Metal Objects from Harappan Sites in Gujarat: An Analytical Overview

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Abstract: *This study investigates metal artefacts reported from Chalcolithic sites in Gujarat, offering insights into the cultural and economic shifts within the Harappan civilization. Focusing on the Regionalization, Integration and Localization Eras, the analysis reveals contrasting trends. The Integration Era, marked by urbanization, advanced metallurgy, and robust trade, yielded diverse artefacts like axes, knives, fishhooks, and bangles, indicative of centralized production and technological innovation. In contrast, the Localization Era witnessed a decline in settlement size, craft production, and trade. Metal artefacts from this period were utilitarian, limited in variety and quality, reflecting a decline in technological sophistication. The scarcity of high-value goods like gold and semi-precious stones further emphasizes diminished trade and wealth. This comparative analysis underscores the transition from the Integration Era's prosperity and innovation to the Localization Era's decentralization and survival. The study contributes to understanding the decline of the Harappan civilization by examining the changing distribution, diversity, and context of metal artefacts, highlighting broader socio-economic and cultural shifts in Harappan Gujarat.*

Keywords: Harappan Civilization, Gujarat, Regionalization Era, Integration Era, Localization Era, Metal Objects, Craft Production

Introduction

The earliest evidence of metal use in South Asia by pre-Harappan societies has been found in Mehrgarh II A, dating back to the early fourth millennium BCE. The discovery contained a copper ring, a bead, and a small ingot. Mehrgarh and other early sites demonstrate that the Neolithic and Chalcolithic pyrotechnic and metallurgical advancements laid the technological groundwork for the metallurgical traditions of the Harappan phase (Jarrige et al. 1995; Kenoyer 1998). The number of metal artefacts increased gradually during the Early Harappan period, and the Mature Harappan period witnessed an abundance of objects in copper, gold, silver and lead. They had a variety of copper tools and weapons (such as spearheads, arrowheads, knives, chisels, razors, saws, drills, etc.), as well as utensils, ornaments, and art pieces of cultural value. During the Late Harappan period, there was a decline in both the quantity and diversity of metal objects.

Gujarat: Area of Study

From the 1930s to the present, extensive archaeological exploration in the state of Gujarat has led to the documentation of over 800 Harappan and regional Chalcolithic sites, with 65 of these sites undergoing excavation. These excavated sites include major urban centres such as Dholavira (Bisht 1994); towns and craft production hubs like Lothal (Rao 1985), Khirsara (Nath 2012, Nath et al. 2012, 2013, Nath and Kumaran 2017), Juni Kuran (Pramanik 2003-04), Nagwada (Hegde et al. 1988), Surkotada (Joshi 1990), Bagasra (Sonawane et al. 2003; Bhan et al. 2004), Shikarpur (Bhan and Ajithprasad 2009), and Kuntasi (Dhavalikar et al. 1996). Other excavated sites include fortified settlements like Rojdi (Possehl and Raval 1989), Jaidak (IAR 1991-92; Ajithprasad 2008), and Babarkot (Possehl 1994), as well as rural centres and villages such as Rangpur (Rao 1963), Padri (Shinde and Kar 1992; Shinde 1998), Prabhas Patan (Dhavalikar and Possehl 1992), Vagad (Sonawane and Mehta 1985), Kanewal (Mehta et al. 1980), and temporary pastoral encampments like Orio Timbo (Rissman 1985; Rissman and Chitalwala 1990), Jokha (Mehta et al. 1971), and Dhatva (Mehta et al. 1975). These sites have yielded a rich variety of artefacts made from terracotta, metals, stone, shell, bone, and faience. Based on radiocarbon dates and material remains from these sites, the Harappan culture in Gujarat is divided into three phases: the Early Harappan Phase (Regionalization Era) (c. 3900-2600 BCE), the Mature Harappan Phase (Integration Era) (c. 2600-1900 BCE), and the Late Harappan Phase (Localization Era) (c. 1900-1000 BCE). This paper focuses on the metal objects recovered from various Harappan sites in Gujarat, spanning the Early Harappan, Mature Harappan, and Late Harappan phases.

Copper Objects

The following brief descriptions of copper findings from Harappan sites in Gujarat are based on information available from various published sources. As a result, the data is inherently limited due to the varying ways in which it is presented across different publications. However, efforts have been made to collect as much information as possible to facilitate analysis.

Rangpur: Rangpur in Surendranagar district, was first excavated by M. S. Vats of the Archaeological Survey of India (ASI) in 1934-35. Based on the artefacts, Vats suggested that the excavated portion of Rangpur might correspond to the late phase of the Indus civilization or possibly a transitional period leading to Cemetery H culture. In 1936, G. S. Ghurye of the University of Bombay conducted further excavations and supported Vats' findings. To better understand the site, another excavation was carried out in 1947 under H. D. Sankalia and M. G. Dikshit, who observed that the ceramics of Rangpur were distinct from Indus Valley pottery, indicating it could represent a late post-Harappan phase. In 1953-54, S. R. Rao of the ASI conducted systematic excavations and conclusively established that Rangpur had significant Harappan connections. The people of Rangpur during Periods II A, II B, II C, and III were familiar with all common metals except iron. The inhabitants of Rangpur crafted objects such as celts, pins, bangles, rings, and amulets, predominantly using copper with low tin content. However,

some tools were made from high-tin bronze, indicating a variation in metallurgical practices (Rao 1963).

The total number of copper objects found at Rangpur is twenty-five, out of which seven are fragments of indeterminate shape. The period-wise distribution of the remaining eighteen objects is as follows: - Period II A, seven; Period II B, one; Period II C, nine; and Period III, one. It is therefore evident that copper and bronze objects were in considerable use in periods II A and II C, while in periods II B and III they were extremely scarce. In period III, there must have been a general scarcity of metal at Rangpur as in all the other chalcolithic sites in India for unknown reasons (Rao 1963).

Lothal: Between 1955 and 1962, S. R. Rao of the Archaeological Survey of India excavated the fortified and stratified site of Lothal in Ahmedabad district, covering 7.5 hectares. The excavation confirmed that Harappan culture extended beyond north-west India. Lothal was a meticulously planned settlement with a citadel housing two public buildings and a lower town comprising residential areas, workshops, and a marketplace. On the eastern side of the habitation area was a large brick-lined rectangular structure, which Rao identified as a dockyard designed for harbouring ships (Rao 1979; Bindra 2003). However, Leshnik proposed that it was a water tank used for irrigation and domestic purposes. To the west of the citadel, a cemetery lay between the peripheral wall and the river. In its early stages, the site predominantly featured regional Chalcolithic ceramics. During its final phase, there was a noticeable decline in town planning and changes in artefact production (Rao 1979).

The copper and bronze objects from Lothal can be divided broadly into five categories namely, tools, weapons, personal ornaments, objects of domestic use and figures. The line of distinction between tools and weapons is very thin because certain tools such as axes can be used as weapons for offensive or defensive purposes (Figure 1). The personal ornaments form the bulk of the copper objects which are nearly 1500 in number, but it has not been possible to determine the shape and use of more than one thousand objects because of corrosion (Rao 1979).

Prabhas Patan/Somnath: The archaeological mound at Prabhas Patan/Somnath, locally known as Naghera in Junagadh district, was first reported in 1938 by Father Heras of Bombay University. The excavations at the site in 1955-56 and 1956-57, by the Department of Archaeology, Saurashtra, and The Maharaja Sayajirao University of Baroda, under P. P. Pandya and B. Subbarao respectively revealed six periods beginning from Post Urban Harappan to Medieval. To understand the cultural aspects of the site, excavations were conducted in 1971-72, 1975-76 and 1976-77 at the site by the Department of Archaeology, Saurashtra and Deccan College Postgraduate and Research Institute, Pune under J. M. Nanavati and H. D. Sankalia. The site revealed a sequence of five cultural periods datable from 3000 BC - 600 CE. The importance of the site lies in the fact that for the first time, it unveiled the existence of two regional Chalcolithic traditions in Gujarat namely Pre-Prabhas Assemblage (3000-2500 BCE) and Prabhas Ware (2300-1750 BCE) (Rajesh 2011).

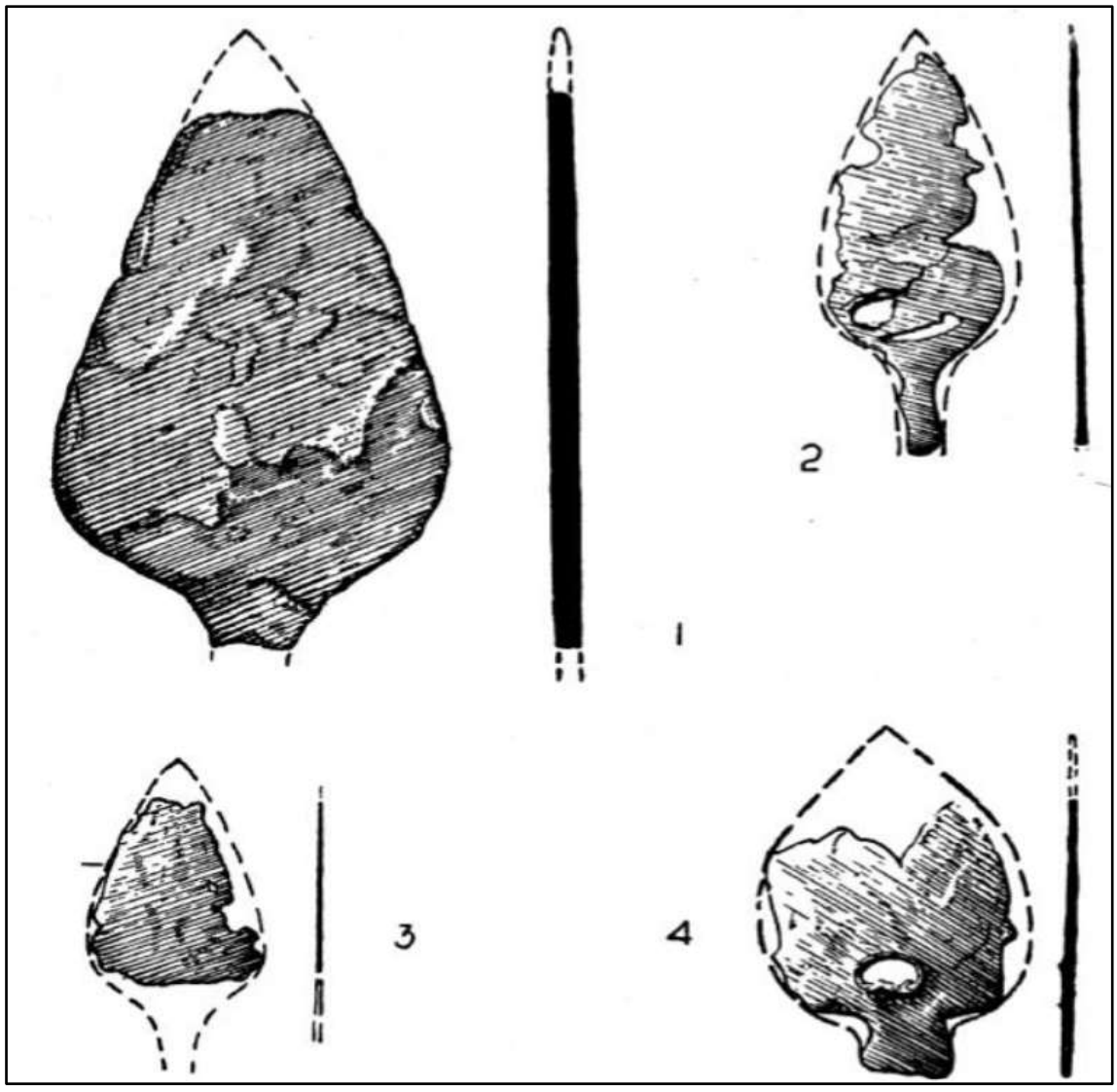

Figure 1: Copper Spearheads from Lothal (Rao 1979)

Among the copper objects revealed a semi-rectangular copper celt with a rounded cutting edge, showing a little flange on one side, which was discovered from Tr. III layer (15). Its edge is blunted by use. This celt has developed a crack along its minor axis, which is almost in the centre. This crack is running across the body. The form concerning technical use is very interesting. The flatness of this celt indicates a typical chalcolithic character. In shape, it resembles some of the celts from Indus Civilization sites and even those from Navdatoli (Nanavati et al. 1971).

Rojdi: The Chalcolithic mound at Rojdi is situated on the bank of river Bhadar in Rajkot district and was excavated in 1957-58 and 1958-59 by P. P. Pandya of the Department of Archaeology, Saurashtra. In 1962-63, the site was again excavated by J. M. Nanavati of the Department of Archaeology, Government of Gujarat, and he noticed Harappan, Micaceous Red Ware and Prabhas Ware, Early Historic and Medieval levels in the site. In 1964-65, the Department of Archaeology, Government of Gujarat, during an

exploration recovered five hundred and twenty microbeads of steatite and eight bicone barrel beads of gold, belonging to a necklace below a structure of Prabhas level. In 1982-83, the Department of Archaeology, Government of Gujarat, carried out excavations at Rojdi and recovered Harappan and non-Harappan artefacts. The excavations from 1983 to 1986 and 1992 to 1994, by a joint team of the Department of Archaeology, Government of Gujarat and the University of Pennsylvania, USA, under Gregory L. Possehl threw much light on the site and its chronology (Rajesh 2011). No metallurgical analysis has yet been conducted on the extensive collection of copper-based metal tools unearthed during recent excavations at Rojdi. These artefacts hold significant value as they highlight the widespread use of metal implements within the Post-Urban Rojdi C context in Saurashtra. Noteworthy items include an axe, bar celt, parasu, and bangles. The axe, attributed to Rojdi C, was discovered in a large structure on the main mound and measures 14.8 x 9.5 x 0.6 cm. The bar celt, also found in the same structure, was broken in antiquity and bent when placed in a shallow pit. The parasu, which features an "endless knot" design on one side, has parallels in the Sorath Harappan contexts at Mitathal and Kurada in Rajasthan. Additionally, a copper sheet was used to create an ornament, and other items such as a bangle, toe ring, ring, and pin were also recovered from the site (Possehl et al. 1989).

Jokha: In 1966-67, R. N. Mehta and S. N. Chowdhary of The Maharaja Sayajirao University of Baroda undertook the excavation at Jokha in Surat District. The site, measuring about 150x100x2 m, revealed three cultural periods. Period I (circa 1500-1000 BC) was marked by the occurrence of Post Urban Harappan ceramics, Malwa Ware and Jorwe Ware, etched beads, fragment of copper celt, microlithic cores, flakes, blades, lunates, triangles and trapezes and terracotta objects. The most noteworthy find from this period was a Neolithic celt. Two other celts were also obtained from the surface of the mound (Rajesh 2011). The metal objects from the site are made of copper, lead and iron. The copper objects are represented by nails, rings, sheets, celt and bangle pieces (Mehta et al. 1971).

Dhatva: In 1967-68, The Maharaja Sayajirao University of Baroda, conducted the excavation at Dhatva in Surat district to determine the extent of the Chalcolithic cultures in South Gujarat. The site revealed two cultural periods; Period I (circa 1500-1000 BCE) was characterized by the Chalcolithic pottery showing affinities with similar cultures of Saurashtra and Malwa and stone tools like lunates, scrapers and blades of jasper, agate and chert. Period II (circa 500 BCE- 200 CE) was characterized by Early Historic antiquities such as punch marked coins and Red Polished Ware. Based on the limited quantity and variety of chalcolithic pottery the excavators suggested that this site was just a small village settlement (Rajesh 2011). Objects of copper, lead, gold and iron were obtained from the excavations. They include coins, ear-studs, kohl-sticks, wire, hoe, blades, nails and such other objects (Rajesh 2011). Copper objects from the site are coins, ear-stud, kohl-sticks and wire (Mehta et al. 1975). A small copper ear-stud-like box with concave sides was obtained. It was in a very bad state of preservation. It was hollow and contained some ash-like material (Mehta et al. 1975).

Malvan: In 1969-70, F. R. Allchin of the Cambridge University and J. P. Joshi of Archaeological Survey of India undertook an excavation at Malvan in Surat district. The 1.3 m thick habitation deposit yielded evidence of two cultural periods and of these, period I is assignable to the Post Harappan culture and Period II to the early medieval times. Apart from the chalcolithic ceramics, blades of jasper, agate, chalcedony and bloodstone, cores, flake blades, objects of copper or bronze (small rod and bangle), terracotta humped bulls, circular or bun-shaped terracotta cakes, beads of carnelian and bones of animals like cattle, goat, sheep, dog, pig, deer, barasingha, birds and fishes were also unearthed (Rajesh 2011).

Only three copper objects were discovered and although two of them come from mixed or unstratified deposits, there seems little doubt that all should be assigned to Period I. A copper rod, circular in section with a slight depression in the central part (from a mixed deposit, MVN no. 3), a small copper pin, squarish in section (from a mixed deposit), MVN no. 19) and a mutilated copper bangle, circular in section and solid from a late level (MVN no. 25) are the copper artefacts Malvan (Allchin et al. 1995).

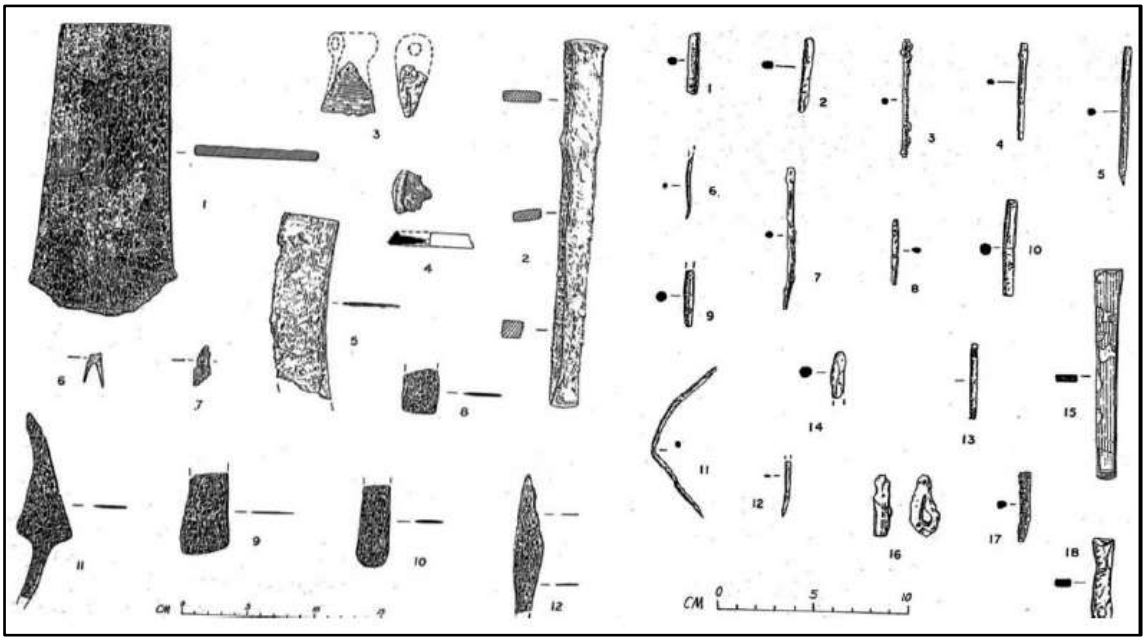

Figure 2: Copper objects from Surkotada (Joshi 1990)

Surkotada: In 1970-71 and 1971-72, J. P. Joshi of the Archaeological Survey of India undertook excavations at Surkotada in Kachchh. The excavation brought to light the remains of Harappan culture divided into three sub-periods, namely IA, IB and IC. Important antiquities recovered from the period were a flat copper celt and a chisel. The occurrence of a thick layer of ash marked the end of Sub period IB. Period IC was characterized by white painted Black and Red Ware mainly represented by bowls with or without carination, Stud-handles, and an inscribed seal; Harappan elements continued in a restricted manner. The fortified settlement consisted of a citadel, a lower town and a cemetery to the southwest (Rajesh 2011). The excavation at Surkotada has

uncovered 129 copper objects, including a hoard with beads and bangles from various sub-periods. Around 50 pieces are indeterminate. The Harappan diagnostic tool types found include simple and crescent-shaped blades, long/short chisels with rectangular tangs and narrow blades, barbed arrowheads, leaf-shaped knives, drills, spearheads or lanceheads with tangs, lid fragments with raised edges, socketed axe fragment and a fishhook (Figure 2). Additional copper objects found at Surkotada include celts or blade axes, antimony rods, bangles, rings, ear-ornament foils, hooks, chains, and small unidentified pieces. Harappan tools such as knives, arrowheads, and spearheads are notably thin. Significant items include a blade axe, a large chisel for stone dressing, a drill for steatite bead piercing (Period I C), and part of a socketed axe. Circular-sectioned antimony rods, bangles, and rings are common (Joshi 1990).

Nageswar: In 1983-84, The Maharaja Sayajirao University of Baroda excavated a shell object manufacturing Harappan settlement situated near a large, sweet water lake in Nageswar village, Okhamandal taluka of Jamnagar district. The site was destroyed in 1976 by local earthwork contractors and revealed evidence of Harappan culture divisible into two phases, Period IA (0.70-1.20 m deposit) and IB (1.30-1.40 m deposit). Period IA yielded Harappan artefacts and Period IB was represented by structures made of stone slab paved floors and rubble walls, fire altar / Pottery kiln and other artefacts. Apart from Classical Harappan ceramics and one stud handled bowl; shell bangles, pendants, broken ladles, inlays, beads and debitage; stone weight, beads, blades and polishers; folded copper sheet and terracotta triangular cakes, bangles and toy cart frames were recovered from the site (Rajesh 2011).

Nine copper objects were recovered from the Nageswar excavation, most in poor condition and difficult to identify due to their fragmentary state. Among them, one is likely part of a fishhook and another a needle. The presence of copper hooks is plausible, supported by fish bones found at the site and the proximity of freshwater sources to the settlement (Hegde et al. 1990).

Kuntasi: Between 1987-88 and 1989-90, excavations at the fortified Harappan site of Kuntasi, Rajkot district, revealed two cultural phases: Urban Harappan (Period I) and Post-Urban Harappan (Period II). Finds from Period I included Harappan ceramics, terracotta toy carts, carnelian beads, faience, steatite beads, cubical chert weights, and a square faience seal. A small pot containing thousands of steatite micro-beads, copper bangles, and rings was also discovered. Period II showed signs of decline. Excavators suggest Kuntasi may have served as a high-tide estuarine port based on artefacts, location, and local traditions. A total of 118 copper objects were found—half from Period I and 57 from Period II—all made of pure copper. artefacts included ornaments, tools, and miscellaneous items. A lead bangle fragment and 17 gold beads were also recovered (Dhavalikar et al. 1996; Rajesh 2011).

Dholavira: Dholavira excavated from 1989-90 to 2003-2004 by R.S. Bisht of the Archaeological Survey of India is one of the five largest Harappan cities in the subcontinent and is in Bhachau taluka, Kachchh district. Ruins of the site are spread over

an area of about 100 hectares in Khadir Island. Two seasonal water channels Manhar and Mansar are flowing on the south and north of the walled settlement.

Figure 3: Copper Mirror from Dholavira (Bisht 2015)

The site is remarkable for its exquisite planning, monumental structures, aesthetic architecture, efficient water harvesting system and funerary architecture. A huge amount of Chalcolithic pottery, human and animal figurines, chert blades, stone weights, copper objects, steatite seals, terracotta sealings, beads of semiprecious stones and drill bits were unearthed from the site. According to the excavator, the seven cultural stages of Dholavira can be dated between 3500- 1700 BCE (Bisht 2015; Rajesh 2011). Excavations at Dholavira have uncovered a diverse range of copper and bronze objects typical of Harappan settlements (Figure 3). These items are categorized into tools, weapons, personal ornaments, domestic objects, and figurines. While some tools like axes and spearheads could serve dual purposes as weapons, the focus was on crafting tools for carpenters, stoneworkers, coppersmiths, and lapidaries rather than advanced weaponry.

Bagasra: From 1995-96 to 2004-2005, The Maharaja Sayajirao University of Baroda conducted excavations at a fortified Harappan settlement at Bagasra, locally known as Gola Dhoro in Maliya taluka of Rajkot district. The site measuring 160x120 m is roughly rectangular in layout. The excavations at the site uncovered a 7.75 m thick deposit of habitation that belongs to four distinct phases: Phase I to Phase IV. The material remains unearthed from the site include blades, cores, grinding stones, polishers, skin rubbers, weights, beads and drill bits of various stones; copper objects namely chisels, knives, bangles, and beads; shell objects such as ladles, circlets, beads, bangles, inlay pieces, balls; steatite beads, seals; faience bangles, beads; bones and bone points, scrapers; otoliths; clay objects namely sealings, balls, clay lumps with reed impressions, and

varieties of terracotta objects like animal figurines, toy-cart frames and wheels with projected hubs, spindle whorls, tops, pottery, pottery rings, pottery discs, triangular cakes, bangles, beads, pendants, ear studs and inlay pieces. The site provided clear evidence for shell working, stone bead manufacturing, faience making and copper working (Rajesh 2011). Excavations at Bagasra revealed many copper objects. The main objects are copper pots, chisels, razors, bangles, bone handle knives, nodules, pellets, beads, rods, nails and unidentified objects (Figure 4) (Patel and Ajithprasad 2018).

Figure 4: Bone handle Knives from Bagasra (Patel and Ajithprasad 2018)

Bokhira: Excavations at Bokhira in Porbandar District by Marine Archaeology Centre National Institute of Oceanography, Goa in 2005, revealed a Protohistoric settlement dating back to the mid-3rd millennium BCE. Four trenches laid in the agricultural land located on the western side of the Porbandar Creek revealed a habitation deposit of 50 cm. A large quantity of artefacts recovered from the site is akin to the material remains of Rojdi and Rangpur (Rajesh 2011). Bokhira revealed two copper objects i.e., a copper finger ring and a heart-shaped pendant. The outer diameter of the ring was 21mm and the inner diameter was 15 mm (Gaur and Sundaresh 2013).

Kanmer: During 2005-06 to 2008-09, JRN Rajasthan Vidyapeeth, Udaipur, Gujarat State Department of Archaeology and Research Institute for Humanity and Nature, Kyoto, Japan jointly excavated the fortified Harappan settlement at Kanmer locally known as

Bakar Kot situated 35 km east of Rapar in Kachchh district. The fortified site measuring 115x155x10 m revealed fivefold cultural sequence namely KMR I – Pre-Urban Harappan (2888-2623 BC), KMR II- Urban Harappan (IIA- 2130-1785 BC and IIB - 2470-2149 BC), KMR III – Post Urban Harappan, KMR IV– Early Historic (673-888 AD) and KMR V – Medieval (1224-1239 AD). Antiquities from the site include beads of steatite, faience, semiprecious stones, terracotta, shell and gold, steatite and terracotta seals, sealings, terracotta cakes, dices, gamesman, amulets, polishers, drill bits, rough outs, bangles of shell, copper and terracotta and weights along with copper artefacts (Rajesh 2011, Kharakwal et al. 2012).

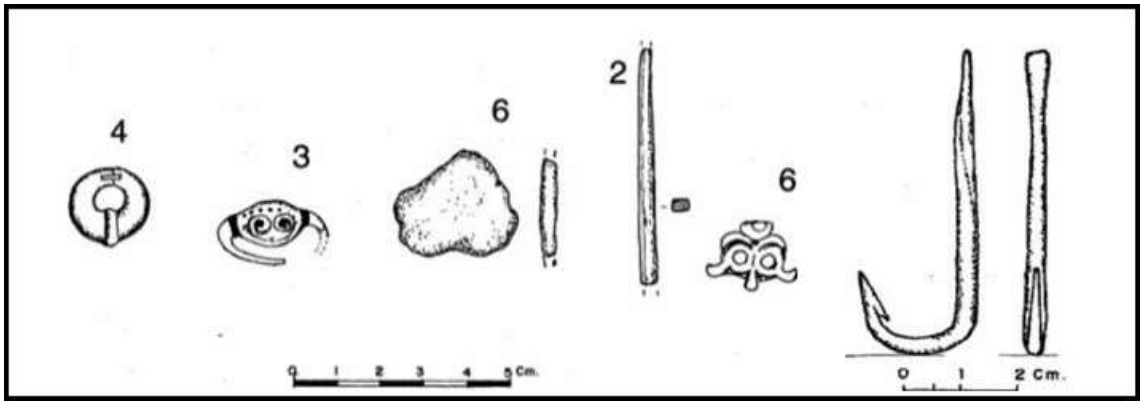

Figure 5: Copper objects from Bet Dwaraka (Gaur et al. 2005)

Bet Dwaraka: Hiranand Shastri conducted excavations on Bet Dwarka Island in the Okhamandal taluka of Jamnagar District in 1930, attributing the site's earliest occupation to the 3rd century BCE (Rao 1987). Later investigations by the National Institute of Oceanography (NIO), Goa (Gaur et al. 2005), revealed evidence of human habitation on the island dating back to Chalcolithic or Post-Urban Harappan times. The excavator suggested that the site's continuous habitation was driven by the availability of marine shells and due to its strategic location, it likely served as a safe harbor in antiquity (Rajesh 2011). The most important finding is a copper fishhook from the late Harappan Phase, and it is well-preserved and one of the biggest fishhooks from this phase. Fishhook is with a barbed point, straight sunk without forming any curve. However, the top is beaten up and made broad and thin, perhaps for holding thread. Some of the Mesopotamian sites like Ur, yielded similar types of fishhooks. Fishhook from Bet Dwarka is one of the biggest recorded from Harappan sites. The length is 6.5 cm, the barbed point of 1.1 cm, section of the sink is round (Gaur et al. 2005). An antimony rod, pendant, ring, and earring are other important findings from the excavations. Antimony rod is of rectangular sections. One half is thinner than the other one. Similar types of antimony rods have been reported from several Harappan sites. A broken finger ring with a bank of round sections having a broad oval shape with floral designs on the upper side was also found. A thick earring found here can be placed in the ear by turning the two sides away from each other, as they are joined with a groove and socket. The ring has evidence of gold coating. The outer diameter is 1.9 cm, and the inner diameter is 0.7 cm (Gaur et al. 2005).

Langhanaj: Langhnaj, a Mesolithic site with Chalcolithic connections in Mehsana district, was extensively excavated over several decades. Initial excavations by H.D. Sankalia of Deccan College in 1942 and subsequent years unearthed artefacts and burials. In 1953-54, the Maharaja Sayajirao University of Baroda discovered microliths and human burials. To reassess its archaeological significance, the site was excavated again in 1963-64 by a collaborative team from the University of Poona, the Maharaja Sayajirao University of Baroda, and the Government of Gujarat. Some 21 burials were unearthed from the site through different excavations, and a comparative study of skeletons from Langhnaj and Lothal (Harappan site) indicated close similarities between the Harappans of Lothal and hunter-gatherers of Langhnaj. It was further attested by the recovery of a copper knife of 98% purity from the middle phase of Langhnaj. Radiocarbon data obtained from the mid-phase of the site (2040±110 BC) is also comparable with the age of Lothal and many other Harappan sites in Gujarat (Rajesh 2011). So far, only two metal objects have been found. The first was an arrowhead found at a depth of 2 ft. 6 in. (75 cm.) in 1949. The other is a copper knife found at a depth of 3 ft. 2 in. (about 97 cm.) in layer 3 in 1963 (Rajesh 2011).

Kotada Bhadli: Kotada Bhadli located in Nakhatrana Taluka of Kachchh District was excavated in 2010-11 by Shirvalkar of Deccan College Postgraduate and Research Institute, Pune. The Chalcolithic settlement measuring 130x115x5 m has a stone fortification wall. The artefacts unearthed from the site showed similarities to those of Sorath Harappan, Late Sorath Harappan and Classical Harappan. Various artefacts from the site include ceramics, pottery discs and terracotta beads (Shirvalkar et al. 2014). The copper objects at the site include bangles, rings, and various miscellaneous items. Six plain, round or oval-section bangles were discovered, likely used as bracelets, children's bangles, or for storing copper. Two rings were found, one thin and fragile, possibly used as an ear ornament, and the other with a sturdy double spiral, also likely an ear ornament. Other miscellaneous items include three fragile wire fragments, a flat pin with rounded ends, a unique copper stylus with a gold tip, and an unidentified heavy, flat copper object with irregular sides.

Khirsara: Khirsara (Gadhwalivadi) is a small village in Kachchh, Gujarat, located approximately 7 km south of Ravapar on the Bhuj-Narayan Sarovar State Highway and 5 km north of Netra. The archaeological site, situated 2 km east of the village, lies between two seasonal streams that flow into the Khari River about 400 m away. The fortified settlement, measuring 310 m × 230 m, was excavated by the ASI from 2009 to 2013. These excavations revealed a rich Urban Harappan cultural deposit with five structural phases. The site featured residential structures, a factory area, a warehouse, kilns, a well, and evidence of flood damage across successive phases (Nath 2012). The site yielded a diverse collection of copper objects like Chisel, bars, nails, bangles, fishhooks, arrowheads, pins, knives, chisels, needles and weights.

Jaidak/Pithad: The site at Jaidak is located about 4.5 km southeast of the Pithad village on the right bank of the river Aji in the Jodiya taluka of the Jamnagar district. The site

was first reported by P. P. Pandya heading a team of the Archaeological Unit of the Government of Bombay at Rajkot while exploring the Jamnagar and Rajkot districts. He has reported from Pithad pieces of Harappan pottery, particularly two dishes-on-stand. In 1992, the Department of Archaeology and Ancient History, The M. S. University of Baroda carried out a small-scale excavation at the south-eastern extension of the site (Jaidak-II); unearthing over 1.00m thick chalcolithic habitation deposit including the remains of several stone structures. The site was excavated recently by the Department of Archaeology and Ancient History, The Maharaja Sayajirao University of Baroda for consecutively two field seasons – 2005-'06 and 2006-'07 (Sen 2009).

In Period II A at Jaidak, copper objects were scarce, with only four crucible pieces and kiln fragments found, indicating copper melting activity. An unidentified lump of copper was also discovered in the western fortification area. In Period II B, copper objects become more numerous, including chisels, broken fishhooks, simple rings, bangles, wires, and small broken copper pieces. The chisel is rectangular with a sharp, bevelled end, like those from Kuntasi II and Lothal. The fishhooks, all fragmentary, have curved ends and are likely for river fishing. Rings are made from thin copper strips, either squarish or circular, and bangles are simple, undecorated, and highly corroded. Additionally, two unique copper objects resembling ornaments were found, one a spiralled ring and the other a spiralled object with hanging wire ends, the latter being peculiar to Jaidak (Sen 2009).

Navinal: Located on the margin of the Gulf of Kachchh in Mundra taluka of Kachchh District, Navinal shows cultural remains of the Integration and Localization eras of Indus Civilization. The site was discovered in the 1950s by P.P. Pandya of Department of Archaeology, Saurashtra. It was first reported by S.R. Rao in 1963 and was assigned Rangpur IIB phase of the Harappan culture of Gujarat. Later in 2011, the site was explored by P. Ajithprasad of the Maharaja Sayajirao University of Baroda and in 2012 by A.S. Gaur of the National Institute of Oceanography. In 2013, the site located in the forest land was explored by a joint team from the University of Kerala, Kachchh University, Albion College – USA, Gujarat State Archaeology Department and M. S. University of Baroda to understand its archaeological potential (Patel et al. 2014).

At the site, copper objects and evidence of copper working include fragments of spatulas, points, hooks, wires, knife blades, sheets, beads, and rings, along with prills, nodules, waste materials, and crucible fragments. Although no definitive evidence of copper smelting has been found, some coarse clay crucibles with copper adhering to them suggest they were used for melting copper. Most copper objects were likely produced using sand moulds, which would leave minimal traces. The small number of beads (one with a gold covering) and rings point to their use as ornaments, while the wire fragments, varying in thickness, indicate their use in craft and art production. Crucible fragments make up 2% of the total copper-related artefacts, with weights ranging from 4.99g to 7.5g, though the exact shape of the crucibles is difficult to determine due to the lack of proper rims or bases (Patel et al. 2014).

Shikarpur: The Harappan site of Shikarpur, located in Bhachau taluka, Kachchh, was first excavated by the Department of Archaeology, Government of Gujarat between 1987 and 1990. The excavations revealed two distinct cultural phases: layers 1-9 represent the Urban Harappan period, while layers 10-19 correspond to the Pre-Urban Harappan phase. Artefacts found at the site include Harappan ceramics, terracotta animal figurines, toy carts, bangles, shell beads, semi-precious stone objects like pendants, copper objects (rings, bangles, chisels), chert blades, and bone items. Faunal remains from the site include cattle, buffalo, sheep, goat, pig, dog, blue bull, blackbuck, jackal, hare, and rhinoceros. Re-excavations from 2007 to 2010 by the Maharaja Sayajirao University of Baroda further clarified the site's cultural sequence and function. Additional significant finds included terracotta tablets, sealings, steatite pendants, figurines, cart frames, copper celts, and weights. A total of 234 copper objects were recovered, including rings, bangles, and chisels (IAR 1987-88, 1988-89, 1989-90; Bhan and Ajithprasad 2008).

Table 1: Other Harappan sites yielding copper artefacts

Name of the site	Copper artefacts
Desalpur	copper script-bearing seal, copper knife (IAR 1963-64). Bangle fragment, rod and other copper object fragments from surface exploration.
Zekhda	copper bangles, copper wires (IAR 1977-78)
Pabumath	copper awl (IAR 1977-78).
Taraghda	copper ring (IAR 1978-79).
Vagad	copper objects (Sonawane and Mehta 1985)
Loteshwar	copper bangle pieces (IAR 1990-91)
Datrana	copper punch (IAR 1993-94)
Nadapa	copper bangle fragment, two thin copper strips and a fragment of chisel or knife (Rajesh et al. 2020).
Moti Pipli	copper/bronze nail, folded strip of copper (IAR 1992-93).
Somnath	copper objects (IAR 1956-57)
Juni Kuran	copper arrowheads, wire, fishhook (Pramanik 2004)
Janan	copper objects
Padta Bet	copper wire
Dhwajagadh	copper objects (surface find)
Gajod	copper artefacts (surface find) (Jaipalsinh et al. 2023)
Bhuragadh	copper objects (surface find) (Jaipalsinh et al. 2023)
Bambhanka	copper objects (surface find)
Lodrani	copper artefacts (surface find)

Nagwada: Between 1985 and 1990, excavations were carried out at the Harappan settlement of Godh in Nagwada Village, Surendranagar district, by the Maharaja Sayajirao University of Baroda. The site was divided into 10 m × 10 m grids, and soil samples were analyzed to select excavation trenches. A 1-meter-thick deposit revealed four structural levels, divided into two periods: Period IA (layer 5) and Period IB (layers

1-4). The burials found in Period IA, including both inhumation and symbolic burials, showed similarities to pre-Harappan pottery from Amri, Nal, and Kot Diji. The excavation uncovered four phases of structural activity, including post-holes, stone-built rectangular structures, mud-brick buildings, and rubble-stone constructions. Classical Harappan ceramics were less prevalent, with Anarta pottery and white-painted Black-and-Red Ware also found. Evidence of craft activities, such as shell working and stone bead making, was also discovered (IAR 1985-86,1986-87, 1987-88, 1988-89, 1989-90; Hegde et al.1988).

During excavations at Nagwada, a few copper objects were found, notable for their form and context. These included an intact flat celt (14.5 x 9.5 x 0.5 cm, 568 grams) with a bevelled cutting edge and a chisel (7.5 x 0.8 x 0.4 cm) with one bevelled end. Copper ornaments such as pendants, coiled rings, and perforated folded strips were discovered and placed in miniature vessels buried under house floors. The pendant was found with beads of agate, amazonite, and steatite in structural phase III, while the metal strips were found alone in phase II.

The copper artefacts unearthed in limited quantities during excavations and surface explorations at various Chalcolithic sites across Gujarat provide further valuable insights into the technological and cultural practices of the era. These artefacts, representing tools, ornaments, and other objects, are significant for understanding the metallurgical expertise and material culture of Chalcolithic communities in the region (Table 1).

Figure 6: Gold artefacts from Kanmer (Kharakwal et al. 2012)

Table 2: Copper artefacts from Harappan sites in Gujarat

Copper Artefact Types										
Kuntasi	Nageswar	Surkotada	Malvan	Jokha	Rojdi	Somnath	Lothal	Rangpur	Site Name
x	x	✓	x	x	✓	✓	x	✓	Celt
✓	x	✓	x	x	x	x	✓	✓	Knives/Dagger
✓	x	✓	x	x	x	x	✓	x	Arrowheads
✓	x	✓	x	x	x	x	✓	x	Spearheads
✓	x	✓	x	x	x	x	✓	x	Chisel
✓	x	x	x	x	✓	x	✓	x	Axe
✓	✓	✓	✓	x	✓	x	✓	✓	Pin& needles
✓	x	✓	✓	x	✓	x	x	✓	Bangle
✓	x	✓	x	x	✓	x	x	✓	Ring
x	x	✓	x	x	x	x	x	✓	Bead
✓	x	x	x	x	x	x	x	✓	Amulet/Pendant
x	x	x	x	x	x	x	✓	x	Razor/ Blade
✓	x	✓	x	x	x	x	✓	x	Drill bit
x	x	x	x	x	x	x	✓	x	Animal figurines
✓	✓	✓	x	x	x	x	x	x	Fishhook
✓	x	x	x	x	x	x	x	x	Mirror
✓	x	✓	✓	x	x	x	x	x	Rod
x	x	x	x	x	x	x	x	x	Seal
x	x	x	x	x	x	x	x	x	Weight
x	x	x	x	✓	x	x	x	x	Wire

Khirsara	Kotada Bhadli	Langhnaj	Bet Dwaraka	Kanmer	Bokhira	Bagasra	Dholavira	Site Name
	x	x	x	x	x	-	-	Celt
✓	x	✓	x	x	x	✓	-	Knives/Dagger
✓	x	✓	x	x	x	✓	-	Arrowheads
x	x	x	x	x	x		✓	Spearheads
✓	x	x	x	x	x		✓	Chisel
x	x	x	x	x	x	✓	✓	Axe
✓	✓	x	x	x	x	x	-	Pin& needles
✓	✓	x	x	✓	x	✓	✓	Bangle
x	✓	x	✓	✓	✓	✓	✓	Ring
x	x	x	x	x	x	x	-	Bead
x	x	x	✓	x	✓	x	✓	Amulet/Pendant
x	x	x	x	✓	x	✓	✓	Razor/ Blade
x	x	x	x	x	x	x	-	Drill bit
x	x	x	x	x	x	x	✓	Animal figurines
✓	x	x	✓	x	x	x	✓	Fishhook
x	x	x	x	x	x	x	-	Mirror
✓	x	x	✓	✓	x	x	✓	Rod
x	x	x	x	x	x	x	x	Seal
✓	x	x	x	x	x	x	-	Weight
x	✓	x	x	x	x	x	-	Wire

Padta Bet	Juni Kuran	Nagwada	Nadapa	Zekhda	Desalpur	Shikarpur	Navinal	Jaidak	Site Name
x	x	✓	x	x	x	x	x	x	Celt
x	x	x	✓	x	✓	x	✓	x	Knives/Dagger
x	✓	x	x	x	x	x	x	x	Arrowheads
x	x	x	x	x	x	x	x	x	Spearheads
x	x	x	x	x	x	✓	x	✓	Chisel
x	x	x	x	x	x	x	x	x	Axe
x	x	x	x	x	x	x	x	x	Pin& needles
x	x	x	✓	✓	✓	✓	x	✓	Bangle
x	x	✓	x	x	x	✓	x	✓	Ring
x	x	x	x	x	x	x	✓	x	Bead
x	x	✓	x	x	x	x	x	x	Amulet/Pendant
x	x	x	x	x	x	x	✓	x	Razor/ Blade
x	x	x	x	x	x	x	x	x	Drill bit
x	x	x	x	x	x	x	x	x	Animal figurines
x	✓	x	x	x	x	x	✓	✓	Fishhook
x	x	x	x	x	x	x	x	x	Mirror
x	x	x	x	x	✓	x	x	x	Rod
x	x	x	x	x	✓	x	x	x	Seal
x	x	x	x	x	x	x	x	x	Weight
✓	✓	x	x	✓	x	x	x	✓	Wire

' ✓ ' = Presence 'x ' = Absence ' - '= Data not available

Gold, Silver and Lead Artefacts

The gold artefacts were recovered from the sites namely Rangpur, Lothal, Dhatva, Dholavira, Bagasra, Bet Dwaraka, Kotada Bhadli, Khirsara, Navinal, Kanmer, Rojdi and Nagwada (Table 3). Silver artefacts were reported from Dholavira and Nagawada (Table 4) and lead artefacts were recovered from Dholavira, Jokha, Dhatva and Kuntasi (Table 4). Rangpur is noted for its gold beads and finely crafted necklace fragments. Lothal stands out with various items, including ten-strand necklaces, head ornaments, precision-crafted beads, disks, and gold foils from different eras. Dhatva presents a unique circular copper earring coated in gold. Dholavira demonstrates advanced techniques like soldering and plating, with discoveries of 123 gold foils, 116 beads, and spiral rings. Bagasra unearthed 12 items, including beads, pendants, and earrings, mainly from stratified layers. Bet Dwaraka features a thick earring with a gold coating. Kotada Bhadli is notable for a copper stylus tipped with gold. Khirsara and Nagwada exhibit similar artefacts, such as flat disc beads, microbeads, and gold rings, whereas the site Navinal revealed a copper bead covered in gold.

Table 3: Gold artefacts from Harappan sites in Gujarat

	Gold Artefact Type								
Site name	Bead	Ring	Earring	Pendant	Disk	Micro bead	Foil/sheet	Stylus	Spacer
Rangpur	✓	x	x	x	x	x	x	x	x
Lothal	✓	✓	✓	x	✓	✓	✓	x	✓
Dhatva	x	x	✓	x	x	x	x	x	x
Dholavira	✓	✓	x	x	x	x	✓	x	✓
Bagasra	✓	x	✓	✓	x	x	✓	x	x
Bet Dwaraka	x	x	✓	x	x	x	x	x	x
Kotada Bhadli	x	x	x	x	x	x	x	✓	x
Khirsara	✓	✓	x	x	✓	✓	x	x	x
Navinal	✓	x	x	x	x	x	x	x	x
Nagwada	x	x	✓	x	x	x	✓	x	x
Kanmer	✓	x	✓	✓	x	x	✓	x	x
Rojdi	✓	x	x	x	x	x	x	x	X

' ✓ ' = Presence ' x ' = Absence

Discussion

Out of the 65 excavated Chalcolithic sites in Gujarat, metal artefacts have been recovered from 28 sites, demonstrating the region's metallurgical significance during the Harappan civilization. Sites such as Loteshwar, Datrana, Moti Pipli, Nagwada, Taraghda, Shikarpur, Janan and Dhwajagadh, yielded metal artefacts associated with the Regionalization Era. Sites including Surkotada, Kuntasi, Kotada Bhadli, Jaidak, Nageswar, Rangpur, Lothal, Bagasra, Shikarpur, Desalpur, Pabumath, Vagad, Juni Kuran, Somnath, Navinal, and Padta Bet feature metal artefacts spanning both the Integration and Localization Eras. Furthermore, Bet Dwaraka, Jokha, Dhatva, and

Malvan are identified as Harappan sites with copper artefacts exclusive to the later Harappan period (Table 5). Notably, Dholavira and Kanmer stand out, as metal objects have been documented from all three chronological phases of the civilization, emphasizing their importance as key sites in understanding the evolution of metallurgical practices during the Chalcolithic period in Gujarat (Figure 9). The Localization Era of Harappan culture in Gujarat is characterized by a gradual decline in various aspects of the civilization that once thrived. This period is marked by reduced settlement areas, a decline in craft production, the collapse of trade networks, and disintegration in areas like pottery production, the manufacture of semi-precious stone items, and shell-based goods. Copper artefact production and usage also declined, as indicated by the limited metal objects found in shallow deposits from this era at various sites in Gujarat.

The Integration Era and Localization Era of the Harappan civilization in Gujarat represent distinct phases in the region's cultural and economic history, with a marked decline in technological and social complexity from the former to the latter. A comparative analysis of metal artefacts from these eras reveals significant insights into their differences. Sheshadri (1994) conducted a scientific analysis of copper artefacts from the Integration and Localization Eras, recovered from sites such as Nagwada, Kuntasi, Somnath, and Pithad in Gujarat. Her findings revealed that Harappan metalworkers demonstrated advanced expertise in alloy composition and smelting techniques, surpassing those of the Copper Hoard Culture. Despite this, the metallurgical techniques employed by both phases were notably similar. Microscopic examination of representative samples showed that craftsmen from both groups produced finely cast objects with no visible casting fins or porosity defects. The metal exhibited homogeneity and compactness, indicating the use of well-ventilated, smooth moulds equipped with vents to release trapped gases during casting. Cooling methods for the cast objects varied, involving either rapid cooling in the atmosphere or gradual cooling under hot ash (Sheshadri 1994).

The composition analysis of copper artefacts from Bagasra, conducted by Ambika Patel and Ajitprasad, revealed that the objects were extensively corroded, mineralised, and encrusted, with high levels of oxygen and chlorine. Zinc was identified in analysed artefacts, while trace amounts of arsenic—commonly found in copper ores—were detected in the bangle and ring, suggesting the use of mould-based casting techniques. The analysis also found the presence of iron, a typical component of copper ores, indicating that the smelting process likely occurred at temperatures below 1200°C, preventing the complete removal of iron. The absence of lead and the presence of these elements offer valuable insights into the ore composition and the metallurgical practices employed at the site (Patel et al. 2018).

During the Integration Era, the Harappan civilization was at its peak, characterized by large-scale urbanization, advanced metallurgy, and extensive trade networks. Metal objects were diverse and widely distributed across several sites, including major urban

sites like Dholavira, Lothal, Bagasra, Shikarpur and Surkotada. Artefacts such as axes, knives, blades, fishhooks, pins, needles, and bangles were common, demonstrating a broad range of functionality, from tools and weapons to personal adornments. Unique items like animal figurines in copper, drill bits, and copper vessels highlight technological innovation and skilled craftsmanship. The widespread discovery of gold and silver artefacts, beads, and amulets reflects an affluent society engaged in trade and producing high-status goods. The presence of melting evidence at multiple sites indicates organized production activities, likely centralized in urban areas. This era also shows strong regional and inter-regional connectivity, as evidenced by the variety of materials and artefacts across sites.

Table 4: Silver and lead artefacts from Gujarat

	Silver Artefacts						Lead artefacts					
Site Name	Beads	Coiled objects	Sheets	Ornaments	Rod	Weight	Sling ball	Seal	Bangle	Ear stud	Arrowhead	Sheets
Dholavira	✓	✓	✓	x	✓	✓	✓	✓	x	x	✓	✓
Nagwada	x	x	x	✓	x	x	x	x	x	x	x	x
Dhatva	x	x	x	x	x	x	x	x	x	✓	x	x
Kuntasi	x	x	x	x	x	x	x	x	✓	x	x	X

' ✓ ' = Presence ' x ' = Absence

In contrast, the Localization Era signifies the gradual decline of Harappan civilization, following the disintegration of its centralized urban centres. The range and distribution of metal artefacts in this period were significantly reduced. While items such as axes, knives, rings, and bangles were still present, their production and use were more limited. Sites like Rojdi, Jaidak, and Kuntasi retained evidence of some melting activities, but these were localized rather than part of a widespread production network. Artefacts from this era, such as simple rings, chisels, and fishhooks, reflect a more utilitarian approach, indicating a focus on survival rather than innovation or luxury. The absence of advanced items like animal figurines and drill bits underscores the diminished technological complexity of this phase. The economic decline during the Localization Era is evident in the narrowing geographical spread and reduced variety of artefact types (Table 15). For example, gold artefacts, common in the Integration Era, were found only at isolated sites such as Kanmer and Bet Dwaraka, reflecting a decline in wealth and trade networks. The Localization Era also saw reduced craft production, particularly in high-value goods like semi-precious stone beads and shell ornaments. This decline coincides with the shrinking size of settlements and a more fragmented societal structure, marking a departure from the centralized urban planning of the Integration Era.

Figure 7: Silver Objects from Dholavira (Bisht 2015)

It is significant to note that several tools, which could also serve defensive purposes/hunting purposes, have been discovered at Harappan sites from the Integration Era. These include arrowheads, axes, knives, and daggers, found at sites such as Lothal, Rangpur, Dholavira, Bagasra, and Juni Kuran. Typically crafted from copper or bronze, these implements often feature design elements like backward-projecting barbs, which are indicative of their utility in hunting or combat. The discovery of arrowheads in fortified Harappan settlements suggests a potential role in defence or as part of preparations for conflicts, highlighting the dual functionality of such tools.

In contrast, during the Localization Era, the emphasis on fortifications and defensive tools appears to have declined significantly. Fortification walls or defensive tools like arrowheads are rarely observed or absent in the archaeological record of this period. This shift might reflect changes in sociopolitical dynamics, with less focus on conflict or defence, possibly due to altered settlement patterns, reduced external threats, or the declining complexity of societal organization. The absence or rarity of such tools in the Localization Era suggests a move away from the urbanized, fortified settlements of the

Integration Era toward smaller, less defensively equipped communities. This transition marks a distinct difference in how these later communities adapted to their environment and organized their social and material culture.

Table 5: Copper Artefacts from Localization Era Sites in Gujarat

Copper Artefact Types								
Site Name	Lothal	Rojdi	Malvan	Rangpur	Surkotada	Kuntasi	Dholavira	Jaidak
Celt	x	✓	x	✓	x	x	-	x
Knives/Dagger	x	✓	x	✓	✓	x	-	x
Awl	✓	x	x	x	x	✓	-	x
Spearheads	x	x	x	x	✓	✓	-	x
Chisel	x	x	x	x	✓	x	-	✓
Axe	✓	✓	x	x	x	✓	-	x
Pin	x	✓	✓	✓	✓	x	-	x
Bangle	x	✓	✓	✓	✓	✓	✓	✓
Ring	✓	✓	x	x	✓	✓	✓	✓
Sheet/foil	x	✓	x	x	✓	x	-	x
Amulet/Pendant	x	x	x	x	x	✓	-	x
Blade	✓	x	x	x	✓	✓	-	x
Drill bit	x	x	x	x	✓	x	-	x
Animal figurines	✓	x	x	x	x	x	-	x
Fishhook/hook	✓	x	x	x	✓	✓	-	✓
Mirror	x	x	x	x	x	✓	-	x
Rod/Nail	✓	x	✓	x	✓	✓	✓	x
Earring	x	x	x	x	x	x	-	x
Wire	x	x	x	x	x	x	-	✓
Arrowhead	x	x	x	x	✓	x	-	x
Bead	X	X	x	x	✓	x	✓	x

Site Name	Bagasra	Kotada Bhadli	Bet Dwaraka	Jokha
Celt	x	x	x	✓
Knives/Dagger	✓	x	x	
Awl	x	x	x	
Spearheads	x	x	x	
Chisel	✓	x	x	
Axe	x	x	x	
Pin	x	x	x	
Bangle	x	✓	x	✓
Ring	x	✓	✓	✓
Sheet/foil	x	x	x	
Amulet/Pendant	x	x	✓	
Blade	x	x	x	
Drill bit	x	x	x	
Animal figurines	x	x	x	
Fishhook/hook	✓	x	✓	
Mirror	x	x	x	
Rod/Nail	✓	x	✓	✓
Earring	x	x	✓	
Wire	x	x	x	
Arrowhead	x	x	x	
Bead	x	x	x	

' ✓ ' = Presence 'x ' = Absence ' - '= Data not available

a

b

Figure 8: Copper bangle (a) and copper rod (b) from Kanmer (Kharakwal et al. 2012)

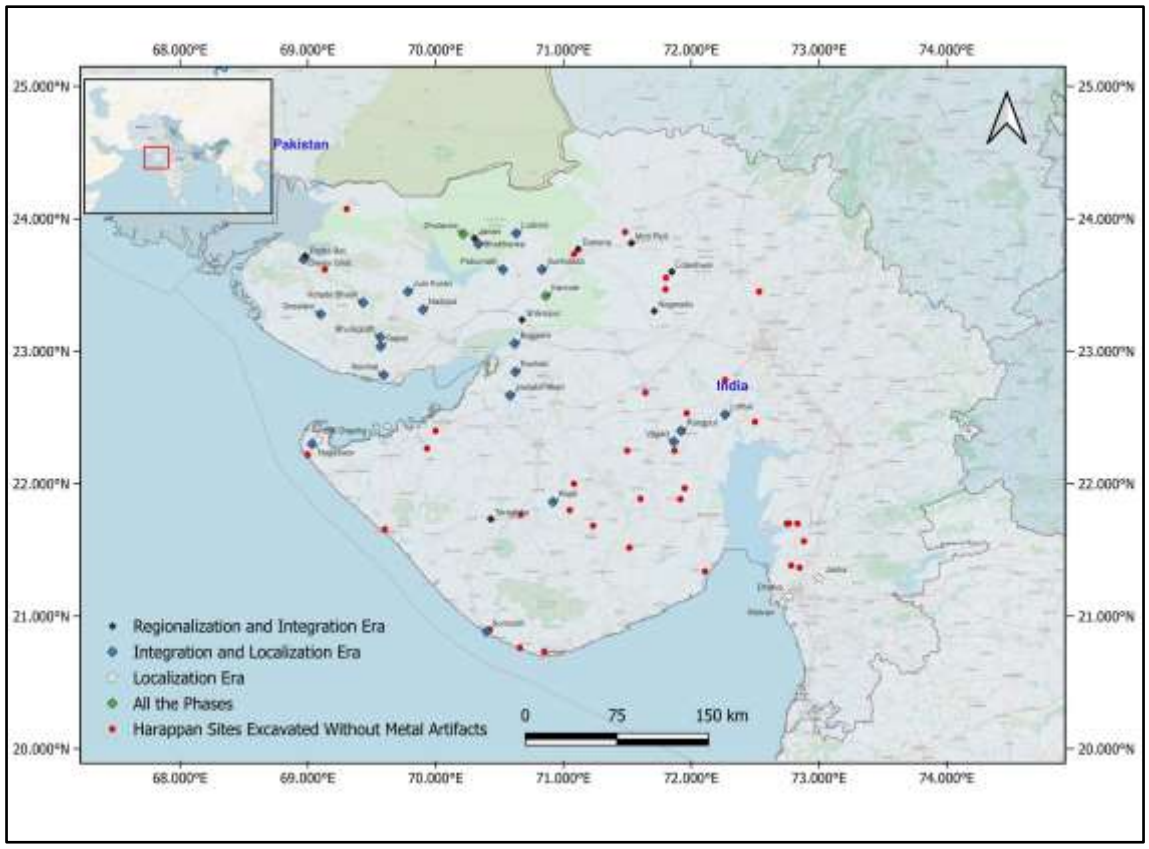

Figure 9: Map of Harappan Sites in Gujarat with Metal Artefacts from Different Phases of the Harappan Culture

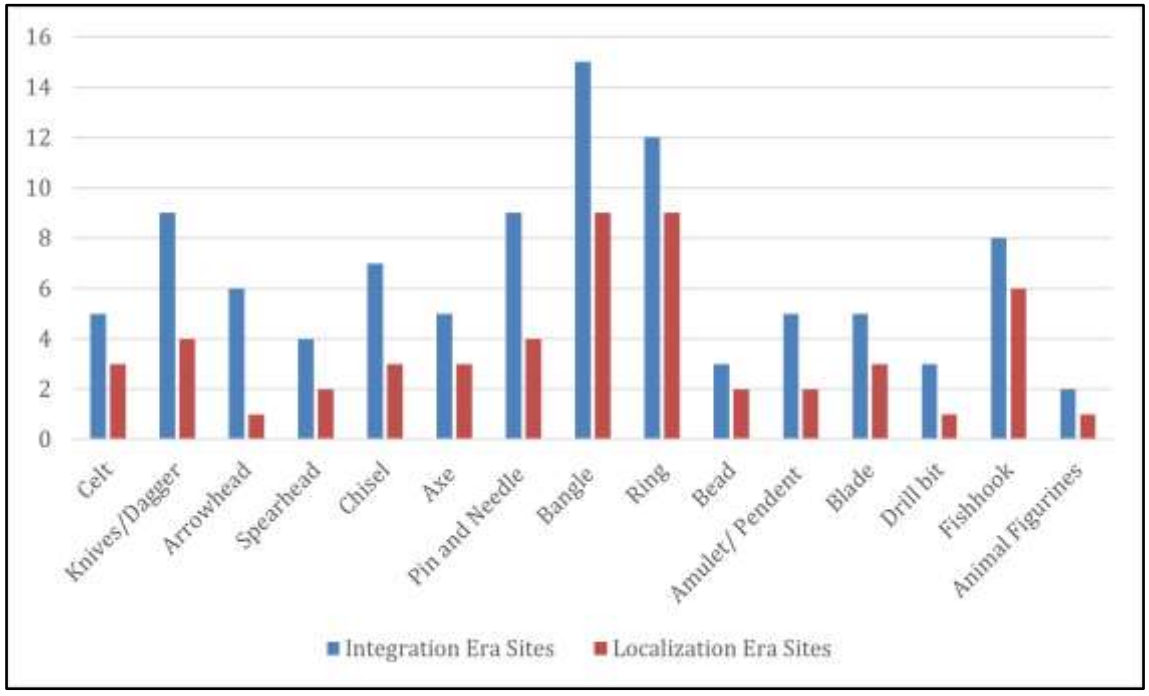

Figure 10: Count of Sites in Gujarat from the Integration and Localization Era featuring copper artefacts

In summary, the Integration Era represents the zenith of Harappan society, with extensive trade, technological advancements, and a variety of high-quality artefacts. In contrast, the Localization Era reflects the civilization's fragmentation and decline, with reduced innovation, limited artefact diversity, and localized production (Table 5) (Figure 10). This transition highlights the socio-economic and cultural shifts that occurred as the Harappan civilization moved from a period of prosperity and organization to one of decentralization and eventual decline. The metal artefacts unearthed from these eras serve as tangible markers of these broader historical processes.

The distribution and archaeological contexts of metal objects at Indus sites provide insights into their use by residents. Copper, gold, silver, and lead do not appear to have been materials with restricted access, as metal tools and ornaments are commonly found in most contexts, particularly within houses and room blocks. However, copper is notably scarce in burial contexts, unlike many other ancient civilizations where metals were often buried with the dead. This suggests that copper objects were not considered high-status or wealthy items in the Indus craft hierarchy, or such wealth items were deliberately kept in circulation rather than being interred with the deceased.

Conclusion

The Harappans in Gujarat utilized various metals, including copper, gold, silver, and lead, to craft a range of artefacts. While gold, silver, and lead were primarily used for ornaments, copper and its alloys were employed to produce ornaments, tools, and weapons for daily use. However, they did not create large weapons like swords for warfare. Copper artefacts from Gujarat Harappan sites include antimony rods, barbed arrowheads, bangles, blade axes, chisels, fishhooks, knives, nails, spearheads, mirrors, and utensils, among others. These items served diverse purposes and can be categorized as ornaments, agricultural tools, weapons, household utensils, office tools, play objects, and potentially ritual items.

To refine the understanding of Indus metallurgy, it is essential to study technological changes over time. Since secure archaeological contexts and chronological sequences are often lacking, laboratory-based analytical approaches are crucial. Expanding compositional research on Indus copper artefacts and examining alloying patterns can reveal shifts driven by cultural trends, raw material availability, or technological advancements. Changes in alloy usage, for instance, may indicate evolving practices or resource constraints. Isotope studies on archaeological copper materials could further clarify the supply chain of raw materials and finished products, offering insights into resource distribution and technological development across different Indus sites.

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