three or four hours, when it attains the temperature of 1100ºC to 1200ºC, metals begin to melt. When all the metal is melted, the crucible becomes crimson red. It is checked with an iron stick and dregs are separated with a big ladle. After that the plate-shaped earthen moulds are smeared with used engine oil (see Fig. 35). Then molten metal is poured into the moulds with the help of a big ladle (see Fig. 36). One artisan spread paddy husk on it (see Fig. 37). The molten metal became brownish with the contact of air. The size of the moulds varies concerning the

size of the bowls. After cooling the metal ingots are taken out from the moulds (see Fig. 38).

II. Shaping the bowls

Shaping is done by alternate heating and hammering methods (see Fig. 39). At first the master artisans heat a few bell metal bun shaped ingots and flattened these slightly by hammering one by one. Sometimes they cut off extra weight or projection with the help of an iron chisel. Then a pair or two pair flattened ingots are hammered together. This is done by alternative heating and hammering in six or seven successive stages. The process is done by one head craftsman and three hammermen. The head craftsman is called *garandar* and he is holding the flattened ingots on the iron anvil with the help of long pincers. Three hammermen called *barandar,* hammer it circularly. After proper shape, they separated the bowl ingots from each other and finally shape is given one at a time by one head craftsman and two or three hammermen. Finally, the head craftsman is given its final shape. He labelled it sometimes on circular iron slabs or mud flowers or hollow stones with the help of a wooden hammer.

III. Finishing

The third or final stage is finishing which consists of three sub-stages, like labelling, rubbing and scraping. Then the craftsman efficiently labels the bowls from all sides with the help of a headed rounded hammer on an iron anvil. It is called *mather kaj* and the hammer is called *matha haturi* (see Fig. 40). After labelling, the edges are rubbed by a square-shaped iron file. Sometimes inner bottom portion of bowls is scraped by hand with the help of flat flat-shaped iron file (see Fig. 41).

Finally scraping is done by modern electronic scraping machines (see Fig. 42). Some crafts centres use leg-operated traditional indigenous lathe for scraping the bowls. Modern electronic scraping machine has two parts. Both are axial type, but one axal is set with motors with a strip of belt and the other axal is used to adjust the bowl during scraping. They fixed the bowl middle of both axal and scraping was done by a long iron scraper. The traditional indigenous lathe is also an iron axal. It has two supporting posts and, in the middle, there is a bearing, which is connected to the chain wheel post with an iron chain. One side of this axle has a circled wooden head, which is used for scraping. A mixture of pitch and resin is used in this case. At first, the scraping man heated the bottom of the bowl and fixed it to this wooden head. Then one artisan moves the chine wheel and the other is scraping the bowl with an iron scraper. At village Pukhuria, artisans are scraping only the inner portion of the bowls and some

edges of the outer portion. Finally scraping is done by hand with iron files. Now the bowl is ready for marketing (see Fig. 43).


Fig. 34. Crucible and raw metals


Fig. 35. Earthen moulds


Fig. 36. Big ladle


Fig. 37. Poured moulted metal


Fig. 38. Bell metal ingot (*Ruya*)


Fig. 39. Hammering


Fig. 40. Labeling


Fig. 41. Rubbing

Fig. 42. Modern scraping machine

Fig. 43. Complete bowl 2.5 kg

Observations

It is noticed from the present study that the bell metal traditional craft of village Pukhuria (22.9351°N, 86.9662°E) is developed day by day. Here the artisans are used to make different-sized bowls of bell metal and follow traditional casting and hammering technology. Pukhuria is the only village in Bankura district as well as Rarh Bengal where we can find different kinds of traditional craft sceneries than the other traditional craft carters of Rarh Bengal. Though artisans here used to follow traditional craft methods, use of modern tools are also noticed. Sunil Karmakar, an old artisan, aged 62 years old has said that its main cause is foreign trade relations. He also informed that there is no burden of collection of raw materials and sale of new production (bowl). The merchant groups from Australia directly provides the raw metal (copper and zinc) and collect the complete bowls. He said that only the artisans of village Pukhuria enjoyed this privilege. There are at present more than 100 units (furnace). The young generation is also showing keen interest and engagement in this craft. Modern electronic lathe and scraping machines are used here.

From an excavated report in eastern India, many copper plates and copper, brass and bronze artifacts, figures and utensils are excavated and reported. We have very little knowledge about the manufacturing technique of these artifacts. So, an ethnographic study among the present *Karmakar* groups of Pukhuria will be helpful to know about the past traditional brass and bell-metal craft technology.

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Wood Carvings in *Satras* of Majuli, Assam, India

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Abstract

Majuli is a river island district of Assam, popularly known as the hub of numerous Satra institutions (i.e., Vaishnavite monasteries). In 16th A.D. Sankardeva started a religio-cultural movement in Assam and established Satras as a platform for his religion. Satras became a centre of religious practice and a hub of art, craft, literature, and culture. Wood carving is one of the notable art forms that was developed and practised in the Satras. This paper analyses the wooden sculptures and other miscellaneous objects of the Satras in Majuli from the 18th century A.D. Though previous works have been done on the Sattriya culture, wood carvings have reached lesser marks of importance. This present research aims to study and document; and analyse wooden objects and the wood carvings of the Satras on the Majuli River island. The focus is primarily on the vernacular wood carving tradition and techniques while incorporating the hengul-haital (a kind of paint). This study highlights the importance of wood carvings in the Satras and its present-day relevance.

Keywords: *Hengul-haital,* Majuli, *Satra, Sattriya* culture, wood carvings

Introduction

Wood carving is undeniably one of the oldest arts known to humankind. The recovery of wooden spears from the Middle Paleolithic period such as the Clacton Spear, attests to the longstanding tradition of utilitarian woodwork in human history. Although the creation of wooden sculptures has been a widely practised art form, few have survived undamaged due to the perishable nature of wood. Woodcarving persisted for many centuries in ancient India. Ample descriptions from the literature indicate that wood was utilised in crafting thrones for kings, religious sanctums, images, and idols of deities. Additionally, the existence of a distinct class of craftsmen in society, known as *vaddhaki* (carpenters) in Vedic culture, is well-documented (Choudhury 1952). Wood has been a significant material, utilized by craftsmen due to its availability and natural characteristics like the texture of the surface, varied colour, and smoothness.

The forest of Assam is rich with a variety of valuable wood. Harshacharita mentioned the wood carving craft in ancient Assam. Even the medieval works mention objects made of a single piece of wood in Assam. Fathiyah-i-Ibriyah mentioned wooden boxes, stools, trays, and chairs made from a single piece of

wood (Choudhury 1959). The Ahom kings patronised wood carvings and woodwork. Shihabuddin Talish recorded the wooden grandeur of Gargaon place of Ahom kings (Gait 1926). Nath opined that the Ahom had their efficiency in wooden works perhaps owing to their ancient connection with China (Nath 1948). The *satra* institutions too patronised the wood carving in medieval Assam under the Vaishnavite saints Sankardeva and Madhavadeva. According to some of the biographers of Sankardeva and Madhavadeva, the *pat-duwar* or the principal door comprising the main entrance to the prayer hall established by Madhavadeva in Barpeta district was embellished with the carvings of floral and creeper designs called *lata-kata*. The motifs and design patterns of *lata-kata* were composed by Madhavadeva himself as a collection of verses called *lata-kata ghosa* with rendering of meandering creepers on wood. This work of wood carvings itself became a specimen and source of inspiration to its contemporary and later artisans. The *satras* of Assam now have very few wooden objects of art belonging to the past tradition. The earliest examples rarely belong to the 18th century because of the weather and perishable condition of the wood. Bardowa *Satra* retains a considerably large repertoire of wood carvings from the past (Kalita 2006).

Majuli is a river island of Assam, surrounded by river Brahmaputra, known as the hub of numerous *satra* Institutions (Vaishnavite monasteries). Some of the *satras* of Majuli are celebrated as the most legendary *satras* of Assam. The *satras* are the treasure house of the Vaishnavite heritage, art, and literature. Majuli got its name in the 16th century A.D. as mentioned in one of the oldest chronicles *Assam Buranji*. The chronicle collected from Sukumar Mahanta stated that the Mughal forces battled with the Ahoms in 1634 at the *Majulir Bali* (sand shores of the island). According to *Satsari Asam Buranji* and the *Deodhai Asam Buranji* the term Majuli and Majali or Mojali are casually used to mean the island. Thus Majali, Mojali, or Majoli were the corrupt forms of the Majuli (Nath 2009).

It is said that there are more than 80 *satras* in Majuli, but only 31 *satras* are recognised by the Majuli Cultural Region Act, of 2006. Because of the erosion caused by the mighty Brahmaputra, the numbers are declining day by day. Sankardeva rooted Vaishnavism in the land of Majuli by establishing its first Vaishnavite institution or *satra* at Belaguri Dhuwahat. The *satras* of Majuli are the treasure house of numerous antiquities and art objects of historical and cultural value related to the Vaishnavite tradition. The present study is primarily on the vernacular wood carving tradition and technique. Though there are several works available on art, literature, and the Vaishnavite tradition of Majuli, works

on wood carving are negligible. Wood carving and art objects of wood mostly form a subject of passing reference in many of the previous works, and some discussed the woodwork of Majuli as a part of religious symbolism. Rajguru, in a chapter in his book Medieval Assamese Society 1228- 1826, offered a discussion on wood carving in Assam along with other art forms of medieval Assam. He mentioned the various art prevalent in Medieval Assam and offered a brief narration on the wood craft. Though woodcraft of *satras* was included but remained limited to a basic introductory level. A glimpse of the wood craft of Majuli can be seen in an article by Kalita (Kalita 2006). Kalita offered the characteristics of the Satriya art forms and analysed the religious aspects of woodcraft practised in the *satras*. In another article, Kalita introduced the objects of woodcraft preserved in the *satras* of Majuli (Kalita 2013). Apart from these, works particularly dedicated to woodcraft focusing on Majuli are negligible.

Objectives

The objective of the present research is to document and make an analysis of wooden objects and the wood carvings of the *satras* on the Majuli. The focus is primarily on the vernacular wood carving tradition and technique of *hengul-haital* (a kind of paint) application. The study would be limited to mainly from the 18th century onwards. Physical evidence of wooden objects earlier to the 18th century is not being found in existence because of the perishable nature of wood. The study is mainly based on field visits to *satras* of Majuli. The interview method was applied to gather information about the tradition by conducting interviews with the artisans of *satras*. Furthermore, these rituals also serve as a means of fostering a robust collective identity within society. By participating in shared ceremonial practices, individuals reaffirm their belongingness to a larger community and strengthen their sense of unity. These rituals often involve communal gatherings where members of society come together to celebrate, mourn, or commemorate significant events. Through these shared experiences, bonds are formed, and a sense of solidarity is nurtured. Moreover, the rituals also reflect and reinforce the social values that are upheld within society. They provide a platform for the transmission of cultural norms, moral principles, and ethical codes from one generation to the next.

The Neo-Vaishnavite Movement and the *Satra* Institutions of Assam

In the fifteenth and sixteenth centuries, many sects of Brahmanical religion existed in Assam. Various practices related to Brahminical cults, caste discrimination, offerings, enchanting, animal sacrifice, and even human sacrifice were prevalent in medieval Assam. Under such circumstances, Sankardeva initiated the Neo-Vaishnavite movement in Assam towards the end of the fifteenth century AD. In his Bhakti movement, he included people of all social and economic levels, casts, and other ethnic groups of Assam like Khasi, Miris, etc. The Neo-Vaishnavism did not differ in essential points from similar Vaishnava movements of medieval India. Characteristics, like belief in and adoration of a personal god Visnu or Krishna, emphasis on devotion and faith, recognition of the equality of all persons, the ignoring of the caste distinction at the spiritual level, the high place assigned to virtues like love, piety and non-violence and deprecation of the practice of image-worship, are common to all Vaishnavite sects of India (Sarma 1966). Though there are various similarities with other Vaishnava movements in India, the Neo-Vaishnavite movement of Assam has some unique and innovative characteristics. The new wave of faith is popularly regarded as *Ek-saran-naam Dharma*. According to Kakati, "The *Ekasarana system is not a religion of bargain and barter between God and men or of sacrifice and easy recompense; it is one with exclusive emphasis on slow spiritual outlook by laying flesh and spirit in the hands of the Lord*."

To spread and popularise the new faith, Sankardeva travelled through the entire Assam and founded the Vaishnavite monasteries known as *satras*. The *satra* institutions are accompanied by a prayer hall known as *naamghar* and a row of hut for the fraternity. The term *satra* is derived from Sanskrit. *Satra* did not remain just a place of congregational prayers but soon became an institution of *sattriya* Art, dance, music, literature, and crafts. Woodcraft as a visual representation of religious ideology emerged in the *satras* and developed parallel to the time.

Evidence of Wood Carvings in *Satras* of Majuli

Wood is a principal medium of expression of art and craft in Majuli. As the availability of rocks is limited because of the unique geographical position of Majuli, other workable materials that were locally available like wood were exploited for the execution of art. Basically, in a *satra*, the *naamghar* is located in the centre, surrounded by four rows of huts known as *chari hatis*, *pub hati*,

paschim hati, uttar hati and dakshina hati. Wooden objects and crafts can be seen mainly in the facade and the doors, walls around the *naamghar,* the pillars and the pillar capitals, and religious wooden sculptures and objects of daily purposes.

The *naamghar* and other huts of *satra* were almost wholly built of wood. *satras* like Dakhinpat, Garamur, Kamalabari and Auniati used wood lavishly with carvings, paintings and other objects. The *naamghar* faces the east, which is a large open hall with an apsidal roof. The apsidal roof has an elaborate wooden structure. The interior is simple - there are two rows of pillars (*khuta*) five or seven in number. With the help of wooden beams also known as the *chati,* erected an architrave over which rests the roof. The doors with carvings of lion motifs are called *simhaduar*. The most sacred space is the *manikut,* attached to the east of the *naamghar*. However, because of the perishable nature of wood, several wooden works get damaged. However, we can find various wooden sculptures, objects and carvings in the *satras* till now.

Dakhinpat Satra

Dakhinpat *satra* is one of the most influential *satras* of Majuli and one of the main *satra* popular among the *Chari-satras*. This *satra* was established by *Satradhikar* Sri Vanamalideva in 1584 under the patronage of Ahom king Jayadhavj Singha. The walls of the central building of the *satra* are constructed with wood. The doors and windows have the traditional pattern on them. The roof of the *naamghar* is supported by huge wooden pillars. Wooden door frames of numerous shapes, sizes and designs are found in the *satras* of Majuli. Some of these doorframes are remarkable specimens of wooden art. The frame of the main door of *naamghar* (see Fig. 1) is curved with flowers surrounded by *lata* or creepers around it. The door has some geometric shapes and is coloured blue.

This *satra* also preserves some of the wooden utilitarian objects used for religious purposes. *tou* (a kind of bowl of considerably bigger size), usually made of brass and bell metal common in *satra,* but in rare cases, wooden *tou* are also reported. A wooden *tou* is preserved in a very bad condition in Dakhinpat *satra*. A wooden *sarai* with four tiers (see Fig. 2) is also preserved in Dakhinpat *satra*. *Sarai* is generally made of brass and bell metal. The one found in Dakhinpat *satra* is made of wood and decorated with *hengul haital*. Because of the red colour of *hengul*, this *sarai* is called *rangoli sarai*. The *sarai* is used for giving offerings to the *satradhikar*, the head of the *satra* institutions. A wooden *tema* (casket) is found in a much-distorted condition. Wooden *temas* (caskets)

are usually used for keeping betel leaves and areca nuts. Sometimes these caskets are used for preserving *rudraksha mala* and other things that are used for performances.

Fig. 1. Wooden door of the *naamghar*

Fig. 2. *Rangoli sarai*

Garamur Satra

Garamur *satra* is one of the royal satras of Majuli. It was established in the year 1657-58 by Ahom king Jayadhaj Singha and Jayharideva became the head of the *satra*. The *kirtanaghar or naamghar* of Garamur *satra* have huge numbers of wooden sculptures in standing position. The figures are found to be made from round logs of wood. Figures are overlaid with paint in recent times.

A wooden idol of Krishna in the position of playing his flute is found in Garamur *satra.* The idol is portrayed in *tribhanga mudra* with the left leg slightly bent. The hair of the figure is tied in a knot at the top of the head (see Fig. 3). Another avatar of Vishnu, the Chaturbhuja form of Varaha is found in the same *satra*. The *chaturbhuja* Varaha figure has two upper hands depicting *kartarimukha mudra* and two lower hands depicting *musti mudra* (see Fig. 4). A sculpture of Vishnu is depicted sitting on the lap of Ananta Naag. Ananta is depicted in human *chaturbhuja* form and seated in *padmasana* position; Vishnu is depicted in profile with its legs hanging down. Ananta's theomorphic form of snake is also shown which is coiled upon a tortoise (see Fig. 5). Another Chaturbhuja sculpture found is the Narasimha *avatara* of Vishnu. The Narasiṁha figure is shown in *pralambhapada* posture. He is holding the *asura* Hiranyakashipu in his lap and in the action of tearing the chest of the *asura* with all four of his hands (see Fig. 6). One wooden sculpture of Hanuman depicts the episode of lifting the mount Gandhamardana. Several local deities like *Khoba Khubuni* can be seen in the mountain (see Fig. 7). Apart from all these

sculptures, several other wooden sculptures of Garuda are also seen in the *naamghar*.

Fig. 3. Sculpture of Krishna

Fig. 4. Sculpture of Varaha

Fig. 5. Sculpture of Vishnu in the lap of Ananta

Fig. 6. Sculpture of Narasimha

Fig. 7. Sculpture of Hanuman

Uttar Kamalabari Satra

Uttar Kamalabari *satra* is a branch of Kamalabari *satra* founded by Badulapadma Ata. The wooden pillars of the *kirtanghar* of Uttar Kamalabari *satra* are 5 m in height. They are curved at the top and their breadth decreases as it goes up. The wooden pillars are still bearing the load of the roof of the *kirtanghar*. Because of its perishable nature these are gradually decaying and to protect these, *satra* authorities have replaced the lower portion with cement pillars nowadays. The wooden pillars are made in fine circular shape and decorated by carved capital in the form of Lotus and *kordoi tenga*. One doorframe earlier used in the main prayer hall (*naamghar*) can be seen lying in the *satra* premises. The doorframe is curved with creepers or *lata* all over it. Uses of peacocks and other animal motifs can also be seen. The use of creepers in the wood carvings is one of the distinct features started during the medieval period under the influence of Neo-Raishnavism (see Fig. 8). The windows of *boha* or residences of Vaishnavs of *satra* are curved with creepers (see Figs. 9 & 10) Natural colours like *hengul-haital* are used both in the doors and windows of residences of Viashnavite saints. In the doorframe of *boha* or the residence, geometric patterns can be seen. Floral designs are also used (see Figs. 11 & 12).

A wooden boat named *Mayur Ponkhi Nao* of Badula Ata of Kamalabari *satra* is preserved in the Assam State Museum (see Fig. 13). This boat was used for transportation of respective *satradhikaras* for crossing the Brahmaputra River and later for offering *'pindo'* on the death anniversary of the *satradhikara*. Feathers of peacocks were carved on both sides of the boat. *Hengul* and *haital* were used to paint the boat.

Fig. 8. Doorframe

Fig. 9. Window of residence of Satra

Fig. 10. Window of residence of *satra*

Fig. 11. Door of residence of *satras*

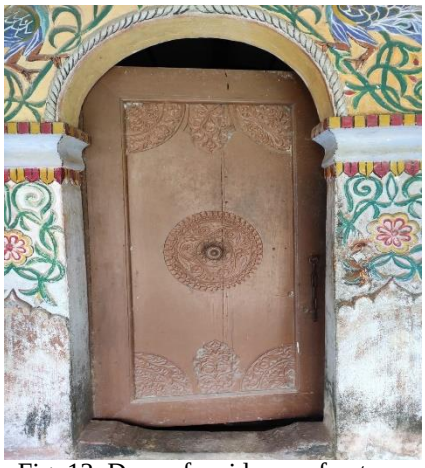

Fig. 12. Door of residence of *satras*

Fig. 13. *Mayurponkhi Khel Nao*

Auniati Satra

Auniati *satra* was founded by Niranjan Pathakdeva. One of the huge wooden Garudas can be seen (see Fig. 14) in this *satra*. The Garuda sculpture is in the *naamghar* facing towards the *manikuta*. The Garuda sculpture found in Auniati *satra* is seen in *pralambhapada* position sitting over a lotus-carved pedestal. The wings of the Garuḍa are widely open. The figure is seen holding a conch in its left hand and a snake in its right hand. Different natural colours such as yellow, red, green and white are used. *Asana* is considered an abode of the Vaikuntha placed in the *manikuta.* The *asana* of Auniati is three tired (see Fig. 15). Most *Asanas* are made with three, five, seven or nine tires. The *asana* is used to hold the Tenth book of the Bhagawata Purana, worshipped in Vaishnavism. But idols of Lord Viṣṇu are also placed in the top chamber of the throne in some *satras.*

The *asana* is carved with animal motifs at the four corners of each tier. The corners of the *asana* are curved with a lion over an elephant (*gajasimha*). As lions are curved at the corners, it is called *simhasana.* Another *asana* can be seen in the Assam State Museum (see Fig. 16). Floral designs were curved at the top chamber. This *asana* is in every *naamghar* and *satra* of Assam, who followed Vaishnavism.

Fig. 14. Sculpture of Garuda

Fig. 15. *Simhasana*

Fig. 16. *Simhasana*

Method of Woodcarving in Majuli

In the *satras* of Assam the *khanikars* (artists) followed a unique method of carving wooden sculptures, known as "*charaikhuliya*" in which "*charai*" means bird and "*khuliya*" means carving. It was one kind of deep incision inside the wooden panel. It is similar to the natural process of the woodpecker digging holes in the tree. In this method, the uncut portions of wood remain raised to give the pattern of the objects. All objects are required to be executed in two distinct phases. The first phase is called *kondhowa* meaning slicing off the surface in flakes. In the final stage, further work is done on the patterns to give a finish to

the objects. After that, the sculptures, whether in relief or in the round, are painted with color (Kalita 1985). It can be said that the artists practised extremely primitive carpentry with a limited number of tools that consisted of an axe, knife and few *batalis* or chisels of various sizes and shapes. The paints used by the *khanikars* on various wooden artifacts consist of traditional hues made of natural ingredients, such as *hengul-haital*, indigo (*nil*), chalk (*dhal*), lampblack (*kajal*), etc. These natural hues are bright in nature, last longer. *Hengul* is reddish in colour. It is a combination of two colours: red and orange. *Haital* is yellow in colour and made up of a natural yellow matter. It is a yellow arsenic chemical element. An equal quantity of *para* (mercury), *gandhak* (sulfur) and *shih* (lead) is ground on the stone palate. Then, the grinds are soaked in water overnight. On the next day, the water is removed and the grinds are kept under water for another three to four days. In this process, it removed all the pollutants and the *hengul* became brighter. To get the true colour of it, one *tola* (160 grains) hengul is mixed with half *tola* gum. The artists prepared a bright pale red colour by mixing *haital* with *hangul*. Similarly, different kinds of fruits and flowers were mixed with *hengul* and *haital*.

Map 1. Map of Majuli

Conclusion

Wood carvings of Majuli were specially developed under the influence of *satras*. Along with being used for making various objects and sculptures for religious activity and performances, wood was used for making traditional domestic architecture, household items, agricultural equipment, utensils, carts, boats, bridges etc. Majuli has a rich vegetation and locally grown trees like *ajar* (Lagerstroemia flosreginae), *koroi* (Albizzia procera), *ou-tenga* (Dillenia indica), *kadam* (Anthocephalus cadamba), *kathal* (Artocarpus heterophyllus), *saral*

(Pinus roxburghii), *gondhoxoroi* (Cinnamonium glanduliferum), *gamari* (*Gmelina arborea*) that are used for construction as well as producing sculpture, art and utilitarian objects.

The subject matter of the wooden sculpture is mainly influenced by Vaishnavism. Sculplutres mainly represents Vishnu and his various incarnations and characters' stories from the Bhagavata-Purana. The deity figures are represented wearing *dhoti* as a lower garment, *uttariya-vastra* (shoulder cloth) in Assamese style, and with short *mukuta* (crown), *kanthaharas*, *kundalas*. The majority of the wood carvings found in *satras* indicate the influence of indigenous folk style. The concept of wide wings Garuda can come from a dragon-like figure common with the Mongoloid art tradition.

The *satras* of Majuli lack preservation and protection, the old wooden sculptures and other wood carvings objects are in a very bad condition. Because of the weather and the material's nature, it was destroyed in a short period. So, the preservation of these century-old art forms and objects became very necessary. One of the *khanikar* of Uttar Kamalabari *satra* mentioned that nowadays the old techniques of wood carving get replaced by new techniques and new types of equipment. A few people of the *satra* still practice the old method. The old work of wood carvings in the walls and doors of the *satras* is now being replaced by the new structure. The Assam State Museum, Guwahati and Museum of Auniati *satra* have preserved some wooden objects from different *satras,* but wood carving objects of different *satras* can be seen lying scattered without any care for preservation.

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Heritage, Economy, and Identity: The Traditional Occupation of the *Pal* Community in Bangladesh

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Abstract

Pottery, an ancient craft and one of the oldest human inventions dating back to the Neolithic period has long been a treasured artistic tradition in the Bengal Delta. However, despite its rich history, this ancient craft is gradually losing its appeal in the present day. The study investigates the socio-economic conditions and professional transformations affecting the Pal community of Bangladesh. The study reveals a gradual decline in the pottery craft, which has deep historical roots, primarily due to the impact of modern technological interventions and large-scale industrialisation. By employing qualitative research methods with an ethnographic approach, the study collects primary data from potters and their families, providing valuable insights into the challenges they face and the evolving nature of their occupational identity. The study indicates a significant shift from pottery to alternative professions, influenced by changing market dynamics and an increasing consumer preference for plastic and aluminium products over traditional clay items. This transition not only affects the economic landscape of the Pal community but also raises questions about the preservation of cultural heritage and occupational identity. The study identifies key challenges in marketing traditional pottery products and suggests that targeted financial support and strategic evaluation of the industry could enhance its sustainability and growth. By exploring these interconnected aspects of heritage, economy, and identity, this study contributes to a deeper understanding of how industrialisation impacts traditional crafts and occupational traditions with the preservation of cultural heritage. This study thus provides a nuanced perspective on the complex interplay between tradition and modernity in shaping the occupational landscape and cultural identity of the Pal community in Bangladesh.

Keywords: cultural heritage, occupational transformation, *Pal* community, socio-economic impact, traditional pottery

Introduction

Pottery is one of the oldest, most widespread, and most artistic crafts in embellishment (Peterson et al. 2001; Shepard 1956; Fang 2023). Nonetheless, the oldest known pottery vases, which date to 18,000 BC, have been discovered in Jiangxi, China (Diamond 1998). Beautiful objects made of clay which are baked to remove moisture and enhance strength are the outcomes of this art. Most of these objects have practical utility, for instance, vessels for holding

liquids or dishes and bowls for food (Peterson et al. 2001). Earthenware surfaces are produced in shades from buff to highly dark red, as well as from light gray to deep black. Such items can be embellished or dressed in a slip, which is a wet or semi-wet mixture of clay and often calcined silica to help bind particles in making an object. These types of articles may also be covered with a clear glaze or an opaque glaze (Savage 2024; Fang 2023). A specific instance of tin-glazed earthenware, and other names are widely accepted in different regions: *majolica, faience*, and *delft*. If the clear glaze body is coloured and designed as cream, then the product shall be called creamware. It has also been known that in the later decades of the 20th century, many earthenware products made for the masses have been created to endure very high and low temperatures appropriate for cooking, freezing, and serving (Savage 2024).

Pottery first emerged in Bengal around 1500 BC, and one of the main reasons is the rich clay abundance found in the region (Jafri et al. 2017; Hazarika 2013). The early dwellers of Bengal utilised this rich natural resource to produce a wide range of pottery items. Excavations carried out at Pandu Rajar Dhibi, Mahisdal, Bharatpur, Mangalkot, Chandraketugarh, Tamralipta, Rajbadidanga, Harinarayanpur, Bangarh in West Bengal, and Mahasthangarh, Govinda Bhita, Bhasu Vihara, Wari-Bateshwar, Raja Harish Chandrer Badi, Mainamati, and Paharpur of Bangladesh have reported various kinds of pottery fragments (Rahman 2021; Ghosh et al. 1991). These include Black-and-Red Ware, Northern Black Polished Ware, Rouletted Ware, Amphorae, Black-slipped Ware, and Knobbed Ware, among others (Rahman 2021). The characteristics of Chalcolithic and Early Historic pottery are distinct and easily distinguished from those of Early Medieval, Medieval, and Late Medieval pottery. This is mainly because, in later periods, traditional pottery was largely superseded by metal and other materials for utensils and everyday use, both religious and household purposes. The common types of pottery identified are Black and Red Ware, Northern Black Polished Ware, Black-slipped Ware, Rouletted Ware, Glazed Ware, Knobbed Ware, Amphora, and Common Pottery (Rahman 2021).

Bangladesh is known for its verdant landscapes and the tranquil village life that characterises much of its rural areas. With approximately 68,000 villages, the country's agrarian culture is deeply ingrained in the daily existence of its inhabitants. Life in these villages is marked by a slow pace, simplicity, and a sense of serenity. The typical Bangladeshi village features lush fields, narrow pathways, and a shared aspiration among its residents. Despite the diversity across the country, the essence of village life remains remarkably consistent, with each season bringing its own unique flavours and hues while maintaining a sense of familiarity. In the Satkhira District, villages like Babulia and Jhikra exemplify this rural paradise. The water, air, and land here are much like those

found in other parts of Bangladesh, except for the distinctive aroma of scorched earth emanating from *pal para* (potter village), a locality known for its pottery. This area is home to a community whose livelihood is intricately tied to the fired clay that gives their village its unique character. Here, dreams are sculpted from the earth, taking form on the potter's wheel and shaping in the kiln's heat.

Clay products (pottery) are recognised as folk art in Bangladesh where potters have been crafting pottery and other clay products to fulfil the local, ritual and occasional demands of the people. The potters generally belong to the *pal* community in Bangladesh. *Pal* is known as the craft caste community in Bangladesh. They are also known as *'kumhar'* (potter). The *pal* community is found all over Bangladesh is predominantly Hindu and makes clay products. Within Bangladesh's Hindu society, potters belong to the *sudra*. The potters were popularised during the period of *zamindars* (landowners). They used to be encouraged to make statues of goddesses, plates and other decorative items. After the end of *zamindari*, the potters started to make everyday household products and sell them in the local market to survive. Later, with time, their situation started to change, and from 1980 onwards, the craft began to deteriorate, and their enthusiasm started to fade. At the same time, the people of the *Pal* community are considered part of the lower Hindu caste (*sudra*), and a significant part of them live as neglected within the community. However, some people want to change their social status. Consequently, creating a state of uncertainty over their own identity. But primarily the financial issue was the main concern because of the decreasing demand for pottery craft.

As a result of modernization, people are looking for modern products that are also easily accessible. They also lack financial and technical support as a result of which shift their profession to other sectors. This long vivid journey of pottery history has faded away with internal weakness and external threats. The importance of social inclusion for such a specific community also plays a major role in society.

The Research Field: Satkhira, Bangladesh

Satkhira district encompasses an area of 3817.29 km² and is situated in the southwest corner of Bangladesh, approximately 300 km from the capital city, Dhaka. It shares its northern border with Jessore district, the southern border with the Bay of Bengal, the eastern border with Khulna district, and the western border with 24 Pargana district of West Bengal, India. The district is crosses several significant rivers, Kopotakho, Morichap, Kholpetua, Betna, Raimangal, Hariabhanga, Ichamati, Betrabati, and Kalindi-Jamuna river. Satkhira district had a total population of 2196582 (BBS, 2022).

The Economic Census 2013 report indicated that the soil in the Bengal Delta, particularly in Satkhira, is predominantly alluvial, which is ideal for producing high-quality clay products. The superior texture of this soil is crucial for crafting smooth, lustrous pots. However, the majority of this soil is currently being utilized for brick kilns, leading to a rise in its cost due to decreasing availability.

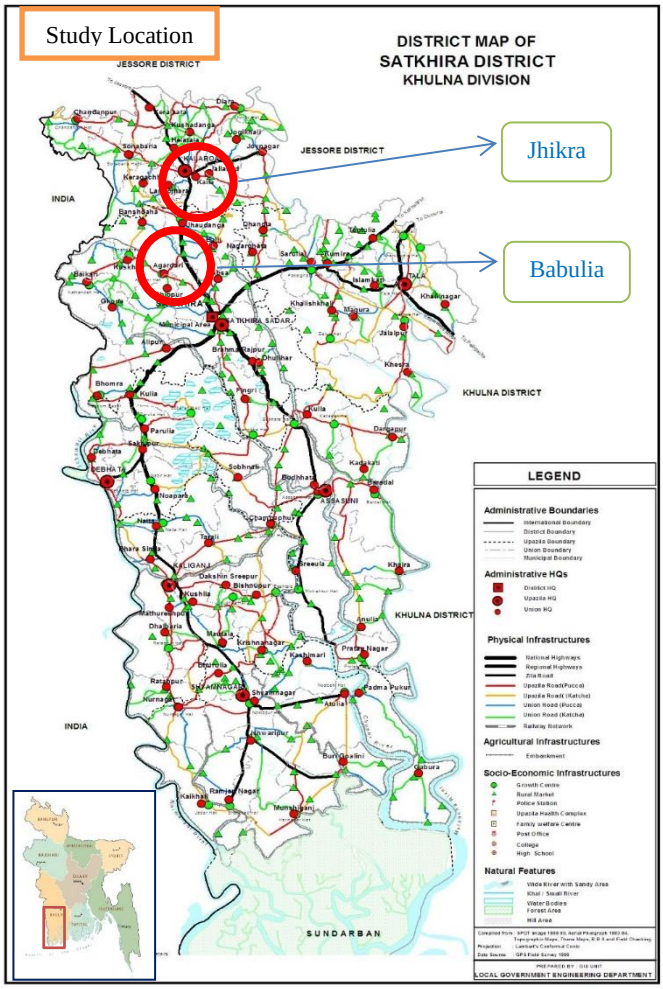

Fig. 1. Map of Satkhira district showing the LEGEND of Establishments by Upazila, Bangladesh Bureau of Statistics (BBS)

This study attempts to look into the transformation of the *Pal* community's traditional pottery profession in Bangladesh and its socio-economic impacts. The specific objectives of this paper are therefore manifold.

- First, it intends to analyse the characteristic features of the pottery industry within the study area, focusing on its historical significance and current state.
- It will look at, secondly, the problems faced by the industry in general, which have beset production, marketing, and labour inputs that have contributed to the decline in pottery production.
- Third, the study shall probe into the reasons for the gradual professional shift of the pottery artisans, with many of them changing their trade into other professions, such as grocery shopkeeping. This shift is largely hypothesized to be driven by modern technological interventions and large-scale industrialisation, which have made traditional pottery less competitive in the market.
- Furthermore, the study also intends to identify some of the key drivers that have contributed to decreased demand for pottery products, including increased preference for plastic and other factory-produced goods.
- Finally, the research will look into the socio-economic status of pottery artisans at the present times and discuss how the professional changes have affected their livelihoods, incomes, and overall well-being. The paper, in this way, will try to present an inclusive understanding of the decline of the pottery industry in Bangladesh and the more general ramifications it has caused to the socio-economic structure of the *Pal* community.

Theoretical Framework of the Present Study

Numerous scholarly investigations have focused on the socio-economic status, artistic practices, and livelihood patterns of the potter communities of Bangladesh. Henry H. Glassie, in his books *The Potter's Art* (1999) and *Art and Life in Bangladesh* (1997), explores pottery art and the insights it provides into the creative process and cultural similarities. Glassie (1999) highlights the potters' deep connection to their work, their methods of learning, and their sources of design inspiration, while also discussing the *kalshi* (water container) and the *murti* (sacred image or depiction of a deity) as essential forms that blur the line between craft and art (Glassie 1997). There is no strict separation between craft and art in the potter's work, as both forms are produced for sale, have practical uses, and possess the potential to be considered *shilpa* (art). Also, draws parallels between Bangladeshi pottery and other global traditions, emphasising the shared artistic values (Glassie 1999; Chandan 2015). The decline of the pottery industry over the past few decades is discussed which attributes it largely to the pressures of a modern competitive market. The potter community played a crucial role in supporting middle-class and families in poverty (Nazrul and Eagle 2016; Anwar 2012). However, advancements in

technology and the introduction of modern equipment, such as electric kilns, molding machines, and new methods for clay processing, have disrupted traditional practices. Despite these challenges, potters continue to persevere in their craft, producing household items for the community, albeit with limited financial rewards (Anwar 2012). The diminishing use of traditional pottery-making techniques and the weaknesses in the marketing systems for clay products (Jamil 2011; Santo 2022). The financial struggles faced by potters exacerbate their difficulties in competing in a marketplace that favours modern, mass-produced alternatives. Similarly, the creative adaptations made by potters to survive in this changing environment (Akter 2009). Some artisans have diversified their product lines by experimenting with items such as jewellery and crockery. However, the widespread availability of metal, plastic, and ceramic alternatives has led many potters to abandon the craft that had been passed down through generations. Nonetheless, some potters are employing innovative thinking in their product development to maintain their craft's relevance (Akter 2009). The impact of generational shifts on the pottery profession observes a decline in interest among the younger members of the potter community (Debnath 2017). In the past, children eagerly participated in pottery-making alongside their parents, but today, many perceive the work as laborious and unattractive. The industry undergoes modernization and incorporates new ideas and methods, otherwise it will continue to decline (Rahman 2017; Debnath 2017). The Survey on Handicraft Establishments, Bangladesh 2022, indicates that at least 82.20% of the handicraft industry is facing a struggle as a result of a lack of capital, and 46.50% is experiencing decreasing sales as a result of a drop in potential customers (Sachee 2023; Debnath 2017). It also addresses government efforts to support cottage industries, including initiatives like the Traditional Cottage-Based Production Unit (TCPU) and the Micro Enterprise for Pottery Production (MEPP), which aim to promote and market pottery products. The shift towards modernizing clay uses and expanding into export markets has improved the potters' economic outlook, suggesting a gradual resurgence in the industry.

The transformation in the pottery community's fortunes is encapsulated by the transition from traditional pottery-making to more commercially viable products like exportable tiles (Kiradoo 2021; The Daily Star 2005). Potters, who once considered abandoning their craft for alternative livelihoods such as rickshaw pulling, are now finding renewed hope. The shift in production has allowed them to support their families and aspire to a better quality of life. This gradual change reflects a broader trend of adaptation and resilience among the Potter community, driven by necessity and the pursuit of financial stability (Nazrul and Eagle 2016; The Daily Star 2005).

Methodology

The research employed qualitative methods with an ethnographic approach, focusing on the villages of Babulia and Jhikra in the Satkhira district, located in southwest Bangladesh along the Betrabati river. Fieldwork involved visiting these villages to assess the living conditions of potters. I engaged with the potters, their families, and members of government and non-government organizations (e.g. BRAC, Rishilpi Handicrafts, PKSF etc.) involved in developing the handicrafts industry. Conversations with potters, their children, customers, and other community members provided insights into their socio-economic conditions. I began by meeting potters who were actively making and selling clay products and exploring the channels through which these items reached the market. I used a combination of structured and semi-structured interviews, along with participant observation. After initial random interactions, I compiled a sample list to ensure gender balance among respondents. With their consent, interviews were audio-recorded, and I took notes during conversations. My research centred on the *Pal* community (*Pal para*) in Babulia and Jhikra, examining their past, present, and future socio-economic conditions and how these impact their livelihoods. The primary focus was on why community members are increasingly shifting away from the traditional pottery profession. Due to time constraints, the fieldwork was limited to the Satkhira. The scarcity of secondary data on the pottery industry in Bangladesh made primary data collection through fieldwork essential. The findings aim to uncover the factors driving the shift from pottery to other occupations within the Pal community, addressing these issues with careful attention to detail in both field interactions and respondent conversations.

Considering Field

In the neighbouring villages of Babulia and Jhikra, 51 potter families are found; 29 in Babulia and 22 in Jhikra. Out of these, 14 families of Babulia make pottery craft their full-time occupation, while 5 families practice it part-time, balancing their crafts with other forms of employment. The rest of the 10 have altogether abandoned the work of pottery and taken to different professions like shopkeeping, day-laborers, and goldsmiths.

Table 1
Total Number of Potters of *Babulia* and *Jhikra* Villages Engaged in Pottery Crafts

	Total Number	Engage in Pottery Profession		Shifted Profession
		Full time	Part-time	
Male	68	38	9	21
Female	47	47	00	00
Total	115	85	9	21

In Jhikra, 11 families continue to follow their ancestral profession of manufacturing pottery, while 3 families work it part-time. The remaining 8 families have given up on their traditional craft in favour of other forms of employment. This distribution shows the evolutionary dynamics of the pottery profession within these villages and the diversification in livelihoods within the potter families. Considering the productive age of potters in these two *Pal Para* ages between 17 to 65 years old fully engaged with the clay production. The total number of male potters is 68 where 38 potters engaged in this profession as full time 9 potters as part time and 21 potters have shifted to other professions. Concerning male potter, women have been involved in the pottery profession in a large number. Where women have not shifted to other professions or not involved with another profession as part-time. These are the present scenario of the pottery profession in this area which is gradually changing day to day.

Research Findings and Discussion

In mid-May, I visited Babulia in the Satkhira District for the first time to observe local pottery-making practices and meet the artisans and community people. Among the artisans, I spoke with Niranjan Pal, a 65-year-old potter who had lived in Babulia since birth and had been crafting clay products since the age of 14. Following are the excerpts of my interview with him.

How was the previous situation of the pottery in this region?

The historical context of the pottery industry in my village had a glorious past, where my family has been engaged in pottery-making for generations. I still remember how the industry once thrived, with my father and ancestors producing a wide variety of clay products such as *kalshis*, *patil* (cooking pots), *nanda* (animal feed pots), dolls, jars, and other utensils. These items were widely sold in various markets, with my father transporting them by

> boat. In the past, pottery played a significant role in daily life, as Bangladeshis commonly used earthenware for cooking, water storage, and children's toys. However, over time, the diversity of products has diminished, driven by changing customer demands. Also, gods and goddesses especially in the Durga Puja festival). Today, production is largely limited to a few specific items, such as *dohi malsha* (curdled milk pots) and *vaar* date, palm juice pots). The industry's decline reflects a broader shift away from traditional clay products.
>
> (Niranjan Pal, 65)

In the early 1980s, the introduction of plastic and aluminium products in Bangladesh marked the beginning of significant changes in consumer preferences (Khatun et al. 2023). These materials were increasingly adopted for daily use, a shift influenced by the promotional efforts of cable TV through commercials.

Fig. 2. Local pottery shop in Babulia Baazar

Fig. 3. *Dohi Malsha* (curdled milk pot) drying under sunlight

Fig. 4. Anima Pal, shaping winter cake vessels

Consumers find these new inventions to be long-lasting, useful, and cost-effective, favouring items such as aluminium pots for cooking and water jars, as well as plastic toys. Despite the declining demand for clay products, Niranjan Pal remained committed to his profession, as pottery was the only profession he knew. Anima Pal, 50, reflected on the changes in the pottery industry. Even 20 years ago, despite the growing popularity of plastic and aluminium, clay products were still commonly used in daily life. However, after 2000, the situation worsened as rapid improvements in road transportation, electrification, and the spread of cable networks in both rural and urban areas accelerated the shift away from traditional clay products (Taheruzzaman et al. 2016).

Additionally, the difficulties in collecting raw materials, particularly high-quality clay, which is now expensive and often sourced from distant locations due to competition with brick kilns. Simultaneously, the increasing prices of clay, paint, and firewood.

> My father was convinced that formal education wasn't essential for us, believing that our craft would provide a better life. He wanted to pass in us the skills of good potters. However, as time passed, situations changed, and we realised we couldn't pivot to another profession. We are uneducated and lack the necessary skills for different jobs, which leaves us with no option but to stick with this work.
>
> (Anima Pal, 50)

Furthermore, the traditional pottery profession is struggling due to modernization, with artisans like Santash Pal facing challenges from new products and a lack of innovation in design. Despite the difficulties, they remain committed to their ancestral craft. None of the new motifs for designs has yet been created (Roy 2014). There is also an artisan who chose pottery over other professions and education, driven by a passion for the craft and family's legacy, sells both clay and other cottage products, adapting to modern demands by diversifying inventory. Most of the participants of the interviews agreed and believed that, with proper care and innovation, pottery can remain a profitable profession.

The pottery craft decline is due to not only the scarcity and rising cost of clay, but also increasing transportation costs, and the diminishing navigability of rivers caused by sedimentation and illegal occupation by brick kilns, fish farms (*macher gher*), and households (Hussain 2018). Major rivers like the Betna, Kopotakkho, and Betraboti shaped the pottery industry by storing sand and clay but also created challenges for boat transport due to sedimentation.

This has significantly reduced the navigability of these waterways, shifting transportation to more costly road-based methods. However, the cost of raw materials and transportation was lower in the past, contributing to the industry's better condition. The dissection to significantly increase product prices, despite rising production costs, further disincentivises potters, leading to a loss of interest in the profession. The introduction of plastic and aluminium in Bangladesh posed significant competition for pottery products, as these materials offered durability that pottery could not match. This led to a rapid shift in consumer preference towards the new materials, prompting many potters to consider alternative professions for survival. Additionally, both government and non-governmental organizations have shown little interest in supporting the pottery sector. A conversation with the Regional Director of the Bangladesh Small and Cottage Industries Corporation (BSCIC) in Satkhira revealed that there is no specific sector dedicated to pottery within the corporation, and it is instead grouped under small and medium cottage industries.

Furthermore, there is no targeted funding for pottery, and it is not recognized as a development project by the government. Consequently, the government does not prioritise pottery as a sector with the potential for cultural heritage and development.

Voices from the Kiln: Perspectives on an Ancestral Craft in Crisis

Forced Transformation

In early December, I visited again to Jhikra, a small village in the Satkhira District, renowned for its artisans and craftsmanship. The village was around ten-minute walk from the main road, along a sandy, dusty path. When I reached there, Malay Pal was busy drying curdled milk pots and date palm jars under the sun, with yards filled with clay products. Malay's wife offered us a tray of *Shiter pitha* (traditional cake specially from the Indian subcontinent), a traditional winter snack popular in Bangladesh. But he was disappointed about his profession and present financial conditions.

It seems conflict between shifting to other profession or holding this ancestral craft occupation.

> Pottery is a skilled craft, but potters often struggle to get fair prices for their work. Climate change has drastically altered Bangladesh's seasons, reducing them from six to three (summer, winter, and monsoon). The extended rainy season makes it challenging to produce and dry clay products due to frequent rainfall. These climate shifts, particularly noticeable in coastal areas, pose a significant threat to Satkhia area.
>
> (Malay Pal, 27)

Fig. 5. Anjana Rani Pal and Lakkhi Rani Pal shaping *dohi malsha* (curdled milk pot)

Fig. 6. Burnt *dohi malsha* (curdled milk pot)

Farmers' observations indicates that longer winters, summers, and monsoons, coupled with shorter springs, are likely to negatively impact agriculture in the region. Bangladesh's seasons have shifted dramatically: winter has extended from 2.5 to 3.75 months, summer has doubled to 5 months, and the rainy season has lengthened from 2.75 to 3.5 months. Meanwhile, spring has shortened by half a month to 1.5 months (The Daily Star, 2011). The month of *boishakh* faced huge rain in the first three weeks and lost lots of clay products but the main monsoon starts from the month of *ashar* (3rd month of the Bengali calendar) and it was extended to the first of *agghrayan* (8th month of Bengali calendar).' In the first three weeks of the month, nearly 8,904 mm of rain has been recorded against the April average of 4,053 mm. Some 10,000 mm of rainfall was

recorded in April 1981 (Chowdhury 2017). Potters are discouraging their children from continuing the profession due to its declining viability. Many are experimenting with alternative crafts like jewelry and crockery. The traditional pottery market has been largely replaced by utensils made of silver and other materials. Seeing jewelry makers and shopkeepers earn more with less effort, potters are losing interest in their trade and considering shifting to more profitable occupations (Akter 2009). Male artisans in alternative occupations often have fixed incomes or sell their goods directly. In contrast, women in pottery focus on making and firing pots, confined to home-based work. They are playing the main role in pottery such as making pots and firing the product. However, the insufficient earnings from pottery keep the families near the poverty line (Anwar 2012).

Additionally, rising costs of soil and firewood, coupled with seasonal challenges, are diminishing pottery's profitability (Debnath 2017). Unlike in the past, when children eagerly learned the craft from their parents, today's youth are losing interest in this ancestral profession. They consider pottery as troublesome and unprofitable. Modernizing the industry with new methods, markets, and ideas could revitalise it and potentially reignite interest among youth (Debnath 2017).

Market Dynamics and Social Shifts: Pottery, Policy, and Changing Perceptions

Understanding the Market Mechanism

In early December, during my second field visit to Satkhira, I travelled to the village of Jhikra, a small rural locality where potters have lived for decades. The village is about a ten-minute walk from the main road, along sandy, dusty paths. It was a pleasant day when I arrived at the home of Malay Kumar Pal, who lives with his family. In the yard, which was typical of potter households, raw clay products, including *dohi malsha* (curdled milk pots) and *vaar* (date palm jars), were drying in the sunlight. I spoke with Malay and his father, Kartik Kumar Pal, over traditional winter snacks, *shiter pitha.* Malay shared insights about their traditional pottery profession, noting its once-glorious past. The declining profitability and lack of fair pricing for their labor-intensive craft.

The renowned sweet shops *Satkhira Ghosh* Dairy, *Dulal Mishtanno Vandar, Jahangir Misty,* and *Ghosh Mishtanno Vandar* are the primary buyers of *dohi malsha* in this region, though their patronage is not consistently guaranteed. A notable number of participants agreed "To establish a more stable relationship, a one-year contract could be implemented, benefiting both parties by ensuring

mutual commitment. Such an agreement would eliminate the artisans' need to seek alternative buyers and the shops' need to find other potters. The contract would outline the artisans' obligation to deliver the required quantity of products and the buyers' responsibility to make timely payments. During the contract period, terms would remain fixed, preventing price fluctuations from either side. Additionally, the agreement would stipulate that product quality must be maintained throughout the duration.

Fig. 7. Satkhira Ghosh Dairy sweets shop

This arrangement would provide security and stability for both the artisans and the sweet shops, fostering a reliable business partnership".

> These days we cannot apply the traditional crafts design and pattern passed down from our forefathers due to a lack of demand. Additionally, neither the government nor the private sector has taken steps to develop or promote pottery craft as part of tourism and heritage, whether cultural or structural, in Bangladesh.
>
> (Santosh Ghosh, 42)

Captivating the Market

Satkhira Ghosh Dairy is the most popular chain sweet shop in the region, with over 150 outlets across Bangladesh. As stated by Nibaran Ghosh, the manager, their *dohi* (curdled milk) and *sandesh* (sweetmeat) are most popular. In Satkhira district alone, there are 09 shops that produce more than 400 pieces *dohi* daily to

meet local demand. But export of pottery crafts from this area is zero though Savar, Dhamrai (Dhaka) pottery village export their products to different regions specially Europe.

Table 2

Handicraft Establishments, IDLC Finance PLC, 2024. (*Monthly Business Review*)

Establishment Type	Total Establishments	% of Total Establishments	Gross Output (In BDT Crore)
Bamboo and Cane Industry	32,224	43.80%	1039.2
Pottery and Tepa Puppetry	14,108	19.20%	587.5
Nakshi Kantha Crafts	6,517	8.90%	169.3
Kurushkanta Product Industry	5,699	7.70%	105.7
Sheetal Pati (Carpet)	3,538	4.80%	82.0

The Exporters Association, Banglacraft, contributes to the promotion of handicrafts made in Bangladesh for export purposes to 50 countries including the USA, France, Germany, Spain, Holland, Belgium and Japan. Around 80% of these handicrafts are exported to European countries. In Table- 2, 19.20% of all establishments are engaged in Pottery and Tepa puppetry, although the majority, 43.80%, are in the bamboo and cane industries.

Table 3

Distribution of Lending Institutions

Institutions	Percentage of Lending (%)
NGO	86.70%
Bank	7.60%
Government Organisations	4.70%
SME Foundation	4.60%
Private Organisations	1.90%
Joyeeta Foundation	0.10%

The variety of items exported to foreign countries includes *nakshi kanthas* (a traditional Bengali embroidered quilt art form), *nakshi* bedsheet, home decoration items, carpets, hand-knit fabrics, terracotta, earthenware, jute-related products, and bamboo crafts (Sachee 2024). Table 3 illustrates that 86.70% of loan funds originate from NGOs, followed by 7.60% from banks, and just 4.70% from government agencies. Thus, we may observe that government intervention is minimal.

Taking a loan is also a very complex process for village people. Most of them are used to take loan from local money lender where the rate of interest is higher than any financial institution. Another option is bank or NGO loan but the procedure is very complicated for villagers (Bhattacharya 1980). Due to the fact that formal financiers face hindrances in extending credit facilities, handicraft establishments largely rely on NGOs to finance them. Such hindrances include lack of security, poor documentation, lack of bank transactions, and non-existent payback records (Sachee 2024). Clay craft are not

only used to carry deep local traditions, emotions and memories for the community but also have great importance for a country's cultural heritage value.

> This market has four permanent craft shops, including mine. I try to keep as many pottery items and cottage goods as my customer prefer. Since this is an upazila area, I also keep some home décor items, which have become quite popular among local customers. People are increasingly interested in cottage products (Bamboo, Wooden). However, to sustain this industry, we need a significant public-private initiative.
>
> (Sanjay Kumar Pal)

The marketing of pottery is limited, and even struggle to reach potential customers due to various constraints. People come with own interest, often through referrals from other customers. This information gap makes it challenging for artisans to engage with customers. According to the Federation of Bangladesh Chambers of Commerce and Industry (FBCCI), this industry should be assessed on a case-by-case basis, and financial assistance can be provided through the Entrepreneurship and Equity Fund (EEF). It is important to note that domestic demand for pottery is rising, which could enhance its trade locally. Export opportunities could further increase its value, and support from the EEF could facilitate this growth (Rahman 2017). If people recognise pottery as cultural heritage, it will help preserve the art. He also emphasises the need for community awareness (Haridas Pal, 43, Babulia).

The cultural landscape of Bangladesh is known by numerous rural and urban fairs, organized by both government and local communities, that serve as vibrant expressions of the nation's diverse heritage and culture. These events, ranging from the *boishakhi mela* (Festival celebrates on 1st day of Bengali New Year) to Durga Puja and the Muslim festivals of Eid-ul-Fitr and Eid-ul-Azha, provide a platform for cultural exchange and economic activity. A notable feature of these fairs is the presence of potters who showcase and sell their clay products, reflecting the enduring significance of traditional craftsmanship in both rural and urban contexts. These temporary marketplaces, typically lasting between two to seven days, create a dynamic space for cultural celebration and commerce. Of particular importance is *pahela boishakh* (1st day of Bengali New Year), the Bengali New Year celebrated annually on April 14th, which is marked by the *baisakhi mela*. This event serves as a center of attention for the celebration of Bengal's rural heritage and culture.

Educational Growth and Occupational Shifts

The adult literacy rate in Bangladesh was reported at 76.36% in 2021 (World Bank 2024). This rate indicates the percentage of individuals aged 15 and above who are able to read and write a simple statement about their daily lives. The rate in 2020 was a slight increase from the 74.68% in 2019, which itself was a minor increase from the previous year (World Bank 2024).

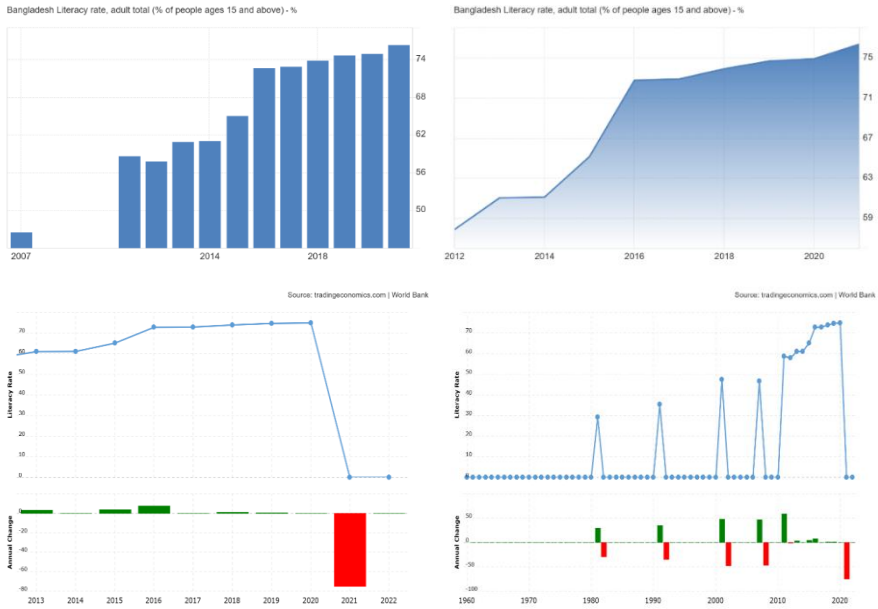

Fig. 8. Bangladesh - Literacy Rate, Adult Total (% of People Ages 15 and Above), World Bank

The literacy rate in Bangladesh has improved significantly in recent years due to advancements in the education system. Initiatives such as food for education, scholarships for primary education, and the provision of free educational materials for higher secondary education have contributed to this progress. Suresh Pal, a 70-year-old potter from Jhikra village, shared his experience, stating that education was once a distant dream due to its high cost and inaccessibility. However, he noted that education is now readily available in his locality. The shift in accessibility is also reflected in the changing professions among the youth. For instance, one of Suresh's grandsons, who received two months of computer training, now works as a computer operator in the local market. He earns money by loading songs, movies, and games onto others' mobile phones, a testament to the decreasing appeal of traditional professions like pottery.

> My son is currently a higher secondary student and is performing exceptionally well in his studies. He has no interest in continuing our ancestral profession, as it involves working with clay and mud, which is both physically demanding and labor-intensive. I fully support his decision, as I want him to have a better future.
>
> (Ranjan Kumar Pal)

Social Stratification

In Hinduism, potters belong to the Shudra caste, which is considered a lower craft caste. This positioning creates an unequal relationship with upper-caste Hindus, distancing them from mainstream society. The concept of 'dominant caste' reflects how the caste system has merged with class structure, leading to new social dynamics where class cuts across caste boundaries (Mukherjee, 2000:338). Kartik Pal, a local pharmacy shop owner, claims there is no evident caste or class divide in the community. However, certain traditions persist; for instance, it is not acceptable for a Pal caste boy to marry a *muchi* (scheduled caste) girl, whereas marrying a girl from an upper caste is allowed.

Hence, caste and class stratification simultaneously play a driving role in their changing occupations. Class struggle complicates their daily lives while financial affluence divides power. As a result, the income earned through clay craft remains at the bottom of their social class hierarchy. Additionally, the youths do not turn to this cultural artistic work and change their profession in other directions. Amal Pal shares, "Uncertainty of social and financial security has led to youth turning to jobs and migrating to Dhaka, Khulna, Chittagong and other cities in search of work such as, labourer, brick kiln, garments factory worker, etc. A picture we see even when we look at potters in India". Not only that, as the region is prone to natural calamities, most of the marginalized people work as seasonal migrants for a significant period of 3/4 months of the year in different parts of the country.

Skill Deficiency

Potters traditionally acquire their skills through generational training rather than formal institutions, resulting in limited opportunities for skill development. The lack of institutional training facilities and awareness among potters contributes to the production of lower-quality clay products, which diminishes customer satisfaction and market demand.

Furthermore, upgrading the artisans' skills through undertaking proper training and education in the area would help in the modernization of the production technique and improvement of product quality (Kasemi, 2014).

Perceived Sustainability of Clay Crafts

Today, it is concerning for the community to keep clay crafts as a traditional craft. However, nearly all artisans desire to conserve and preserve them as part of our cultural heritage. Yet, there is a tipping point beyond which artisans resist further changes, feeling that excessive change threatens local culture. Even the prospect of increased income does not compensate for this perceived cultural erosion.

Importantly, artisans do not consider product development as the only way to preserve their crafts. They are confident that certain sacred items, such as vases, or depicting Hindu deities, will endure due to their integral role in Bengali life. In the clay craft specifically, NGO support has been crucial in helping products retain their original meaning and cultural significance. This situation highlights a delicate balance: while some development is necessary, pushing too far can threaten the sustainability of craft products. To address this, several steps are needed:

i. *Recognition*: The craft sector should be formally recognised as an industry, emphasising its heritage value.
ii. *Promotion*: Extensive publicity is required to raise awareness and appreciation for these crafts. Arrange workshop for live demonstration to encourage youth.
iii. *Unification:* Bringing artisans together under a single organization could facilitate knowledge sharing and skill development.
iv. *Exhibitions:* Craft exhibitions can play a vital role in showcasing and preserving traditional techniques.
v. *Government support*: Implementing policies similar to those supporting the jute industry in Bangladesh could benefit the pottery sector. This might include incorporating craft support into social safety net programs. And introduce it as cultural heritage.

Traditional crafts can be preserved while maintaining their historic and cultural importance by providing structured encouragement and striking a balance between development and preservation.

Conclusion

In Bangladesh, pottery has traditionally been a family-based ancestral occupation, primarily operating as small, family-run businesses. Historically, clay products held significant appeal among the rural middle class, serving as essential household items. However, since the early 1980s, this scenario has dramatically shifted with the introduction of modern alternatives such as plastic and aluminium products. These changes have adversely affected the pottery

crafts in the Southwestern part, making it evident even without extensive research that potters now face severe challenges. These include an irregular supply of raw materials, inadequate capital, climate change impacts, and a disconnect between potters and consumers. The first major disruption occurred when plastic and aluminium products entered the Bangladeshi market, causing a sharp decline in the demand for clay items. This sudden shift led to widespread unemployment among potters and created a sense of insecurity that posed a significant threat to both the artisans and the pottery industry as a whole. Consequently, many potters were forced to abandon their traditional craftsmanship. The obstacles hindering the growth of pottery businesses stem from both internal weaknesses and external threats. While internal challenges can be addressed through community efforts and appropriate support, external threats require government intervention through effective policies, strategies, and implementation. The decline in the pottery sector is not purely an economic issue but also involves deep social dynamics. Caste and class relationships continue to play a role in rural Bangladeshi society, with class distinctions primarily based on economic status but also influenced by social acceptance, where caste still matters. This makes it even more difficult to sustain traditional crafts that in itself has a social dimension in the negative resentment towards caste and working in crafts.

Therefore, it is essential not only to provide institutional support to improve the economic situation of the Pal community but also to address social factors that are equally critical for the well-being of the community. The interactions of caste, class, and occupation contribute to their disadvantage in terms of access to better opportunities and institutions.

In addition, inconsistent rainfall and protracted monsoon seasons impede the production and drying of clay, which reduces the level of profitability. Many strategic actions are recommended to achieve the sustainability and revival of the clay market. Public-private partnerships can support the community while modernising manufacturing techniques without losing traditional methods. Additionally, recognising crafts as an industry and providing social protection, including craft support services, can help develop the sector and improve people's socio-economic conditions. Forming cooperatives and participating in exhibitions can help artisans engage with markets more effectively. These measures together can strengthen the craft industry and benefit both artisans and the wider community.

Based on the result of the present study, the preservation of pottery as a form of cultural heritage necessitates a paradigm shift in community awareness, emphasising its collective heritage value over purely commercial considerations. This approach requires a multifaceted strategy that begins at the grassroots level

and expands to encompass broader societal recognition. By reframing pottery as an integral component of cultural identity rather than solely as an economic endeavor, communities can foster a deeper appreciation for this traditional craft. This recontextualisation serves to safeguard the pottery crafts by imbuing it with cultural significance that transcends market fluctuations. The dissemination of this perspective should be initiated at the local level, leveraging community networks and educational institutions to instill a sense of pride and ownership in this shared culture. Subsequently, this localised effort can be scaled up through regional and national initiatives, potentially incorporating policy measures and cultural programs that reinforce the importance of pottery as a tangible link to historical and artistic traditions. This comprehensive approach aims to ensure the long-term viability of pottery as both a cultural practice and an industry, anchored in its intrinsic value to society.

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Craftsmanship in the Pabbar Valley in Western Himalaya

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Abstract

Himachal Pradesh is known for its cultural heritage as well as its craftsmanship which is diverse in every district. Present research takes into consideration two workshops in Pabbar Valley of Rohru area in Himachal Pradesh. First workshop deals with artisans working on temple motifs and wood carving. Second workshop deals with the artisans dealing with Mohra carving process. Woodcarver (takshaka), temple builder (Sthapti) and Coppersmith (thathara) has been taken into consideration in the backdrop of their tools and technologies used for the renovation and restoration of temple walls, doors, ceilings and Mohras of Maheshwar temple in Pujarli, Rantari and Bondra Devta temple in Banchhoch in Pabbar valley. It also takes into consideration the social and economic position of craftsmen. Both, literary and empirical methods run parallel while shaping the work. The paper concludes with three observations: a) Wood carving still holds a major part of temple construction and decoration b) Artisans use several motifs and folk symbols along with popular symbols, c) Use of metal in mohra shows shift in tool technology used by artisans.

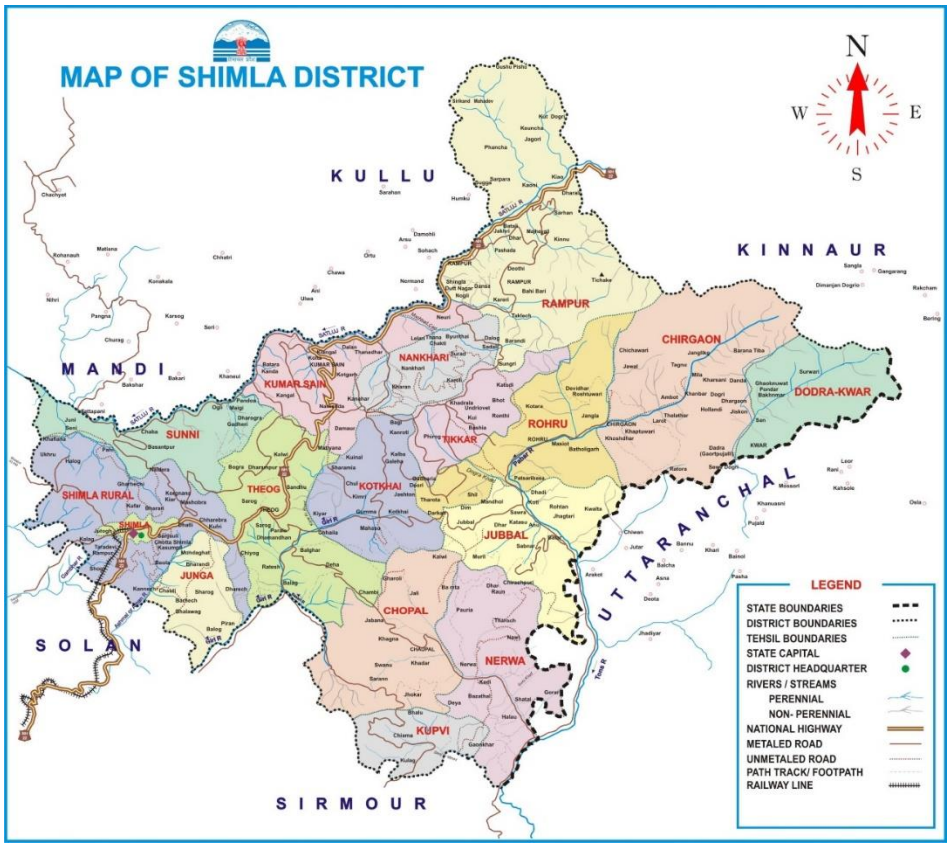
Keywords: craft, Pabbar, Rohru, *Sthapti*, *Taksakara*, *Thatara*, wood-carving

Introduction

Himachal Pradesh is a small state which derive its popular name as land of snow-mountains and as *dev bhumi* (Ahluwalia 1998). It has twelve districts where diverse forms of craftsmanship prevails. For the present study, the area in focus is Rohru which is in upper part of Shimla district. It is situated on the right bank of the Pabbar River so, the area is known as Pabbar valley.

Present work emphasises on art, wooden temples, sculpture, artisans, their traditional tools, and social and economic space in the society. This work is divided into three major parts. First part focuses on artisans of Rohru, mainly coppersmith known as *thathara*, second part of the present work is related to woodcarving and artisans who are involved in this craft known as *takshaka*, and third part is related to wood carvings done in various parts of temples. A small discussion on *Mohra* making has also been presented.

Since ancient past, temples were decorated with doors, ceilings and various fillings carved in teak and other wood with patterns of extreme richness and minute elaboration. Very few studies on workshops of craftsmen dealing with wood, stone or metal in the temples of Rohru valley has been done. It was never



Map. 1. District Shimla, Himachal Pradesh (India) showing Rohru area from https://www.google.com/imgres.Map-of-district-Shimla-scaled.jpg (22.07.2024)

the case that craftsmanship of this area was never noticed or admired. Some travelers, like James Baillie Frazer, Sir William and Captain Alexander Gerrard, and Godfrey Charles Mundy visited different areas of Himachal Pradesh including Jubbal. They all admired the wood carving of Himalayan region. Wood carving is surviving in this area in the form of temples, which are decorated in motifs carved by craftsman with the traditional tools.

Temples of Himachal Pradesh are categorised by the foreign as well as native scholars from nineteenth century onwards on the basis of different part of temples. Roofs of temples in Himachal Pradesh are shaped by the climatic condition. Most of the temples have slopping roof. Walls of pent roofs temples are constructed in *Kath-Kuni* style. Pillars a ceiling is also the important part in temples and they are constructed in traditionally ways.

Present work along with field survey, has taken into consideration various readings like; Ananda K. Coomarswamy's *The Indian craftsman* (1909) which is a great work in developing an understanding on the craftsman and their wages system. J.Ph Vogel's *Antiquities of Chamba state* (1911) presents an analysis through the inscription of Maruvarman's reign in Chamba where the names of artisans like Gugga appear very interestingly. Stella Kramrich's *The Hindu Temple* Vol. 1 and 2 (1911) remained very useful book for understanding the concept of building the temple. V.S. Agrawala's *Indian Art* (1965) is a great work to develop the understanding, chronological sequences of art and crafts activities from Stone age to Gupta age. J.F. Fleet's *Corpus Inscriptionum Indicarum: inscription of Gupta Kings and their successors*, (1970) Vol. 3, proved a great work to enhance the understanding and draw the chronological sequence. Percy Brown's *Indian Architecture: Buddhist Hindu Period* (1971) remained useful to understand the temple architecture.

To develop understanding on regional art and temple form, A.P.F Harcourt's *Kooloo, Lahoul and Spiti* (1972) proved useful to find first classification of the temples of Himachal Pradesh. Penelope Chetwode's *Kulu-The end of the Habitat world* (1972) helped in categorisation of temples. Mian Goverdhan Singh's *Art and Architecture of Himachal Pradesh* remained helpful in developing a basic understanding of indigenous art which is peculiar to the land such as metal art, wooden art and temples art. M. Postel, A. Neveen, K. Mankodi's *Antiquities of Himachal* (1985) and Herman Gotez's *The Early Wooden Temple of Chamba* (1995) hinted through inscriptions and temples how the temple art arrived in Himalayan Region.

Laxman S Thakur's *The Architectural Heritage of Himachal Pradesh: Origin and Development of Temple Styles* (1996) is a bench-mark attempt in developing an understanding on evolution of temples, different types of temples, plans of temple and information about the different parts such as pillar, ceiling, walls etc. Mian Goverdhen Singh's *Wooden Temples of Himachal Pradesh* (1999) proved very useful work to develop an understanding of basic temple architecture and categories of temples on the bases of structure and pattern of roof in western Himalayan region. O.C. Handa's, *Temples Architecture of the Western Himalaya Wooden Temples* (2001), *Woodcarving in the Himalyan Region* (2006) has proved a very useful work during the field survey on quality of different woods, different types of wood carving and detailed information regarding the motifs. Hari Chauhan's *Cultural Heritage of Pabbar Valley* (2012) remained useful book to understand the base of art, crafts and craftsmanship, fair, festival and culture of Pabbar valley.

Research Methodology

The present study is based on the primary as well as secondary sources. Primary work has been done through field survey conducted during 2018-2023, where 2019-2021 remained Covid-19 affected years when no temple related activity was performed. Besides empirical studies, literary sources have been consulted time-to-time to draw comprehensive outlook.

Objectives of Research

1. To know socio-economic conditions of artisans of Pabbar valley
2. To study the tools of carving used by different artisans involved in temple work.
3. To study the development of temple styles in Pabbar Valley.

For the present study, Maheshwer temple Pujarli, Temple Rantari, and Bondra temple Banchhoch were taken into consideration where renovation at various levels took place during 2018-2023. Several visits to artisans' workshop and woodcarver's workshop at Pujarli and Rantari were conducted. Seven artisans and nine woodcarvers were interviewed at different time intervals. During the field survey, researcher visited three workshops, two related to the temple building; and one related to *Mohra* casting where he observed tools of wood carving and casting. Tools of wood carving are different from the tools of casting, so are the artisans.

Historical Background of the Artisan

A person who does skilled work with his hands or make things in a traditional way with his hands is known as artisan (britannica.com). Laxman S. Thakur places all artists in a single group, called *silpin* (122). The word *silpa* occurs frequently in ancient Indian literature and denotes various, arts, crafts and occupations. Several artistic activities were prevalent from the beginning of Stone Age such as ostrich eggshell were engraved with cross-hatch patterns, green pigment pieces at Bhimbetka and fragments of red ochre ware reported in Baghora sites in the Son valley (Dhavalikar 2013). Harappan age was one of the productive ages for the artistic activities (Dikshit 1939). It is evident from the presence of thousands of artifacts found in various centers of the culture. It is clear after analysis of the artifacts and monuments that Harappan people were skillful artisans. Bulk population of the Harappan people must had belong to various arts, crafts, and professions such as conch, alabaster and ivory, pottery, terracotta, stone and seal cutters etc (30-31). With the beginning of Rigvedic age, reference of artisans as *taksakas* (carver), *karmaras* (blacksmiths), and *rathakaras* (chariot makers) etc started appearing *(RV* X). Stella Kramrich

narrates the origin of various artisans from Visvakarman who begot nine illegitimate sons from *sudra* woman. They were called, *malakar (*garland maker), *karmakara* (blacksmith), *sankhakara* (conch maker), *Kuvindaka* (weaver), *kumbhakara* (potter), *kamsyakara* (metal bell-maker), *sutradhara* (architect carpenter), *citrakara* (painter) and *svarnakara* (goldsmith), all they were expert in their art (8).

During Mauryan and post-Mauryan period, religious, social and material conditions certainly brought forth the demand of artisans. The multiplication of various religious sects and localisation of center of power, acceleration of temple and other artistic activities, primarily contributed to the emergence of a class of artisans who specialized in their respective fields. This phenomenon was not restricted to this emergence only, but various treaties known as *Silpasastras* and *Vastusastra* were composed in which specific rules and regulations concerning temple, sculpture, palaces and forts have been provided. These two terms *Silpa* and *Vastu* have been used interchangeably both in literature and inscriptions. *Silpa* generally signifies the whole mechanical art, whereas *Vastu* is applied by way of preeminence to architecture (Thakur 1996).

During Gupta period with the rise of artistic activities, in literature and inscriptions abundance of examples of artisanal activities are found. Traced back to Gupta period, mention of artisans and guilds suggest that they thrived in urban crafts and trade centers. Mandsaur inscription refers to the silk weavers, who built the Sun temple (Fleet 86). Stella Kramrisch has categorised professional artists into four groups namely:

1. *Sthapati* - the chief architect
2. *Sutragrahin* - expert in drawing
3. *Vardhakin* - specialist in painting. It also refers to one who was dexterous in joining wood
4. *Taksaka* - who was expert in carving

These craftsmen carried out the instructions of the *Sthapka* (guide of *sthapati*), who had a qualification of an *Acharya*. These artists had always worked within a very strict delineated tradition. *Sthapati* must have the knowledge of mathematics, history, geography, painting, draftsmanship, mechanics, and science of architecture (Kramrisch 1946). The word *sthapati* exceptionally occurs in the inscriptions. None of the inscriptions from Himachal Pradesh mentioned it (Thakur 1996).

Early Artistic Activities in Himachal Pradesh

Indian art in the Himalayan region has been of late arrival. Due to dominance of indigenous art and culture, the influence of Indian art was feeble, and archaic forms persisted much longer than anywhere else. The coins of the Audumbaras (2^{nd} - 3^{rd} century AC) depict railing, which is still in continuity in Himalayan folk art (Goetz 1995). These are the earliest references of the artistic activities in Himachal Pradesh. With the downfall of Gupta Empire, many artists penetrated to this region due to the political and social disturbance in north-west region. Several monuments in this region were built at several places after the Gupta age such as at Sirmour, Kullu and, Chamba etc.

These artists who were referred to as *silpi, sthapati, taksaka* in literature were skilled in their profession. It is conspicuous from their monuments in the region. Inscription also provided some information about the artisan. The image inscriptions of Meruvarman from Bharmaur and Chatrari, ascribed to the early 8^{th} century AC mention the master craftsman Gugga, who was engaged in the construction of four temples and who, with other artisans, casted the brass images of Laksana Devi. He was probably the head of the Bharmaur workshop and supervised the whole group of artists (Vogel 1911).

Laxman S. Thakur argues that stylistic analysis of temple and sculpture yields information on the migration of various artists from Rajasthan, Kashmir, Centre India, Uttar Pradesh and Bengal to Himachal Pradesh. The artisans who executed the Hadimba temple at Manali probably went later to Udaipur where they decorated Mrikula Devi temple as well. Thus, it is most likely that skilled craftsmen moved from temple to temple wherever they were required (126).

Role and Position of Artisan in the Society of Pabbar Valley

Several earlier studies prove that the penetration of Brahmanism in to Himalayan region brought caste and professional hierarchy in region which is prevailing even till today. During the survey of Rohru region in Pabbar valley, researcher when tried to see the caste of artisans belonged to, he found that most of the craftsman belong to lower castes such as *thathara* (coppersmith) and *luhara* (blacksmith) etc. The *sonar* (goldsmith) did not fall in lower castes in the social system. They got higher social status in society, but rest of the artisan's face discrimination like untouchability and prohibitions in temple and house of higher castes. The irony was that they could not even enter the temples they have built. Once the work is finished and deity gets seated (*pratishtha*), artisans who built idol were not allowed inside the temple (Field survey 2018 and 2022).

Economic Condition of Artisans of Rohru

The basic source of the income of artisans was agriculture and crafts. Once they were free from agricultural activities, they switched to crafts activities. Artisan's holdings of land was minimal. Sustenance on crop was not sufficient for their family survival so they simultaneously focused on craft (Interview Radhe).

Artisan earlier were fed on behalf of the temple, and their payment were mostly in kind. Barter system of payment existed in Himachal Pradesh. Under this system a certain share of grain was paid after regular intervals to the artisans, as a reward of their services at the time of harvest. The measures were counted in *Patha* (a utensil used for grain measurement). According to artisan Jobandass, age 56 at Pujarli village, presently village artisans are paid in kind. Till few years ago in Pabbar valley in Rohru area, blacksmith, coppersmith and carpenters, continued to receive share at the time of harvest. Post-covid situation changed this age-old practice to some extent (Interview).

During the field survey, in an interview with a blacksmith Virender, age 42 in Jounli village, when asked about *batai* or barter system, he informed that these people used to make tools for the whole village community and in the form of wages, villagers used to give them grain on specific days of the year. Usually these days were festival days like Shivratri, Magh Saza, Baisakh saza etc., But as a post-covid effect, certain changes occurred and now artisan get their wages in cash form that ranges between 400-1200 rupees per day (Interview).

Education Level of Artisans of Rohru Valley

Artisan's formal education remained severely limited but their skill has travelled generations. In the *Samarangana-sutradhara* a treatise on architecture, the author King Bhoj of Dhara, says: He, who begin to work as an architect (*sthapati*) without knowing the science of architecture (*vastusastra*) and who is proud with the false knowledge must be put to death. He, who thought himself well versed in the traditional science and who is not skilled in the work will faint at the time of action like a timid man on the battle field. He, who expert only in workmanship, but is unable to understand the meaning of traditional science, will like a blind man be misled by anyone (Kramrisch 1946). It shows that artisan should have specific knowledge of his field.

Most of the inscriptions of Himachal Pradesh were written either in Sarada or Tankri, which were engraved by the *Sutradhara* and *Thathra* show numerous mistakes (Thakur 1996). It shows that artisans were skilled in crafts but were illiterate. Still the profession was hereditary. Artisan Roshan Lal confirmed that

transmission of craft skill from father to son is a part of hereditary professional life. Artisans are trained at selected sites and the learning process continues until one learns perfect techniques. It takes time for artisan to get fully prepared for the professional life. Nowadays most of the craftsmen are giving their children formal education, although some artisan whose economic condition is not good, they continue with crafts training to their children (field survey 2018-22).

Religious Belief of Artisans of Ruhru Valley

During the field survey it came to our knowledge that every village has a temple and a local deity, who is either a clan deity called *Kuladevatas* or village deity called *Gramadevta.* Artisan worship their *Kuladevatas* in their separate temple. They also worship in the village community temple but they never enter in the inner sanctum of temple. Only a *bari* (carpenter in local language) can enter in that temple with tools for the purpose of renovation.

Roshan Lal also narrated certain rules for the craftsmen when they were working in workshop inside temple etc. They have to take bath daily and they cannot get their hair and nail cut until the work is done. The artisan has to maintain celibacy because of religious nature of job (field survey).

As for the present study, three types of artisans were taken into consideration; *thathra* (coppersmith), *taksakas* (expert in carving), and *sutradhara* (carpenter). *Thathra,* makes the sculptures and traditional musical instruments. *Taksakas* are wood-carvers and *sutradhara* are carpenters.

Historical Background of Sculpture in Pabbar Valley

The sculptures of the Pabbar valley reveal that they possess the stylistic sophistication of post Gupta period. The figures of god and goddess have gently arched eyebrows, soft smile, and dignified expressions on the marvelously carved faces. These sculptures bear a close resemblance with the sculpture of Gangetic plains.

Different Type of Sculptures Defined According to the Material Used:

1. Wooden sculpture that is made by carving wood
2. Stone sculpture: A sculpture that is made by cutting stone
3. Metal sculpture: Made of metals like cooper, bronze, gold etc. Metal sculptures are of two types: one is full body sculpture and second is only bust part.

Origin and Development of Wood Carving in Himachal Pradesh

Wood carving is the process whereby wood is ornamented with by means of sharp cutting tools. It also implies the process in which wood is fashioned for aesthetic purpose. Wood is widely used for construction and embellishment of palaces, temple and houses since ancient times. It was the most popular medium for the artisan to express their artistic skill from very early time (Chauhan 2012). Wood carved temples survive till date in many regions of Himachal Pradesh, Kashmir, Uttar Pradesh and other parts of India. Each region has developed its own style of structure and carving. Tradition of wood carving in Himachal Pradesh existed since ancient times. Due to perishable nature, very few structures of ancient wood carving have survived except in some of the temples of Himalayan ranges.

Early wood carved temples which have survived in the hilly areas of Himachal Pradesh seem to be influenced by the Gupta period temples in style. Study of early stone building shows that many of the structural features are directly taken from the wooden models. The richness of wood craft can still be noticed in several carvings found in temples, palaces, and houses in the hills of Chamba, Kullu, Mandi, Shimla etc. The carved doors and window frames, facades, balconies, carved panels and pillars are all reminiscent of wood carving. Besides the architectural carvings, there are also carvings of figures of god and goddesses which speak of the mastery over the technique of carving (Singh 2012).

Besides geographical advantage of colder zone, Himachal Pradesh had and still has, magnificent forest of Himalayan cedar, deodar and its wood. If seasoned, it is one of the most durable timber in existence. Though heavy snow, rain and rough weather are some of the causes of deterioration of the ancient wooden masterpieces. When a carving decays, generally it is replaced by replica, sometimes depicting the old motifs and sometimes introducing new ideas (Singh 2012).

Earlier Studies Conducted on Wood Carving

In Himalayan region very few studies on the evolution and development of wood carving has so far been conducted. The difficult geographical terrains of the state served effectively for conservation of its indigenous art/heritage. From nineteenth century onwards the monuments of Himachal Pradesh attracted the attentions of the foreigner scholars, traders and travelers. They appreciated the wooden art of hills. James Baillie Frazer, a traveler visited the Himalayan region after the Anglo-Gorkha war 1815. He stated about the wood carving of Bhawani

temple of Kumarsain that, "the whole of the interior is sculptured over in wood, with infinite labor and probably from a detail of the exploits of deity. The whole roof which is formed of *fir* wood is richly cut into flowers and ornaments entirely in the Hindu taste, with a sharpness and precision, yet an ease that does honor to the mountain artist and considering his tools and materials it is truly wonderful"(Frazer 196).

Major Sir William Lloyd and Captain Alexander Geared visited the Sutlej valley in May 1822. They admired much the carvings on a house in Gaura, and praised the taste, skill and execution of hill artists. Gen. Godfrey Charles Mundey who visited *Deora* of Jubbal, in 1828, stated that *Deora* is, as its name would imply, a place of some sanctity. There is a very pretty modern temple, much ornamented with carved wood work. Lt. Col. Sir Reginald Rankin, who was on the tour in the Himalaya noticed wood work at Manali in Kullu and wrote in his travelogue '*A tour in the Himalayas and beyond (1930)'* that these Indians are an artistic race. Their houses are wonderfully designed and carved, even the poorest have an eye to aesthetic as in Japan (Singh 24).

Wood Used for Carving

In Himachal Pradesh, wood has several species and it is important to know each wood's specific characteristics, texture and qualities that dictate how the wood will respond to the wood carving.

1. *Deodar* (Pine)

Devadara i.e., *Deva+dara*, the wood of the God that is defined in different classical Sanskrit text. Its multi-tiered conical form and the richness of its dark green thick ever green foliage is its specific characteristic. It has been described by several characterising names, viz*daru, devakashtta*, *mahadaru, amardaru*etc (Handa 2006). In the vernacular parlance, the *devadaru* is known by various names as the *deodar, dyar, kelu* etc in wide area in the Himalayan interiors. According to the folk belief, the deodar wood will last for at least one thousand years in water; it may last for five to ten times more in air. This popular belief is well proved from the ancient wooden temples of Chamba, Brahmour and Chitrari, belonging to 7th century AC. Himalayan deodar wood comes with variety of texture long-fibered, pleasantly scented, highly resinous, water resistance and moderately hard. These qualities make it one of the most workable and supple structural timbers (Handa 2006).

2. Walnut

Walnut is a fine-grained hardwood that is dense and shock resistant. It polishes to very smooth finish, making it ideal for carving. After the deodar, walnut is most preferred variety of wood for carving (28). Besides these two popular varieties, the artisans of Pabbar valley also used some other woods like *sheesam*, teak etc. for temple carvings on ceilings etc.

Wood Carving and Motifs

The art of wood carving survived in the Himalayan region mostly in the form of temple architecture of local deity. Though wood carving has also been done in the palaces and houses as well but here we are taking only the theme of temples into consideration that comes under the category of religious wood carvings.

Religious Wood Carving

It is an artistic imagery using religious inspiration and motifs, and is also often intended to uplift the mind to the spiritual level. Sacred art involves the ritual and cultic practices. It is mostly inspired from the religion. During the field survey, researcher found that, the theme of religious wood carving was more or less based upon religious signs, gods and goddesses (field survey 2019).

Motifs of Wood Carving: Folk and Popular Motifs

Folk motifs come under the folk art as it expresses the feelings of the people in a particular group and community. Folk motifs are inspired by the nature, culture and religion of a particular place and community. In case of folk wood carving it is done by the hereditary professional artisan like *Thathar, Bari* and *Sonar* etc (Handa 26).

1) *Naga* (Serpent)

Among the folk motifs the nag, (serpent) has been the primordial and ageless one in Pabbar valley. Infect it has been depicted by the wood carver through ages in the wood carvings so intensively and extensively in innumerable manners, that it can be claimed to be the most popular motifs in the wood carving. During the field survey researcher found that the profusion of serpent motif even on the earliest folk woodcarving may indicate the antiquity of this depiction and its mystic and cultic propensities. *Naga* has commanded a primordial reputation as an ambivalent god in the Himalayan region. Although we have seen some local deity, worshiped as a *Naga* in this region. *Naga* is also worshipped as a god of

rain (*Varsha ka devata*) instead of Indra. The linear character of this device is most convenient to carve along the linear granular structure of wood. The carver has depicted this motif in various forms meandering, undulating and zig-zag to create a subtle impression of peristaltic movements. It is possible for that singular technical reason that serpent has been the most popular motif in wood carving in the Himalayan region. This motif has profusely and variously been carved in myriad compositions and combinations of the eaves-board, wall-plates, beams, brackets, pillars and numerous other structural parts. Nevertheless, the use of this device on the door, window jambs and lintels draw a particular attention (Field survey 2018-22).

2) *Mohras*

Although *mohras* are cult objectives in this region, but they have also figured as a device in the architectural wood and later in metal carving in various manners. *Mohra* i.e. a face image or a bust image is very common on the eaves board, door lintels etc (field survey) Earlier wood carvers used to make them but later metal replaces stone and wood. Now *mohra* makers form a different category of artisans.

3) Birds

O.C.Handa opines that birds have appeared only occasionally in the traditional architectural wood carving in Himachal Pradesh. These have been carved as the decorative motifs in the panels, having no relevance to the overall composition. Although we find a reasonable use of avian devices in Kinnaur where peacock has appeared variously in the wood carving (Handa 133-34). During field survey researcher found that among the birds, the depiction of peacock and parrot is the most dominated. They are depicted on the eaves board and top of the door (Field survey 2019).

4) Animals

Animals are among the most common motif of the wood carving. Mostly crocodiles, leopards, deer and antelope has been carved. Crocodile has appeared in woodcarving in various manners, but its depiction is largely confined to the front edges of *Kurads*. During field survey, researcher found that deer are commonly depicted in temple architecture. Leopard is one of the most zoomorphic carved animals, in front of door of temples. The head of the leopard is carved on the *Kurads* also. Elephants appear frequently as independent motif in the architectural wood carving in gable and eaves board (Field survey).

5) Trees, Leaves, and Geometrical Patterns

Trees and leaves are also amongst the most common motifs in woodcarving. Tree and leaves are mostly carved on eaves board, *Kath Kuni* walls, doors, windows etc. (Sivaramamurti 1974). O.C Handa states that the geometrical motifs found in the architectural wood carving suggestively have come from the patterns of the traditional weaving patterns of woolen fabrics. The chequered patterns, which have been popular in the traditional woolen products may also be seen reproduced in the architectural wood carving. However, circles, squares, triangular, etc. carved in the linear compositions spread uniformly on the flat area in various combinations and sequences are common in wood carving (138).

Each motif has specific importance; certain motifs are the cultic objects and some represent nature and its relations with human, few are borrowed from traditional art. *Naga* and *mohra* are the cultic objectives and so they are depicted as a motif. On the other hand birds, animals, trees and leaves are mostly depicted for the purpose of decoration only. The geometric forms are borrowed from the traditional weaving patterns. It seems that although artisan had no knowledge about the motifs but he borrowed them from old temples, and carved according to the space on the wooden surface.

Other Motifs

We saw the influence of Brahmanical migration in art, architecture and wood carving has been so intense, that Vaishnava gods and goddess, also accepted nothing but the goat sacrifice for being pacified. Brahmanical devices, motifs and themes may be seen profusely and enthusiastically carved on the panels, beams, wall-plates etc. (140-41).

Over the millennia of its development, Hinduism has adopted several iconic symbols forming part of Hindu iconography, that are imbued with spiritual meaning based on either the scriptures or cultural traditions. The exact significance accorded to any to the icons varies with region, period and denomination of the followers (Sharma 2017).

Major motifs in Pabbar valley are Shiva, Vishnu, Durga, Sarasvati, Ganesa etc. Mahadeva is one of the principal deities. The depiction of Shiva is mostly in phallus and body form. In Maheshwar temple of Pujarli we find a Shiva image along with Lord Ganesa. Although Lord Ganesa is also known by many attributes but elephant head makes him distinct. Ganesa is widely revered as the remover of obstacles, the patron of art and science and the lord of intellect and

wisdom. As he is honored at the start of rituals and ceremonies, that's why he is depicted on the temples walls and doors etc (Field survey 2018-23).

Tools of Artisans

The craftsman engaged in wood work is known as mason or in local dialect *bari* or *mistri.* He works with his traditional techniques and tools. His tools are simple in nature, and are prepared by local blacksmith. They are made with specification and under the instruction of carver. Craftsman uses the wide variety of tools, according to the extent of artistic ability or the nature of carving and quality of wood on which he works. On the basis of visit to an artisan workshop in temple at Pujari, crafting tools are divided into two major categories on the basis of carving (field survey 2018).

1. General tools
2. Specific tools

1. General Tools:

General tools are those tools that are generally used by the mason and carpenter. In this category falls hand saw (*aari*), adze (*basola*) planer (*randa*), Hammer (*hathodi*) scale and drilling equipment etc. These tools are commonly used for wood work (field survey 2018).

- **a. Hand Saw** (*aari*)**:** The wood lies in workshop in the form of planks, then handsaw is used to cut the planks according to the carver's needs and requirements.
- **b. Adze** (*basola)*: After cutting wood, it is trimmed carefully with adze to get desired shape.
- **c. Planer** (*randa*): It is used to plane the surface of the wood.

Fig. 1. General tools of the carpenters in Pabbar valley

Fig. 2. Adze (*basola)*

Fig. 3. Various types of chisels used for wood-carving

2. Specific Tools:

This category covers certain specific kinds of tools which are used for wood carving like chisel, knife and gauge.

a. Chisel*:* *(chheni)* Chisel is a tool with a shaped cutting edge of blade on its end. This edge is used for carving, cutting, and making designs on wood. It is available in different shapes and sizes. Small size chisel is used for minor carving, and also for refinement in carving. Big chisel is used to make a frame and broader design on wood. In local dialect it is known as *charsi* and is used mostly in the initial stage of wood carving.

b. Gauge: It is similar to chisel with the only difference that its blade edge is not flat, but carved or angled in cross section. It is also available in

different sizes and shapes for major and minor carvings. It is used for developing clarity in round carving.

c. Knife: It is used as a wood carving tool in minor wood carving.

d. Partaz: It is similar to the chisel and also the important tool of carving. It is in slanted edge form and used for making clarity in wood carving.

Fig. 4. Chisels used for wood-carving

Fig. 5. Gauge used for wood-carving

Process of Wood Carving

According to artisans Jobandass, Bhupinder, Ram Kishan and Bhagwandass, the process of wood carving is very long. It starts with selecting a good quality tree-wood. Then it is cut and trimmed carefully and left to dry for few months. After the tree has dried, then begins the work of artisan. The pieces of tree are cut off to the required size and after that artisan trim it by their tools i.e. handsaw, adze, planer etc. according to their need. The artisan draws the blue print of motifs on the surface of wood by the pencil, and then start carving the wood according to the blueprint by their different kind of carving tools like chisel and gauge etc. This is the whole process of wood carving (field survey 2018).

Wood carving survived in the Pabbar valley in the temples and places. Artisans involved in this art known as *taksakas*, wood carvers. A wood carver is trained in a workshop by his father or senior artisans who knows the use of

different types of tools such as hand, saw, planer adze, chisel etc. Senior artisan make junior artisan learn how to carve the motifs for months and sometimes years.

During the field survey we saw lots of motifs carved on temples under-study. It is interesting to note that artisan have no knowledge about the motifs, why they depicting that motifs, they depict them according to the space and borrow from old temple. Scholars certainly studied temples and motifs in Himachal Pradesh from various perspectives.

Temple Architecture and Classification of Temples

According to Laxman. S. Thakur, history is not certainly a classification of building in archaeological water tight compartment but definitely a history of national life and thought. All customs, manners, skills and thoughts of a particular community or a group of people are unequivocally reflected in their arts like, temple architecture, sculpture, wood carving, painting, and embroidery. These arts are well preserved in Himachal Pradesh and gives us valuable information on the life and culture of its people (Thakur xv).

From nineteenth century onwards the monuments of Himachal Pradesh attracted attention of British scholars, traders, administrators, travelers, military personal and archeologists. The work of James Bailli, Frazer, Baron Charles Hugal, G.T Vigne, William Moorcraft, George Trebeck, Walter Hamilton give us brief sketch of references to numerous temples around Himachal. Alexander Cunningham threw new light on the temple of Bharmour, Chatrari, Chamba and Kangra, but generally from an archeological rather than from an architectural point of view (xv). James Fergusson, the most observant architect, also devoted a separate section on architecture of Himachal in his work, *Architecture in the Himalayan* (Fergusson 1899).

Classification of Temples (Himachal Pradesh) by Foreign Scholars

A.F.P. Harcourt 1972 was the first scholar who divided temples of Himachal Pradesh into four categories for the first time in his book, *The Himalayan Districts of Kooloo, Lahoul and Spiti*.

i) The pyramidal carved stone temple which is also common in rest of India

ii) The rectangular stone and wood temple, furnished with a pant roof and verandah.

iii) The rectangular stone and wood, provided pagoda fashion with successive wooden roof, one on the top of other.

iv) The small rectangular temple with a pant roof. This being probably but a variety of the edifices of the second order above quoted (Harcourt 60).

Another work on the temples of Himachal Pradesh was carried out by Penelope Chatwood in her book, *Kulu-The End of the Habitable World*, where she categorised the temple architecture of Himachal in four types (120-3) as:

A) Type 1-The carved stone temple with characteristic curvilinear tower (*shikhra*), the style of which was not indigenous to the hills, but was imported from the northern plains somewhere around seventh and eighth century A.D.

B) Type 2-It is the indigenous timber-bonded style of the Western Himalaya which consisted of dry stone and deodar beams. This style was used throughout the region in both sacred and secular buildings. It is said to be earthquake-proof.

C) Type 3- It is the chalet style. Harcourt refer to the little chalet type temple in this class as being probably but a variety of the edifices of the second order. So she put in direct succession to the half-timbered type 2 style, it is clear to keep them together. If in yours mind's eye, you black out a Type 2 temple and place the wooden top story on a low plinth, you are left with a Type 3 chalet like temple.

D) Type 4-The pagoda style, which is a building with a succession of superimposed pent roofs, each one little smaller than the one below it (122-3).

Classification of Temples by the Native Scholars

After independence, many native scholars studied monuments and temple architecture of Himachal Pradesh. Some of these names include Laxman S. Thakur and O.C. Handa. They classified the temples of Himachal on the basis of forms of roof and structure of temple architecture. But their classification is not unified.

Laxman S. Thakur classified the temple architecture into three types in his work, *The Architectural Heritage of Himachal Pradesh* (26-7). Other classification of the Himachal Pradesh temple is done by the O.C. Handa, in his classification he classified the wooden temples of Himachal Pradesh in seven types on the basis of form of roof and temple structure (127).

Architectural Elements of Temples

Laxman S. Thakur states that no structural monuments of pre-christian era have so far been discovered in Himachal Pradesh. The only monument which can

safely ascribe to the late Gupta period is the platform of a brick temple found in Chamba town. The ruins of a large Buddhist stupa were discovered at Chetru in Kangra district. It is significant to note that once the wooden details had become a part of the stone tradition, they were never completely abandoned. The classical traits, gradually found their way into the folk. Sometimes both the folk and classical motifs got frequently intermingled with each other (Thakur 1996).

Pattern of Roof

During the field survey it came to the knowledge that most of temples of this region are Pent roof type and their roofs are shaped in sloping form. Artisan Jobandass discussed about the process of the building of pent roofed temple. He states that a grid of wooden beam is constructed in slopping form, then the stone slab is laid down on the wooden grid beam and the apex of the wooden usually decorated with the *amalaka, kalasha* and *chatri*. *Trisula* appear at the topmost member on those temples that are dedicated to Devi or Shiva, while the *Cakra* indicative of a Vishnu temple (field survey 2018-23).

Walls of the Temples

Walls of the temples taken for study were/are in the *Kath-Kuni* style. The construction of *Kath-Kuni* walls is done by laying apart two square-sectioned wooden wall beams longitudinally parallel to each other to define the width of walls. In order to ensure proper bond between two, there are lap-jointed by the cross-joists suitably spaced along the lent of walls. Sometimes these cross joist placed over the wall beams secured by driving wooden pegs through the holes made in them. The space between wall beams is handpicked with stones (field survey 2018-23).

The Pattern of Pillars

Laxman S. Thakur categories the three types of pillars (i) *rucak* (square) (ii) *Vajra* (octagonal) and *vritta* (circular). They are composed of three parts: base, shaft and capital. The base is either a plain, square block or wood elaborately molded. The commonly pillars have a square base with a torus and fillet or sometimes double served molding decorated with scroll motif. The shaft section of the Nagar temple is square and octagonal. In same case, the capital of pillar does not start immediately above the shaft, but it is capped by square or octagonal capital of the *ghatapallava* variety (36).

Matsya purana (adhyaya 253) narrates full details about the construction of a pillar; like its length and width. It describes a method of constructing pillar. It also gives information about the motifs that are used for the decoration of the pillar i.e. lotus, flower stick, creeper design etc (887).

Fig. 6. Construction of *Kath-Kuni* walls of temple (under-construction)

Fig. 7. Floral and geometric patterns on wooden

Ceiling Pattern

Ceiling of temples in Himachal Pradesh are of three types (i) *lantern* (ii) *samatual* (iii) *nabhiechanda.*

Most temple have *lantern* ceilings which consist of the superimposed diminishing squares. The plan of the cells being square, the architect opts the method of cutting of angles as the easiest means of spanning it. The second square formed is further reduced by another series of four stone which make another square rested upon the first four. The process is repeated until a single square of sufficient dimension is formed in the end. The triangular pieces and carved with *gandharvas*, *yaksas* and *kirttimukha*. This kind of ceiling find in the top story of the temple.

Second type of ceiling is *samatala* or flat where ceiling is made of wooden planks divided into squares and closely into frames. It is in square and octagonal

forms. Except the top story it is the most useable ceiling in the temples. Both two ceiling are used in the temples of Rohru area.

Fig. 8. Floral and geometric patterns on wood ceiling

Third type of ceiling is *nabhichanda* ceiling. In this ceiling, four stone beams are laid horizontally, on which rest another set of four stone beams. The domical ceiling consists of series of concentric circles probably held together with. Moreover, each circle is decorated with a scroll and the apex with full blown lotus (Thakur 1996).

Door and Doorframes

In Himachal Pradesh, almost all temples are approached through a single doorway with no particular orientation. The width of the doorway is half of its right. Doorframe consists of three, five or seven superimposed *pedyas* (jambs) and *utarangas* (lintels) following the Gupta age door style. All the *sakha* and their corresponding *utturangas* are decorated. The first *sakha* normally consists of a *patra* type. While the other *shakhas* are *pratiharisakha, rupasakha, srivrksasakhanagasakha*. Besides these, specific categories of doorframes and other decorative elements consist of *patravall* (scrolls) *pramaths* (dwarfish figure) *namsers, mithunas, simhaskirttimukhas*. Ganesa generally appears on the *lulata-bimba* shown either as seated or in a standing position. However, in some cases, we find a deity carved on the lintel to whom the temple way is dedicated. Ganga and Yamuna were the most common decoration on the doorjambs. In

some temples a horizontal stone piece above the *uttaranga* display either the group of *navaghras* or flying *gandharvas* or *krttiimukha* (36).

Temple of Rohru Valley

During the survey of Rohru region two distinct type of the temples were seen that do not strictly adhere to the classification of temples given by Laxman S. Thakur or O. C. Handa. Though they possess partial features of the temple style described by Laxman S. Thakur, but they differ substantially from the traditionally described categories. The new categories or sub-categories include:

1. Nagar Temple

The Nagar style reveals two distinct features, one is planning and second is elevation, in planning it is almost square. In its most developed form, it consists many *angas* (offsets) in the middle each side of *mulaprasada*. In elevation, it exhibits a conical *sikhra* (spire) gradually including inwards in a convex curve topped by an *amalaka*. Nagar temple of Himachal Pradesh in two types:

1) Monolith rock cut temple- there is a temple following that style at Masrur in Kangra.
2) The structural stone temple-they are found in every part of Himachal Pradesh

We have not found the monolith type of Nagar temple in Pabbar/Rohru region. Only few temples, such as the temple of Hatkoti, of Nagar types are found in this region (Thakur 1996).

2. Pent Roofed Temple

Pent roofed is the second type of temples classified by Laxman S. Thakur. This kind of temples are peculiar to the hill. The wall of these temple consists of the alternate courses of wood and stone. Such structure can easily be distinguished by their slopping roofs, usually covered with stones slates. They are square and rectangular in plan. Such temple is confined to the hill regions only, thus they are termed as hill temples. They are practically designed according to the requirement of varying climate condition (28).

During the field survey researcher found that most of the temples of this regions are pent roof type. Main reason behind this is climate conditions, availability of natural resources and most important thing is multipurpose use of temple (filed survey 2018). Pent roof temple of the region is divided in to various parts.

a) ***Single Story Pent Roof Temple:*** Traditionally a group of 20-50 village have a supreme deity and they have a temple in a specific village. This deity takes a round of every village annually and stays at every village for one or two days. Villagers celebrate this day of deity-arrival as festival. The villagers in their respective village build a single story temple for the purpose of deity's stay. That is the main reason behind the construction of single story temple in every village in and around Pabbar region. There are some of the exceptions of single story temples like temple dedicated to goddess Kali in Sarahan.

Fig. 9. Single story pent roof temple

b) ***Multi Story Pent Roof Temple***: These temples usually have two or three stories. Each story has different function. There is an underground story used to store all the assets of the deity; including gold and silver jewelry etc. First floor is used as a granary, so that in case of natural calamities like drought, floods, earthquakes etc. people would not runout of food. But present day granary is shifted to another adjacent structure that is specially built for that purpose only. Layakram, the interviewer stated that the *Mohara,* main deity and other deities are placed in second story (field survey 2018).

Fig. 10. Multi-storied pent-roof temple

c) ***Mixed Structure Temple***: During the renovation, many old temples of this region were modified and their old structures were changed. Mostly this change occurred in the multi-storied pent roof temples. The new temple became the fusion of gable and pagoda. Main reason behind the modification usually was economic condition of area, government aid and honor rivalry among the different regions of the valley.

1. Economic condition of this region is based on horticulture. Most of the people are prosperous and they owe it to their deity. Out of devotion, they give huge sum of donations to the temple committee which is used to construct or renovate the temple.

2. Government confers lots of grants for the constructions and renovation of temple.

3. In villages of the surveyed region there follows rivalry, even in the way temples are constructed and decorated. It is a matter of pride and honour for people of different castes to have better construction and decoration of temple (field survey).

3. Pagoda Temple

Pagoda temples possess all the characteristics of pent roofed temple; except the pagoda have succession of superimposed roofs on a little smaller than the one below it. Otherwise its plan, arrangement of wood and stone, ornamentation, doors, veranda etc. are same as pent roofed temples. We have an example of Pawasi Maharaj Temple Jatwari (field survey)

Fig. 11. Building and renovation of temple

Mostly old temples are rebuilt or renovated, but in some cases new temples are rebuilt i.e. if deity is placed or moved to another place or if temple is gutted to fire completely. The process of building a temple begins with the selection of site. Deity selects a place for temple. Temple making process starts after that. First of all, base is prepared, which should be deep. After that, a platform is built. This platform forms the base of the whole temple on which further it is built in pent roof style. Walls of the temple are in *Kath-Kuni* style and roof of the temple is pent roof.

In traditional style of renovation, all the material; wood stone etc. is gathered first, carved and shaped. Then the work starts with outer wall, and then moves toward the interiors. Old stones are replaced with new ones. This is done in continuity up till roof. The old wooden beams are replaced with new one. This process follows from bottom to top. Lastly roof of the temple is replaced. This is a unique and traditional way of renovation of the temple (field survey).

Mohra: Art in Metal Carving

Once the temple is complete, deity comes in to the picture. Deity is casted in a particular style called *mohra* which is basically only the bust part of the deity. Generally, they are small in size, but are strong and well modelled. The *mohras* are usually hollow relief busts of deities of different sizes, casted by local craftsman that are carried on palanquins and portable matters during festivals (field survey). These ageless images are undoubtedly the most fantastic and formidable in entire Himalayan area. It is considered as the best metal works example. M*ohra* represent the local deity. The importance of these *mohras*

become all the greater, as a number of them are inscribed and dated providing valuable documentation (Singh 2012).

Importance of *Mohras*

The main objectives of these *mohras* is of course worship but as far as their identification is concerned, they are the outcome of the condensation of several agamic traditions and local cults of divinised chieftains, kings, and heroes. As a rule, all the *mohras* belong to the same group and collectively bear the name of the deity of the shrine to which the *ratha* belongs. Their most common identification is either these are Shiva Mahadeva or Umadevi or a Naga deity. Local traditions also identify the *mohras* with saints (*rishi)* and heroes (*viras).*

Development Process of *Mohra*

Mohra is a representation of the face of deity. In the initial stages local deity were represented in the stone sculpture. During the survey of Pujarli temple, the image of Lahruveer Devata was noticed in a stone sculpture. Apple as cash crop and agriculture played an important role in the economy of Rohru people. The transition of *mohra* from stone to metal has direct relation to this rise in economic condition of people. In initial stages, sculpture was made of clay wood and stone but with the growth of economy they used metal for casting the sculpture (Postel 1985). Layak Ram, temple committee member Pujarli stated that *mohra* is casted from an alloy of eight elements (*ashtadhatu)* that includes the traces of precious metals like gold and silver etc. (Chauhan 2012).

Process of Making and Casting Mohra

Mohra maker, Jeet Ram told that there are two kinds of *mohras*, that show the importance of hierarchy; main *mohra* and other *mohras*. There are 9 to 12 *mohras* in a palanquin. Most of them represent a single deity but some are his chieftain (*vazir*). Main *Mohra* is in the center of the palanquin and is known as *mandi-mukha.* Others are around it. *Mandimukha* being primary *mohra* of any palanquin, is treated with the greatest reverence during its making and use (field survey 2018-22). Alka Hingorani asserted that cast *mohra* last longer because of the material and the process of manufacture, so they tend to be oldest object in continuous in any given *Palkhi,* which adds their power and prestige. It is very expensive to recast any existing *mohra*. It is also a communal affair. The whole community contributes in the form of money for the purpose of casting material (66). The copper-smiths Ratan Dass, Santosh Kumar and Bhed Ram are indulged in casting of these *mohras.* To cast the *mohras,* and other related materials, inside the temple premise a temporary workshop is created for the purpose. Copper-smiths carry all their instrument with them. Their residency, food and other things of needs are provided by the temple committee (field survey 2018).

Paldan Dorgy, a coppersmith told that the process of casting *mohra* is quite rigorous. Coppersmiths start working only after worshipping their tools as it involves religious sentiments. The metal is heated in the traditional kiln. After that they flatten the metal by beating it with a hammer and they keep cleaning it. Slowly it is transformed into a flat piece of thickness about 0.6 mm. After the initial beating and flattening process the metal is put on wooden anvil. Then it is transformed into the metal sheet in bowl shape. After that they use measurement tools to specify and design the facial features. Then a lighter hammer is used to give the metal facial features. Throughout the process metal is heated, hammered and cleaned continuously. Then they pour the resin (*'Ral'* a mixture of mud, oil, resin) in back of the *mohra* and its thickness increases to 1 to 2 inches. Then commences finer embellishment of face, hair and jewelry. That is the process of casting *mohra* (field survey 2018). To make *mohra, thathara* uses several tools. Descriptions of these tools is provided below:

Tools of Thathara

1. **Chisel:** *Thathara* uses many kinds of chisels for different purposes. They are small in size as compared to wood carving chisels. Their edges are built in different shapes like round, square, flat, sharp for different purposes of casting and designing the *mohras.*

Fig 12. Different kinds of nails used by *Thathara*

2. **Hammer** (*hathori*)**:** *Thathara* uses many types of hammers for different purpose. Some hammers are used to flatten the metal sheets, some are used for making sharp edges and few are used to refine the sheets into a more tangible shape.
3. **Cutter**: It is used to cut the metal sheets. They are also in different size.
4. **Divider:** It is used to divide the specific space for casting facial expressions.
5. **Furnace**: *Thathara* uses traditional furnace to melt the metal.

6. **Tongs**: When the metal is put into the furnace, they use tongs to hold the metal.

Fig 13. Tools of *Thathara*

7. ***Kitkari***: Its shape is like a little hand-saw. It is used to draw the ring type design and linear design.
8. **Anvil**: They use two kinds of anvil: wooden and metal. Metal anvil is used to flatten the metal, but wooden anvil is built by *Thathra* for special purpose of casting wooden *mohra*. They carve a 3 inches radius hole on a wooden piece. Then metal sheets are put on the wooden anvil, and hammered on metal sheets. Metal sheets are molded in to the bowl like shapes. Finally, facial expressions are carved on metal sheets (field survey 2019).

Fig 14. Anvil work by *Thathara*

Social position of *Thathra* in Pabbar/Rohru Valley

After the casting process is finished, there is a custom of worshipping the *mohra*, called *Jangol*. It is done by *Thathara*. It is generally believed that the casting process is impure. This worship is offered as a compensating for any unintentional act of desecration done during the whole process of making of *mohra*. A farewell ceremony is conducted after the completion of the work. Farewell is also given to the builder of the temple. In this ritual different craftsmen who worked on various parts of temple are honored by the temple

committee, and worshipped also. They receive money, gold, goats, grain and daily useable things for their services (field survey 2018)

We noticed that temple building is not a single but conglomeration of many artistic activities in the Pabbar Valley. It provides an opportunity to showcase the skill and perfections of artisans. Although they are mostly illiterate, but they have mastery in their specific crafts, because they are trained in a workshop where they learn the use of various tools of their particular crafts.

It is interesting to note that artisan such as *taksakas* wood carver, *thathra* coppersmith, *sutradhara* carpenter all belonged to lower caste. They built and cast *mohra* but did not touch them and enter in the temple after the *pratishta* ceremony of *mohra* takes place. Major cause of discrimination is occupation of artisan, which is considered less honorable then other, and a kind of belief system created by the upper class of the society. Although, the economic conditions of these artisan at present time is getting better than social condition.

Conclusion

Present research revolved around the art, mainly three temple architecture; *Mohras*, artisans and their tools of Pabbar valley. During the field survey researcher found that temple architecture played an important role in society from ancient time to present time in this region.

Mohra is not only a form or shape, but it is also a representation of deity in this region. Every village has a particular deity and they built a temple for them. There is a main deity of a group of 20 to 30 villages and the temple of this main deity is located at a particular village which is mostly inhabited by Brahmin population.

But with the passage of time we see certain changes in architectural form of temples. Wood carving remained a major part of temple construction. Artisans used many kinds of motifs and folk symbols. Many of the motifs are borrowed from older temples in the vicinity. Artisan carved the motifs according to the space, which is suitable for that place. Although most of the artisan are illiterate, but their skill is proficient.

Wood carver used several tools like different kinds of chisel, gauge, planer, hand saw, *partaj*, hammer etc. But with the passage of time we saw many changes in their tools even. In earlier time tools were mostly built by blacksmith and they used wood and iron to be casted in a traditional way. Nowadays woodcarvers use mostly modern tools which are manufactured in factories. They also use electronic tools like planer, driller etc.

Thatra also uses many kinds of tools which includes different kinds/sizes of chisel and hammer for different purposes. They also use cutter, tangs, furnace etc. *Thatra* was still using traditional tools except the furnace

All artisans receive wages in the return of their services, but the mode of wages differ from earlier times. There are many other reasons that lead to the improvement of the economic condition of the artisans mentioned in the research.

Although, major changes occurred in the economic condition of the artisan life, but still in the society of Pabbar valley they do not hold equal rights. All the artisan known as *silpin* belong to lower casts and they are dominated by the upper class of the society. In earlier time the condition of artisan was very bad; during the survey it came to knowledge that level of discrimination was very high. Upper class people used to call them *koli, dank* etc. We also noticed discrimination in clothing. They did not wear similar kinds of clothes that were worn by the upper class. Houses of the artisans were built on the outskirts of the village of upper class. We saw the untouchability in every measure of life, such as food, water etc. *Thatara, taksakara, sthapti* are the main artisan of this region they build and cast the *mohara* and temple. The biggest irony is that after the *prathista* ceremony they cannot enter in the temple.

During the field survey it came to our knowledge that a *bari* can enter in the temple only in the case of renovation. Although, *Thatara, taksakara, sthapti* and *bari* could not take active part in any activity such as worship, fair, festival; but still when the fund is collected for certain purpose such as, renovation of temples, *mohra* making and *mahayagya* at that time they are treated well. It was also found that goldsmiths (*sonar)* are treated equal in the society because their occupation is considered honorable then other occupations.

Temple art is considered very important in Pabbar valley due to belief system. The state government has started taking several initiatives with the passage of time. Now fine is imposed if someone scribble on the walls of temple or disturb the original and heritage structure of the temple. Renovation is also carefully done. These initiatives have helped in preserving the artisans and their traditional crafts in Pabbar valley in Himachal Pradesh.

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Field Surveys (2018-23)

Field Survey of temple workshop Pujarli and Rantari, Conducted from October 25 to 30, 2018. Only in October 2018, their workshop was operational. Later visits were made to their villages/homes.

Field survey of Rantari and Bondra Temple was conducted on October 10, 2018 where coppersmith Paldan Dorgy Ratan Dass, Santosh Kumar and Bhed Ram were interviewed.

Field survey of village Jounli, Interview with blacksmith Virender age 42 years, was conducted on October 25, 2018.

Field Survey of Pujarli temple was conducted along with interview of Jobandass and Layakram in October and November, 2018.

Field survey of workshop at Pujarli, Interview with artisan Radhe, a 62 years old man, was conducted on October 30, 2018 and subsequently in April, 2022.

Field survey of artisan workshop Pujarli, Interview with Artisan Jobandas, age 58 years, was conducted on October 30, 2018 and subsequently in April, 2022.

Field Survey of artisan's workshop village Pujarli, Interview with Artisan Roshan Lal, age 66 years, conducted on October 30, 2018. Subsequently in April, 2022 his son Mohan Lal, age 41, gave interview. He was working along his father.

Field survey of Pujarli temple was conducted along with interview of temple committee member Layakram, age 50 years, and Jeet Ram, age 52, on October 30, 2018 and April, 2022.

Field survey of temple workshop in Pujarli and Rantari, Interview of Jobandass, Radhe, Virender, Roshan Lal was conducted on October 25 to 30, 2018 and subsequently in April, 2022.

Field survey of artisan workshop at Pujarli, Rantari, Banchhouch, conducted during October- November, 2018. Later in April 2022 also interviews were conducted.

Field survey of village Pujarli temple conducted on October- November, 2018. Later visits were done to the village of artisans during April, 2022 to February 2023.

Field Survey of Temple Pujarli conducted on Oct. 30, 2018 and in April, 2022 to February 2023.

Field survey of Rohru, Interview with coppersmith Paldan Dorgy a 52-year old man, conducted on October 10, 2019.

Field survey of temple Pujarli and Rantari, conducted on 25 October to 30 October, 2019.

Field survey of temple Pujarli, Banchouch, Rantari and Naryan, conducted from October 25 to November 5, 2019. Subsequent visits to these temples were made on different intervals in April, 2022 to February 2023.

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Ethno-technological Perspective of Current Wisdom of Metal Craft and Craftsmanship, Tamil Nadu and Karnataka

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Abstract

Ethnotechnology is a term used to describe the study of ancient technology specific/ unique to cultural groups of people. Today, technology and craft are defined as applied science. Still, early humans developed technologies like stone tool knapping, pottery-making techniques, metal casting technology, textile manufacture, stone bead-making techniques, etc. Metallurgy may be defined as metal extraction, purification, alloying, and application. Some eighty-six metals are known today, but most were discovered in the last centuries. The 'seven metals of antiquity', as they are sometimes called, were, in order of discovery: gold, copper, silver, lead, tin, iron and mercury. The first evidence of metallurgy in the Indian subcontinent covers Mehrgarh in Baluchistan, where a small copper bead was dated to about 600 BCE; it is however thought to have been native copper, not the smelted melted extracted from ore. Archaeological excavations have shown that Harappan metal smiths obtained copper ore (either directly or through the local community) from the Aravalli hills, Baluchistan or beyond. Through the ages metal technology has developed in different forms (vessels, weapons, decoration materials, etc.), with other metals such as copper, silver, iron, zinc, etc. This paper will discuss the tracing and understanding of the ancient metal technology with current wisdom practices of (Tamil Nadu and Karnataka) through systematic fieldwork and will focus on the related material which is used and used by metal craftsmen.

Keywords: Chola bronze casting, ethnoarchaeology, metalworking, wax model

Introduction

Metallurgy is a complex art since it concerns the transformation of materials through the control of fire, in particular during casting, annealing and soldering, and by the specific physical and chemical properties of precious metals and copper-based alloys, such as fusibility and malleability. Metalworking tools are normally simple; on the other hand, the different stages of the *chaîne opératoire* require complex know-how and technological specialization (Armbruster 2010). Interpretation and modelling of early metallurgy in South India has been shaped by two primary concerns, both focusing on iron metallurgy because of its dominance in the archaeological record. The first is whether the early iron in the peninsula was the result of diffusionary or migratory processes or whether iron was an Indigenous development. The second concern has been to understand and demonstrate the skills of the early practitioners of metal technologies. Taken

together, these concerns have directed archaeological research towards an emphasis on uncovering the earliest evidence for various ferrous metallurgical practices through excavation and artifact analyses (Gullapalli 2009). Ethnoarchaeology as a distinct subdiscipline of anthropology is a relatively new phenomenon. The field is still in the process of formation and as such still lacks a generally accepted definition or fully developed body of theory and methodology (Stiles 1977). Ethnographic data have long been used by archaeologists for understanding, interpretation and explanation of things found in the archaeological record and ethnographic data collection. Ethnoarchaeology research allows the author to understand the comparative and comprehensive research of metal working tools, the workshop equipment, the objects production, the gestures of the craftsman and the organization of the craft. This type of research was obtained from old chronicles, and ethnographic texts, through an examination of antiquity from museum collections and systematic fieldwork that involves the traditional craftsman in his workshop. This paper deals with the current metal technology process of different study areas, which can bring out the continuity of the making process of objects from generation to generation.

Archaeologists define technology in many ways, depending on their research problems. For some problems, technology is viewed mainly as manufacturing processes- the artefacts and activities involved in making other artefacts. This paper deals with a functional analogy to establish forms, the making process of objects, texts used in the making process of objects, raw materials used for making objects, craftsman settlement of workshop and migration of the craftsman.

Methodology

Ethnotechnology is research emerging from anthropology and it is adopted by archaeologists, is a qualitative methodology that lends itself to the study of the beliefs, social interactions, and behaviours of small societies, migration, materials used by craftsmen and the interpretation of data collected. There are three methodological features of ethnographic research, which have differing philosophical backgrounds, ‘Naturalism’ has its roots in the realist research tradition, which seeks to discover an authentic description of the world. Understanding and induction, in turn, are related to the social constructionist research tradition, which suggests that there are several descriptions, or versions, of the reality the trustworthiness of which depends on what we believe is true, and how relevant the description is. Ethnographic fieldwork typically begins with participant observation, which is later complemented by other data (e.g. interviews and documentation). Keeping field notes is a key activity performed

by the ethnographer or archaeologist. Everyday events are recorded along with the participant's viewpoints and interpretations. Initial observations focus on the general, open-ended collection of materials derived from learning the basic cultural rules and language used at the site. To fulfil the aim of the research, the methodology is used such as literature source (text), and systematic fieldwork of craftsmanship workshop of a different region of South India. These research methods add a practical and human side to the study of ethnoarchaeological records.

Current Knowledge of Bronze Technology in Tamil Nadu and Karnataka

In this paper, the current knowledge of the bronze image-making process includes the regions of Tamil Nadu and Karnataka. A bronze image is made through the *lost wax* method. Technically speaking, it is known as *cire-perdure* and in ancient texts, the *shilpa shastras* call it *Madhuuchchishtta Vidhana*. The process starts with mixing, beeswax and *Kungilium* with a little oil. It is kneaded well and from it, the desired figure is made. Fine details are sculpted into it, and this forms the wax model in the original.

In South India, the Vishvakarma community, both artisans and craftsmen, spread extensively throughout the region and played a vital role in the rural and urban economy. There were different categories of artisan community in early South India like engravers, sculptors, carpenters, ironsmiths, painters, etc., who were mostly considered as a class of master craftsmen or skilled artisans. Through their skilled labour, compassion and association with art and craft activities, the artisans and craftsmen were able to exert great influence on the social and religious life of the people. The community had a vital role to play in the temple towns as these were nuclei of urban development in the medieval period of South India (Rajan 2003). During the Pallava Chola construction "boom" there emerged a distinct class of craftsmen that became known as "*sthapatis*"- architect/ designer. The term *sthapathi* is both a Sanskrit and local Tamil term given hereditary master craftsman who is an expert in either stone sculpting or bronze casting. In South India, the Vishwakarma community of artisans is also known as *kammalas* (Thomas E Levy et al. 2008).

Swamimalai (Tamil Nadu)

Swamimalai is a panchayat town near Kumbakonam in Thanjavur, district in the Indian state of Tamil Nadu. It lies on the bank of river Kaveri and is one of the six abodes of lord Muruga. Swamimalai bronze icons refer to bronze idols and statues manufactured in Swamimalai. It has been recognised as a geographical indication by the Government of India in 2008-09. During the reign of the Chola

empire, Raja Raja I commissioned a group of sculptors for the construction of the Peruvudayar Temple at Thanjavur. The sculptors helped sculpt statues for Airavatesvara Temple and later settled at Swamimalai. Woodcraft is a burgeoning revenue-generating industry in Swamimalai. The state whose skilful craftsmen once depended upon the patronage of the ancient monarchs to earn their livelihoods is now teeming with talented local villages and artisans whose expertise is manifested in the variety of indigenous artefacts created by them.

Making Process of South Indian bronze Casting: The craftsman from Swamimalai is still following the measurement of making bronze from ancient text *Manasara, Manasollasa* and *Sliparatna.* Brief information about casting technology may also be included in ritual manuals, called *agamas*, *tantras* and *samhita* of various religious schools, compiled in Tamil Nadu around the twelfth century. Finally, some information can be found in the Puranas, a large corpus of encyclopaedic texts extremely difficult to date, treating such diverse topics as the origin of the universe, legends about gods, iconography, and ritual (Joosje 2019) (see Fig. 1)

Fig. 1. Google image of Swamimalai

Technical Process of Casting Bronze Sculpture: The technique of casting by the *cire-perdue* process can be divided into four principal stages, they are: 1. model making, 2. mould making, 3. melting and casting and 4. chiselling and finishing.

Preparation of Wax: Wax must be prepared by mixing pure beeswax, resin from the dammar and ground oil, in a proper portion of 5:5:1. Resin must be ground into powder and heated till a thick liquid form. After this, it is added to the beeswax and stirred with a stick till it liquefies and is well mixed. After the wax melts, the liquid is filtered through a white cotton cloth into a tank containing cold water, thus allowing it to solidify. This is then used for making the wax model.

Preparation of the Wax Model: In fashioning the wax model, parts of the image such as the head, body, legs, etc. are made separately by hand. These are then refined by warming them and shaping them using a knife and scraper. Finally, the different finished parts of the image are joined together using heated iron tools. In the case of making a small bronze image, the pedestal is shaped as part of the wax model itself, but in the case of large models, the pedestal must be made separately (see Fig. 2).

Mould-making: The method of moulding includes different types of moulding media and their preparation, e.g. hard clay, semi-hard clay, and soft clay. In the case of small images, only three layers of clay are required but for large images, more layers are required. The clay which is sourced from the riverbed of the Kaveri is locally called v*andal mann*. During the application of clay, the wax model must be kept either on a piece of paper or on a white cloth. Soft clay: For preparation, four parts of well levitated which is used for making pottery and one part of ordinary clay are mixed. Preparation of very soft clay: Soft clay is mixed with cow dung until it becomes extremely soft (see Fig. 3).

De-waxing*:* After the mould is dry, it is placed over firewood and baked, till the wax melts completely and flows out. Once the wax is removed, the mould is removed from the fire and placed in a pit with the mouth facing upwards (see Fig. 4).

Casting: In South India, five metals were used to produce the idols which is called *panchaloha* (Kar 1952; Ruth 1962; Krishna 1976). These include a mixture of copper, silver, gold, brass, and tin. The rule used by the sculptor to estimate the weight of the alloy occupying the mould cavity is that it should be normally 8 times the weight of the wax model. For melting the metal, coke or charcoal are used.

When the metal and mould temperatures are proper for casting, the mould is placed horizontally in a slightly slanting position over bricks. Stone should be avoided for this process. While pouring the metal liquid into the mould, cup-shaped bricks are held below to avoid mishaps. To avoid entry of impurities like charcoal floating on the surface of the molten metal, while pouring metal into the

mould, a piece of knitted jute cloth covers the mouth of the crucible. After completing the casting process, the mould is allowed to cool for a day (see Fig. 5).

Fig. 2. Preparation of the wax model

Fig. 3. Mould making

Fig. 4. De-waxing

Fig. 5. Casting

Final Working on Bronze Sculpture: The sculptor carefully removes burnt clay to extract the object. Iron rods and wires are removed, and the sculptor removes all unwanted runners in the bronze idol/object. The image now is exactly that seen in the wax model. Details of the dress and ornaments as well as other final touches are essential to make the icon perfect in all aspects (see Fig. 6).

Fig. 6. Final work on bronze sculpture

Udupi (Karnataka)

Udupi, a celebrated town of temples in Karnataka is renowned for its bronze and bell metal casting. The age-old process of the *cire-perdue* of the lost wax method is employed to create striking objects out of metal. Udupi is a rich source of tin and copper and thus a significant centre for artisans to produce varied utilitarian and religious objects rooted in regional identity. Karkala which is one of the oldest centres of Jainism is famous for its metalware icons. Ritual objects used in worship such as lamps, bells, pot/*kalasha*, *ginde* etc. besides the south Indian bronzes such as deities, are cast in the Chola and Hoysala style. Another example

of meticulous craftsmanship is the *bhoota* figures that can be found in metal masks and cast idols. These include the likes of *Mahisasura* or the bull demon and *bhoota* attendant figures. Being of Shaivite origin, the sun and moon are a part of the craft's iconographical vocabulary. Similar to the embellishment carried out on the *yakshagna* mask, beaded rope work and gold tassels are common details. Tools such as a blower, box moulds, clay crucible, emery paper, tongs, chisels, furnace, buffing machine etc. are used for crafting purposes (see Fig. 7).

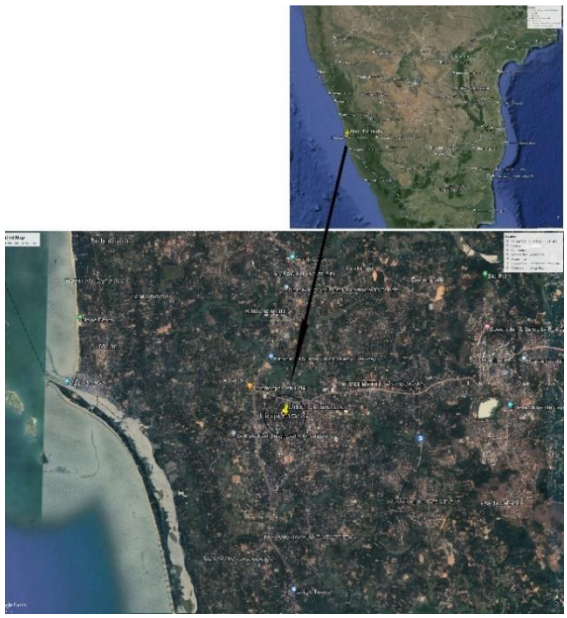

Fig. 7. Google image of Udupi

Making Process*:* The idol is modelled from a molten wax mixture in the required size and proportions. *Kunguliam* (resin) and *mezhugu* (paraffin wax) are mixed with an addition of *kadalaiennai* (groundnut oil). The mixture is heated on a stove and allowed to cool to a consistency and temperature that is comfortable to handle and shape. Torso, hands, legs, and the seating pedestal are fashioned from wax individually and then put together by heating and fixing. A sculpture that is metal all through is termed a solid cast. Solid casting is practised for temple sculptures. A hollow cast is made with a clay-fibre core and a cladding of cast metal on top. Decorative pieces, to reduce the consumption of metal and minimise weight are cast with a clay and jute fibre core. The idol is placed on a bed of sand atop a cloth face up. A layer of *vandal mann* (fine-grained clay) is applied to the wax idol. Care is taken to cover every nook and corner of the wax idol/model. *Vandal mann* is highly impressionable and captures the minutest of

details of the wax model. A mixture of *kali mann* (alluvial soil) and *manal* (river sand) mixed in 1:3 proportions are applied over this layer. The mud sheath on the face side is allowed to dry for about four days. The idol is turned, and channels called runners made of wax are affixed to the wax form. These channels act as outlets of wax and inlets for molten metal later. Two channels are placed side by side. This side of the idol is covered in *vandal mann, kali mann* and *manal* and allowed to dry for four days. A metal wire is wound around the mould to keep the casing intact. For multiple castings of the same form, plaster of Paris moulds is made instead of mud moulds. These can be used for casting about a hundred times before they wear out. The mould is placed with the channels facing downwards and heated. The wax melts and trickles down the channels. As the wax is removed, a negative space is created within the mould.

A rectangular pit with a metal grate and a side inlet for air is used as a furnace for heating metal. Two pots can be placed inside the pit. A small amount of damp mud keeps in place two bricks placed in the pit. The bricks are dusted with sand to prevent the pots from sticking when placed atop. On top of this makeshift stand, pots are placed. Metals are weighed and added to the pot, copper (85%), and zinc (10%). Coal is shovelled all around the pots and a few dried dung cakes are lit. An electrical air blower strokes the fire. The pots are covered with stone domes and the metal pieces are allowed to melt. Metal is constantly added in small quantities till the required weight is obtained (see Fig. 8).

Fig. 8. Metal Technical process of Udupi

Current Wisdom of Iron Technology in Karnataka and Tamil Nadu

The beginning of the Iron Age in India was at first dated to the 5th century BCE, ascribing the diffusion of this metal to the contact with the Greek-Persian world (Wheeler 1959: 132). Subsequent excavations and research have enriched our knowledge of the Indian proto history, showing that ironworking precedes some centuries. However, an agreement on when and where iron technology was utilised for the first time is lacking. Bridget and Raymond Allchin (1982: 345-

46) divided the Iron Age into three stages: in the first stage (1300 - 1000 BCE), iron occurs in Rajasthan (Ahar and Noh) and Karnataka (Hallur); in the upper Ganges valley, it appears in a second stage (1000 - 800 BCE); and in the middle Ganges valley it appears only in a third one (800 - 500 BCE). Conversely, Roy (1983: 181) observed that iron objects were found during the same period in the Ganges valley, that is, before the introduction of the Northern Black Polished Ware (NBPW) and Painted Grey Ware (PGW). Chakrabarti (1977; 1992) indicated Madhya Pradesh (Nagda and Eran sites) as the earlier region where iron smelting occurred (1100 BCE).

Process of iron technology: In the subject of iron technology, there are two processes which are the primary process and the secondary process. In this research paper author will use technology analysis to understand the secondary process of iron technology in two different regions.

Primary process of iron technology (smelting process): Smelting is a process or a combination of processes to produce molten metal. The smelting of iron in the blast furnace is an example of reducing smelting in which coke serves both as fuel and as a source of reducing agent. In the presence of an excess of carbon monoxide, iron oxide can be completely reduced at about 900°C, but the melting point of the metal is 1535°C. *Secondary process* of iron technology (Iron smithing/ Forging process): Forging is defined as a metalworking process in which the useful shape of the workpiece is obtained in a solid state by compressive forces applied through the use of dies and tools. The forging process is accomplished by hammering or pressing the metal. It is one of the oldest known metalworking processes, with its origin about some thousands of years back. Traditionally, forging was performed by a smith using a hammer and anvil. Using a hammer and anvil is a crude form of forging. The smithy or forge has evolved over centuries to become a facility with engineered processes, production equipment, tooling, raw materials, and products to meet the demands of modern industry (Rathi et al. 2014).

Tingallur (Karnataka)

Tingallur: (Latitude: 13°04’14.09” N, Longitude: 77°34’08.46” E) Tingallur is a fully urban developed prime location in Bangalore, and it is 15 km away from the National Institute of Advanced Studies (NIAS) (see Fig. 9). The author has conducted a study on the ironworking of Tingallur, which is located in the Bangalore Urban location. The ironsmiths of Tingallur migrated from Andhra Pradesh, Tamil Nadu and Telangana States and belong to Viswakarama or *kamalar* community. *Kamalar* community from Tingallur are engaged in full-time ironworking for the whole year, and they do not participate in any other occupation such as agriculture. The *kamalar* from Tingallur has no knowledge

about the iron smelting process. They buy raw materials from the steel and iron market and make implements, or sometimes they collect old iron rods from the person who offers the job. Here author would like to give a detailed description of ironsmiths at Tingallur, specifically on the aspects of their settlement or workshop place, the structure of furnace, anvil, bellows/air blowers and the production of iron objects.

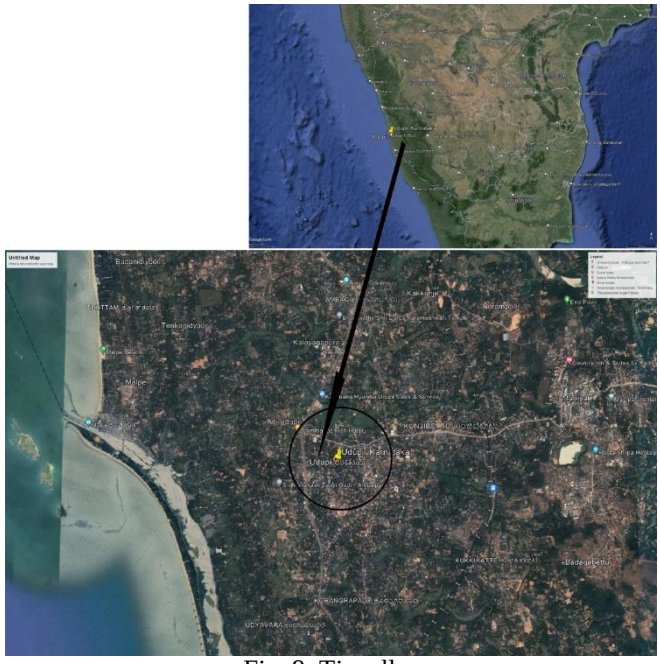

Fig. 9. Tingallur

Settlement of Tingallur Kamalar: The settlement of Tingallur *kamalar* is away from their workshop location due to lack of space and urban development. The working time of Tingallur *kamalar* starts from morning 9.30 am to evening 5 pm. The workshop area is well-planned, and the workshop place is well-plastered with red soil. The arrangement of the tools for the smith is proper and systematic.

Bellows: Tingallur *kamalar* uses a hand-turned air blower which is made up of steel and they have no information regarding the leather below.

Anvil and Workplace Platform: The anvil is mounted on a wooden stand, usually a tree stump but sometimes on a squared timber block. These were set into the ground and supported laterally with rocks or stakes to prevent the stump from moving. The ironworkers of South India use rectangular anvils with curved

corners. A working platform is placed to remove the rust from the heated iron object while working on the hot iron.

Furnace and Furnace Wall: The bowl furnace and circular furnace with a depth of 1 to 2 ft are used here. The bowl furnace is connected to the air blower, which supplies air to raise the required temperature. There is a furnace wall for which there are two reasons to build it. The first reason is to protect the person behind the furnace who is working on the air blower and the second reason is to avoid accidents. The furnace wall is built of brick, and red soil and brick count maybe 9 to 12. On top of the furnace wall, their *Kuladheivam* (family god) is fixed, which is made up of clay.

Technique and production: Forging or smithing is the technique used by Tingallur *kamalar*. Their pattern of work is like the Rajput Lohars. They make implements like knives, chisel, ploughshare and axes. Sometimes they also do welding work and repair work (Udayakumar 2021) (see Fig. 10).

Fig. 10. Tingallur blacksmith workshop

ManaMadurai

Manamadurai: (9.7°N 78.48°E) small village in the Sivagangai district of Tamil Nadu is known for its Ironworking (see Fig. 10). The tradition has been passed down from generation to generation. This is the first research on ironworkers from Manamadurai, its hidden craft centre place in Tamil Nadu. Unfortunately, due to various reasons such (as migration of different works, scarcity of raw materials, new government policy and development of higher education among the young generation), the work of a blacksmith is going to sunset, through the systematic fieldwork by the author is only 3 person is working on making the

iron object for agriculture tools and rituals artefacts. The ironworkers from Manamadurai will only from morning 10 am to 2 pm every day and they get very little work making the iron objects. The ironworkers from Manamadurai do not know about making iron smelting, they have knowledge of iron smithing work. Ironworkers from Manamadurai are experts in the secondary process (smithing), the manufacture and repair of artefacts. Iron smiths had several different alloys available, including ferritic iron, (pure iron, relatively soft), phosphoric iron (harder but more brittle) and steels (varying carbon contents, enabling very hard edges to be produced). There were four main techniques used by the smith, cold working, hot working, welding, and heat treatments (see Figs. 11 &12).

Fig. 11. Manamadurai

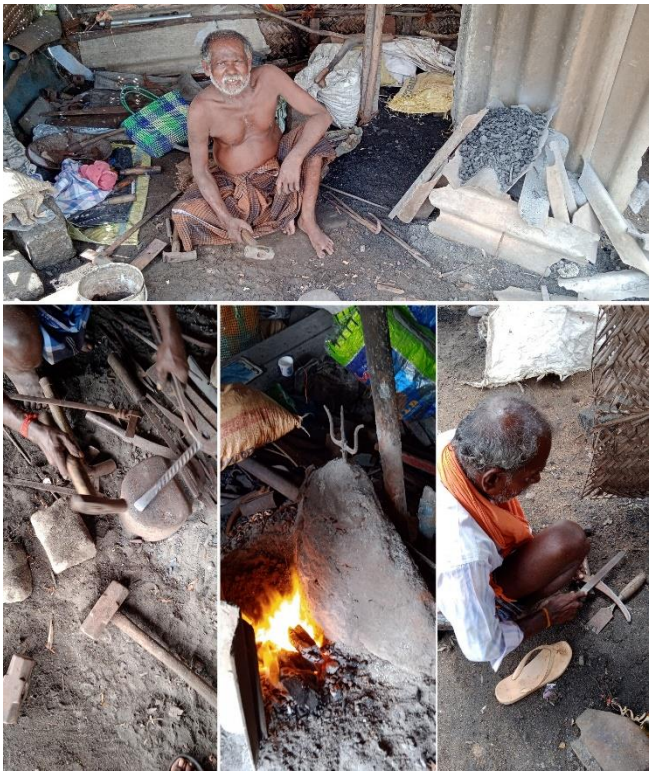

Fig. 12. Manamadurai ironworkers

Observations

Exploration of technology and technological process of ethnoarchaeological studies of metal production give the broad picture of economic status, agriculture production trade etc of the region of the study area. From as early as the start of the twentieth century, ethnographic accounts began to be used together with archaeological and analytical data to influence interpretations of archaeological remains (Thornton 2009). Somewhat unique to the archaeology and ethnoarchaeology of technology is the necessity to give due consideration to the technical, social, and cognitive symbolic elements of the process involved. The archaeometallurgist and ethnoarchaeologist often draws upon his or her personal experience of metallurgical techniques from that person's country or region of origin. His or her perspective will be broadened, however by interacting with a variety of modern practitioners and historical sources to understand alternative experiences and knowledge of techniques and technologies from across the globe (Louise 2014).

Finally, to get a better understanding of the current wisdom of the metal technological process is also needs more field work to trace the distribution of

metal workers in South India. With the systematic fieldwork of tracing the metal workers in South India. The author has traced almost 15 metal workers in South India, in this paper author has used only four major centres of metalwork in Tamil Nadu and Karnataka. This paper indicates there are many unique aspects of each region of metal workers. As researchers, we need to understand to do a comparative approach of technology of different regions. As a concern to the future of metal workers going into the sunset, due to various reasons such as more machinery equipment developed, metal workers not getting properly paid for their work, the young generation is not interested in participating in the metal work and many aspects of caste issues. On another hand we could see that classical crafts such as Chola bronze casting are developed numerously, developed as a centre of many regions and a lot of demand for Chola bronze casting. In the case of ironworkers, we could see very little opportunity even in the countryside or rural, so it is time to document the technical process of ironwork in any platform for future generations before the craft goes into the sunset.

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Communication for Social and Behavioural Change through Art and Craft of Puppetry: A Case Study of the Initiatives of ARMT Creative

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Abstract

Communication for Social and Behavioural Change (CSBC) is a systematic process of implementing research-driven, application-based and outcome-oriented communication strategies to address a societal concern which might deal with change within an individual in particular and the society at large. The objectives of these communication strategies are to devise and positively influence knowledge, attitudes and social norms among individuals, organizations and communities. As we tried to defend ourselves from the 'cynical unseen' enemy COVID-19, a research-based non-profit in India Dr Anamika Ray Memorial Trust came up with its innovative art division called 'ARMT Creative' to propagate social issues and scientific temperament with an outcome of social and behavioural change. The ARMT Creative made its debut with the art of puppetry as a part of the larger collaborative project with UNICEF Assam (India) titled 'Risk Communication and community engagement to Promote 'COVID Appropriate Behaviour' (CAB) among children, women and urban population. This paper is a case study on the journey, methodology, challenges faced and impact of ARMT Creative's innovative use of folk media for social and behavioural change.

Keywords: ARMT Creative, CSBC, Dr Anamika Ray Memorial Trust (ARMT), folk media, health communication, puppetry

Introduction

Puppets were born before theatre actors, is what historians claim (Origins of the Puppet 2016). Even before people started performing on stage, these in-animate players were doing a great job of entertaining a wide range of audiences from different parts of the world. In India, the origin of puppetry was traced back to the Indus Valley Civilization in 2500 B.C. (Ghosh and Banerjee 2006). Archaeologists found terracotta dolls with a detachable head capable of being manipulated by a string which justifies their statement. Folk media has various descriptions. The terms oramedia, traditional media, and informal media have often been used interchangeably in referring to folk media (Panford et al. 2001)

The origin of puppetry in India cannot be dated, but mythology provides these two stories that could be taken as historical data. According to one legend,

the creator Brahma gave life to *Adi*, the first *nat* puppeteer, and created the first puppet for the entertainment of his wife *Saraswati*. Not satisfied with his work, Brahma banished the puppeteer to earth, starting the line of *nat bhatt* puppeteers. This legend applies most probably to the Rajasthani tradition, as the name *nat bhatt* puppeteers belong to this region (Sarma and Singh 2010). Another legend has as protagonist the god *Shiva*, patron of puppetry, and his wife *Parvati*. An artisan manufactured two wooden dolls that captured the attention of the *Parvati* goddess and his divine companion entered the dolls and started an exquisite dance; when they got sick of this play, they abandoned the dolls and the artisan was very sad at his dolls being lifeless again. With the help and blessings of the gods, the artisan then invented a system of strings to move the dolls, and so puppetry was born (Chattopadhyay 1995).

India has four main types of puppets, string puppets, shadow puppets, glove puppets and rod puppets. String puppets are prevalent in Andhra Pradesh, Assam, Karnataka, Maharashtra, Manipur, Odisha, Rajasthan, Tamil Nadu and West Bengal. Rod puppets are used in Jharkhand, Orissa and West Bengal. Glove puppets are located in Kerala, Odisha, Uttar Pradesh and West Bengal. Shadow puppet traditions have continued in Andhra Pradesh, Karnataka, Maharashtra, Odisha and Tamil Nadu.

Puppetry as Craftmanship in India

Puppetry in India stands as a testament to the nation's rich cultural heritage and craftsmanship. As discussed earlier, rooted in ancient traditions, it encompasses a diverse array of styles, including shadow puppetry (e.g., Tholu Bommalata of Andhra Pradesh), string puppetry (*Kathputli* of Rajasthan, *Putala Naach* of Assam), glove puppetry (*Pavakoothu* of Kerala), and rod puppetry (Putul Nach of West Bengal). Each form reflects the regional artistry, with meticulously handcrafted puppets, adorned in intricate attire that mirrors local aesthetics and mythology. These puppets often use traditional materials like wood, leather, or cloth, emphasising the sustainable and artistic essence of Indian craftsmanship (Seetha 2015). Beyond entertainment, puppetry has historically served as a medium for storytelling, preserving epics like the *Ramayana* and *Mahabharata*, while subtly imparting social and moral lessons.

Modern adaptations, however, have seen puppetry evolve into an educational, development and therapeutic tool, blending tradition with contemporary relevance. Artisans continue to innovate, incorporating modern narratives and techniques while maintaining the cultural essence of the craft. This adaptability underscores the resilience of Indian puppetry as both a traditional and modern art form (Kumar 2020). Furthermore, initiatives to preserve and promote puppetry, including workshops and cultural festivals,

highlight its importance in safeguarding intangible cultural heritage. Through this, puppetry remains a vibrant and dynamic expression of India's artisanal legacy.

Puppetry in Assam

A predominating impression that the people of Assam did not attempt to express themselves through the medium of puppetry echoes a simultaneous assurance. Puppetry as an art form has come a long way towards abstraction. The Assamese puppet shows, for centuries, have retained the same simple structure that combines lively movement and music to entertain the audience. Puppets, by their very nature, involve the concept of alienation and enable the modern Assamese to present ideas in a manner consistent with his/her intellectual, cultural and aesthetic predilections. The puppets with their strong stage performance are seen to have done things better than human actors.

If we search the history of puppetry in Assam, we find a huge gap from ancient times to medieval Assam, where the presence of puppetry cannot be traced. The history of puppetry practices may be ancient in other parts of India and it may be a glorified chapter of our cultural tradition too, but we have no proof that it had an impact on great Vaisnavite reformer Srimanta Shankardeva's theatre. There are no historical data on puppetry practices from the 8th century to the 15th century in Assam (Dutta 1986). Whatever little information we have, is mostly oral records and there exists a huge vacuum in terms of written literature.

From all available accounts, at present apart from string puppets, no other forms of puppetry like shadow puppets, rod puppets, or hand or glove puppets exist in Assam. However, the puppet section established at Srimanta Sankardeva Kalashetra, a cultural complex established under Clause VI of the Assam Accord, 1985, is trying its hands at rod puppets and water puppetry. The Assamese *Bhagvata* also has several references which highlight the presence of wooden puppets (*kasthara, kasthamayaputula or daruputula)* and shadow puppets (*chaya-putula)* (Dutta 1986). Experts believe (Dutta 1986) that water puppetry existed in Assam long before Sankardeva's birth but it got its due recognition only during his time. He, in a way, was the pioneer in developing the tradition which is now the national heritage of countries like Vietnam and Cambodia ("Water puppets" 2017).

Puppets of Assam, in their long history of diffident dramatic performance continuously used innovating narrative figures that are expressed beyond any verbal language. During its journey so far, the puppet never failed to adapt itself to new situations in a constantly changing world. The puppet's flexibility is the source of its life; however, this feature is acutely contrasted with the puppet

being an icon image of the character or ideas it portrays. By using a puppet as a tool through which they communicate, the puppeteer is extending and redistributing the boundaries of his physical being.

Craftsmanship and Art of Puppetry to Communicate Health

Health communication as a theory is a consciously elaborated, justified, and uncertain understanding. While it deals with the realms of the body and the complex process of communication, it inwardly looks for answers in areas that are vastly unexplored (Thompson et al. 2003). It takes a lot of effort in a way to understand the level of threat a health hazard carries and accordingly, it requires communicators even seasoned to tune in their mode of communication where data indicate that a hazard is not serious, yet the public is near panic. Here the message needs to be about reassurance to calm down the public and sometimes, it requires buckling up its mode of communication and creating a sense of urgency where data indicates that the hazard is serious, yet the public response is one of apathy (Covello and Sandman 2001).

Health communication in all forms requires some of the following interventions, an interplay of the *body* and *communication*. It requires the combined mechanism of both science and humanism imbibing scientific and humanistic assumptions, values, aspirations, and limitations and lastly trying to find that perfect balance between idiosyncrasy and commonality (Thompson et al. 2003).

The medium of communication here plays a significant role, especially in the wake of finding the perfect balance between the two. Designing a health message requires an innate understanding of the practices and the idiosyncrasies of the society that the audience is subjected to. Puppetry gives content creators the space to indulge in such idiosyncrasy. The art and craft of puppetry also provide an opportunity for health workers to explore community problems and identify potential solutions because of its close connection with the audience members. Puppets with their strong stage presence can introduce inflammatory subjects and criticise local practices (Clift 1990).

"The use of puppets may be useful not only in communicating with children in clinical practice," but also in engaging children during interviews thereby encouraging them to talk about the issue and its impact (Astles and Fisher 2020). It has been seen over the years that organizations like Assam AIDS Control Society, National Rural Health Mission, and Rashtriya Sarba Shiksha Abhigyan, Assam are making use of *putula naach* extensively as a tool for social awareness. It would be worth mentioning that on 27th April 2012, the Assam AIDS Control Society organized a state-level review meeting on the effect of

folk performances and it was observed that the overall impact created by these performances lingers for a longer period in the memory of the audience and they take back quality information with them.

Puppetry creates participatory dialogue, builds community, and opens up possibilities for social change in rural areas (Dutta and Ray 2011). Rini Nath Bora, Consultant of the Assam AIDS Control Society says, "There is direct and intimate communication between the actors and audience". Improvised narrations with the use of local dialects, songs and dance help the audience to associate themselves with the storyline and take with them the content of the shows.

Chandrani Das, State Media Expert of NHM (National Health Mission) in an interview asserted that after preliminary research conducted by their ground-level operators, it was found that the response of *putula naach* as a tool for disseminating information is quite user friendly and so they decided to introduce *putula naach* for social campaigning on health and hygiene and child marriage. On an experimental basis a play was arranged by NHM at the famous *Joon Beel Mela* held in the first quarter of this year. The play '*Moy Abhinetri Hobo Bisaru'* dealt with the consequences of 'child marriage' and was well attended by the visitors of the fair. Feedback collected from the visitors after the show strengthened their plan of action. In the initial stages, they had plans to introduce these programmes only in the Darrang, Baksa and Mangoldoi districts of Assam, infested with a high percentage of health, hygiene, and child-related issues. Through glocalisation, however, the modern puppeteers created content which is "local in spirit but global in character" (Bhattacharjee 2016; 2022).

Puppetry meets the criteria of all segments of people who look for innovative methodologies that promote positive health behaviours, communicate on complex as well as very simple issues of health, appropriate for all age groups, and bring in the play theory where entertainment, learning and play are in perfect order. Puppetry as a creative learning methodology can motivate learning through play (Synovitz 1999).

Puppetry as CSBC Tool

Communication for Social and Behavioural Change (CSBC) is a participatory process for encouraging positive health behaviour change in individuals and communities through the strategic application of targeted messages, and the provision of a supportive environment (Adewuyi and Adefemi 2016). Usually for long-term health interaction there needs to be a definite strategy in practice. More so, a long-term involvement that is usually guided by the principles of Social and Behavioural Change Communication (SBCC) recently termed CSBC.

The tools to implement the CSBC are varied and often it has to change its nature keeping in mind the target audience.

Nunkoosing (2005) argued that, as in all human interactions, a hierarchical relationship always exists in an interview. This hierarchical relationship is linked to ethics as it can allow the powerful to exploit the powerless during an interview. Children's vulnerability and relative lack of power in our society therefore present the researcher with challenges as well as responsibilities to protect children's rights within the research process (Epstein et al. 2007).

When an Assam-based non-profit with its mandate, initiated the task to bring in health awareness on relevant issues among children and adolescents, the use of puppetry as a tool of CSBC was one of the primary choices. The idea also stemmed from the element of introducing newer concepts through a non-hierarchical and familiar tool. Taking this into consideration, a common Indian family setting was taken into account using puppets that the children and adolescents could relate their ideas with and come up with something more relatable and easier to decipher (Dutta and Ray 2009).

ARMT Creative

Dr Anamika Ray Memorial Trust (ARMT), is a registered educational and research non-profit organization, dedicated towards the upliftment of research and development activities in the fields of media, education, ethnic community, communication for development, science, risk & health communication, communication for social & behavioural change and other related areas of media and social sciences. ARMT made its debut with the art of puppetry as a part of the larger collaborative project of two months (November and December 2020) with UNICEF Assam titled 'Risk communication and community engagement to promote 'COVID Appropriate Behaviour' (CAB) among children, women and urban population'. This year the trust started with its own puppet and creative art division 'ARMT Creative' and has produced a series of puppet shows derived from the broad objectives of *poshan mash* as underlined by UNICEF.

In the first phase, ARMT produced four-string puppetry videos each of 4-8 minutes duration, out of which three of them were made on the storyline of creating general awareness on COVID-19, which were largely shared by ARMT's YouTube channel. The three videos were titled 'COVID *Shatru*', 'COVID *Bibhrat*' and '*Mama Ro Mina Ko COVID Katha*' (*Mama Aur Minar Ki*

Fig. 1. Ruby Puppet Theatre, Dakhala, Bijoynagar, Kamrup District, Assam producing puppetry for ARMT Creative

Fig. 2. Sagarika Puppet Theatre, Oujari, Jagiroad, Marigaon District, Assam producing puppetry for ARMT Creative

Covid Katha). The video 'COVID *Shatru* (Enemy)' was based on a king, who reaches safety measures after the spread of the novel coronavirus threatens to devastate his realm. 'COVID *Bibhrat* (Confusion)' was aimed at students for instilling COVID-appropriate behaviour - washing hands regularly, wearing a mask, maintaining physical distance and adhering to other precautionary measures as prescribed in the standard operating procedures. While the first two

videos were in Assamese, '*Mama ro Mina ko COVID Katha*' (COVID Tale of Mama and Mina) was in the Nepali language and was made especially for the Sikkim government.

This puppet show was also screened at the World Puppet Day event organized by the SAARC Cultural Centre in Galle, Sri Lanka in 2024. These videos were part of a larger collaborative project with UNICEF done in November and December 2020. ARMT used the fading folk art form of *Putala Naach* to campaign for its conservation besides creating awareness of the pandemic, by taking help from three traditional string puppet troupes of the region. The three troupes used were 'Ruby Puppet Theatre' (1974) founded by puppeteer Abani Kanta Sarma; 'Sagarika Putala Naach Theatre' (2005) founded by puppeteer Manoranjan Roy and 'Nataraj Puppet Theatre' (2008) founded by puppeteer Ajoy Sarma.

Fig. 3. Nataraj Putala Theatre, Gondhiya, Nalbari District, Assam producing puppetry for ARMT Creative

The biggest challenge faced by the entire team of ARMT Creative in the first phase was during the production process. The traditional puppeteers are very rigorous with their style of presentation. Despite having informed them about the story and background the team was not prepared to counter puppets wearing religious gowns for recording a play that was to be on the theme 're-opening of the school'. Moreover, the traditional troupes did not adhere to the entire project the gravity that health communication more so risk communication demands. The seeming lack of coordination during the manipulation of the puppets could not deliver the desired results.

The traditional style of skilful manipulation cannot imbibe life into all types of characters if not substantiated with a good rehearsal and their age-old techniques of craftmanship of preparing puppets. Manipulation is a forte which

can create a participatory dialogue and build community among the audience. Skilful handling of the puppets gives them different shades according to their character, and the puppeteer is the best person who understands this very well so he tries to create a rapport with the audience with his expert manipulation. The jerks used for projecting an evil or demonic character cannot bring life to the puppet who is performing the role of a teacher, similarly, the character of Covid *Mama* needed some strong movements to showcase the cruelty hidden beneath which one can never attain with gullible manipulation movements which are normally used in the case of projecting female characters. With the change of time and the effect of the digitalisation of media, the outlook of the audience has changed. Team ARMT had to deal with this crisis of the gap between lab-to land where the traditional puppeteers were unable to understand the fact that the audience was no longer fascinated by the simple style of narration and manipulation. The team conducted action research to find out the effective way of performing the puppet shows and look for new technologies which could take the puppets to a different altitude and this gap laid the basis for the formation of ARMT Creative. A series of glove and rod puppets named *Hiyar Phul Monor Pokhila* came out as a result of the action research and formative research initiatives of the ARMT Creative with the support of UNICEF to support the *Poshan Abhiyan*, an overarching scheme for holistic nourishment of India's Prime Minister.

Case Study of '*Hiyar Phul Monor Pokhila'*

'*Hiyar Phul Monor Pokhila'* is a series of plays that revolves around a family of two kids and their journey of life. The two protagonists Hiya and Mon are seen promoting nutritional behaviours among children, adolescents, and women through the series of plays. The idea of the entire series was to create a '*Jan Andolan'* on nutritional benefits among the people who are deprived of a balanced and proper diet using this series. The response and participation from the audience were indicative of a successful engagement.

The series *Hiyar Phool Monor Pokila* comprised 10 episodes, interlinked with one another to ensure a smooth flow in narration. To experiment further, ARMT Creative merged two different forms of puppetry- glove and rod puppets. The broad themes of the shows are 'Care During Pregnancy', and 'Women Nutrition' which talk about the diet chart to be followed by the pregnant woman. 'Importance of Breast Feeding' and the need to feed the baby within an hour of birth for essential nutrients through colostrum and avoid formula milk till six months, 'Five Finger Rule' for complementary feeding. 'Healthy Diet' deals with nutritious foods and their benefits, while 'Responsive Parenting' deals with

minimising the use of mobile phones among children. 'Malnutrition' speaks about malnourished children and waste of food as one of

Fig. 4. Experiment with glove puppetry designed by ARMT Creative of Dr Anamika Ray Memorial Trust in 2021 with a 10-episode series

the biggest vices of the present day. 'Anaemia' narrates the story about the importance of iron and folic acid tablets especially before and after menstruation, 'Adolescent Nutrition' and inter-generational malnutrition as a consequence of child marriage being the last in the series.

Puppetry or for that matter any other theatre form can bring alive difficult concepts and explain them in a simple manner diminishing elements of complexity as well as providing room for the play theory. Puppetry takes in elements from all art forms such as literature, painting, sculpture, dance, music and drama and enables one to have the essence of all art forms in one.

Impact of the Initiatives as CSBC

In an interview, Simon Godwin - the artistic director at the Shakespeare Theatre Company in Washington D.C. shared to the ABC News, "theatre is about being together, being in community together, experiencing stories together," (Parks 2020). The process of changing behaviour proceeds through a sequence of stages (adapted from Fishbein 1992; and Health Com 1995) in which an individual: a) becomes aware of the issue; b) becomes concerned about the issue; c) acquires knowledge and skills about the issue; d) becomes motivated, based on new attitudes and values; e) intends to act; f) tries out a new behaviour; g) evaluates the trial; and h) practices the recommended behaviour.

Considering this theoretical understanding, the ARMT team has also implemented monitoring and evaluation of the campaign launched through live

and digital puppet shows in Tamulpur sub division under the Bodoland Territorial Region of lower Assam in January 2022 with the support of a non-profit called Action Group for Rural Advancement (AGRA) and UNICEF. Over 45 live and digital shows were conducted at 30 different places in and around Tamulpur at the most remote places.

Information gathered by using focus group discussion from over 500 respondents belonging to various age groups ranging from 5 years to 70 years (approx.) reveal that they could associate themselves with the themes and the subject matter shown in the plays. The concept of '*care during pregnancy'* brought in many questions from expecting mothers. Most women were ignorant of the fact that pregnancy demanded them to take care of their health with free medication that was provided by the health department. They were also unaware of the MCP cards and many did not know how to avail the facilities provided by the Government. '*Healthy food habits among children'* was the second most interactive topic with parents looking for a probable solution to tackle this problem. Another theme which also got prominence in the series was the issue of '*anaemia among girl children'* Most of the Anganwadi workers were engaged in convincing young girls to consume iron tablets that were distributed in schools and after the puppet show they discussed the process of making the young girls consume iron tablets would become easier by referring to the puppetry.

Challenges

However, the flexibility and participatory nature of folk media make predetermined evaluation strategies almost inapplicable. However, after interacting with the community members to find out and appreciate any behaviour change, it was realised that the biggest challenge was to empower the community to set their indicators and determine in their way how these indicators will be measured and documented. The challenges that the team faced could be summarised into the following points.


Fig. 5-6. Live and digital puppet shows in the Tamulpur area of Bodoland Territorial Region, Assam in 2022.

Technological Ambitions: While the ambition was to converge traditional puppet craftsmanship with modern technology, the remoteness of the place of

screening created a kind of hurdle which needed more preparedness. The technological expectations of the team were not in sync with what would meet them on the ground.

Language Barrier: While the audience in most places was totally engrossed, there were some areas where Assamese was not the lingua franca owing to which, some children had difficulties understanding which needed a steady translation of the content.

Engaging Local People: For any kind of community health intervention, it becomes absolutely necessary to engage with the local community. The absence of a local community in making the puppetry of executing the play was a slight hiccup in the work delivered.

Creating a Lasting Relationship: Since the entire puppetry was assignment-based, it was necessary to wrap up the program within a week. However, for CSBC to be more effective, repeated and follow-up programs would have been a necessity for a greater impact and lasting familiarity of the characters.

Conclusion

Puppetry art and craft as a tool of information has been used by many agencies of development over the years. All this has created a need to develop this medium and create a utilitarian perspective for different social issues. Health communication occupies a significant role in addressing health crises. In such a situation, puppetry can play a crucial part because of its acceptability and appeal. To develop content for children and put in a complex subject like nutrition demands too much simplicity and well as dexterity for the creators. Keeping in mind the basic theories of communication, developing content for health communication has been done through extensive practice and application of the trial-and-error method that leaves room for future studies in similar areas as well as creating a prototype for extending health-related communication.

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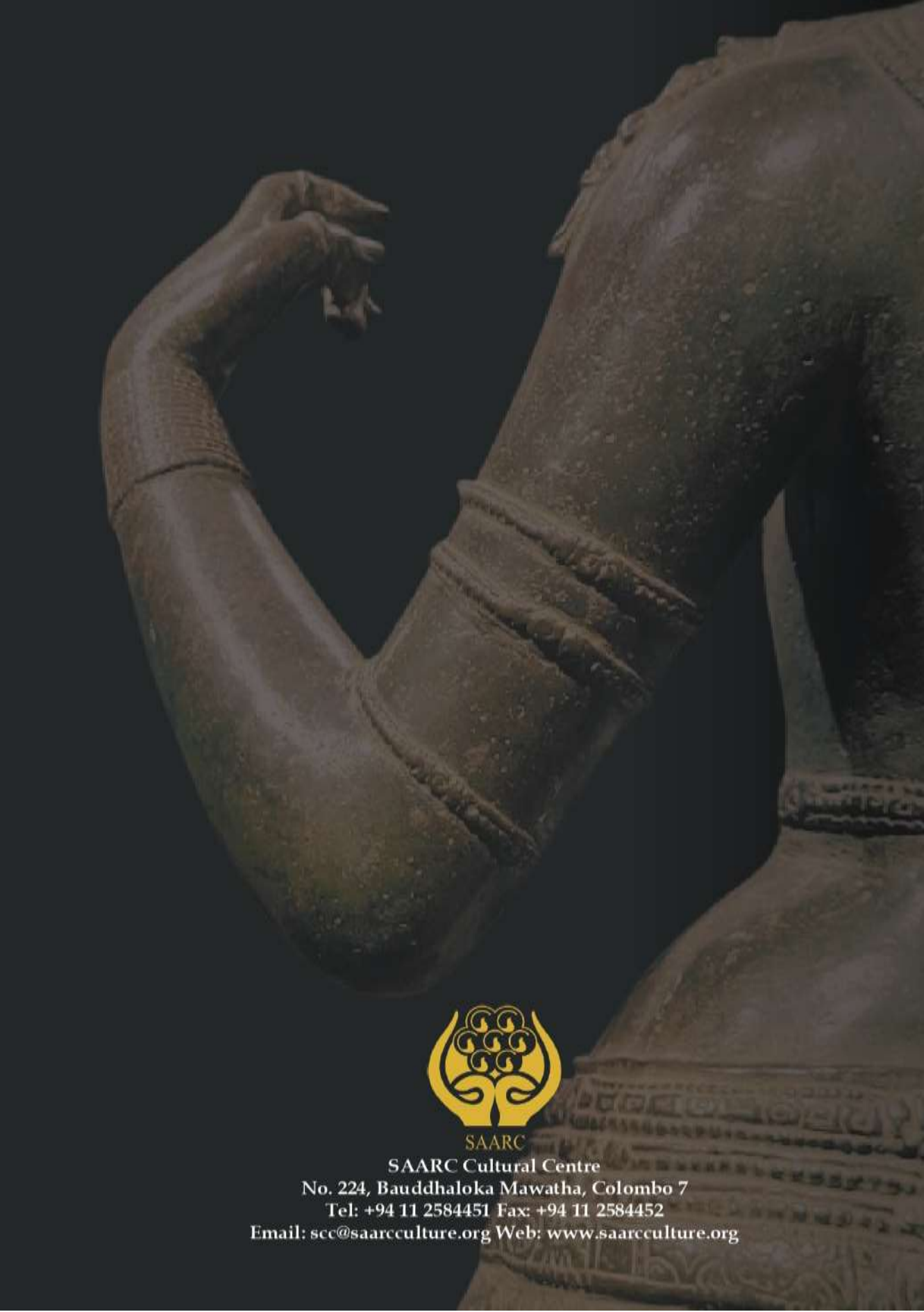

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