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Emerging First Urban Settlements on Indus Hakra Rivers and Associated Lands in South Asia: Case Study from Upper Sindh, Pakistan

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Abstract

South Asia is a unique part of earth where human lived as is claimed in other parts of the Globe. Tracing the historical sequence of early South Asians; it was the 2800–2600 BCE phase when a cultural sequence and process consolidated socio-economic complexity within communities resulting existing mega urban centers.

This paper re-evaluates this phase of social complexity through archaeological data collected from Baluchistan Highland lands, Indus and Hakra river catchments and eastern Guajarati and Rajasthani regions where the observed urban growth pressed lead scholars to argue the social development adopting theoretical models for gathered data. Among the debating scholars, the strong integrating perspectives came from Jonathan Mark Kenoyer, Jim G. Shaffer, Rita P. Wright, Gregory L. Possehl, and Muhammad Rafique Mughal and broader anthropological frameworks proposed by Elman R. Service, Morton H. Fried, and Norman Yoffee. Their debate is highlighted in this paper based on field data which illustrate resilient factors of urban growth in South Asia.

To comprehend the issue, the case study is brought here from the region of upper Sindh where two rivers flowed i.e. Indus in plains and Hakra flowed along the semi desert environment. This region has remained intensively strategic where the communities had inter and intra community interaction with 122 documented settlements of Highland of Baluchistan; River plain populations of the Ravi, Srikhola, Rehman Dheri, Taloor, Nuhato; and in south Gujarati communities. Additionally, in and around of the case study region of present research 29 more settlements are added in previously 122 documented settlements. The case study region has mega city of Mohenjo-Daro in west, Lakhanjo-Daro in immediate northwest, Dholavira and Lothal in east and in North Ganweriwala city. The present analysis is based on comprehending the nature of 29 settlements; their capabilities of production, consumptions, trade and exchange which may highlight the changes and social diversity and intensity. The present analysis also focuses on the self-sufficiency and dependency or totally reliance on the neighboring communities? are the main issues addressed in this paper.

Key Words: *Artisan, hierarchy, heterarchy, interaction, social complexity, Indus Civilization.*

Introduction

Indus civilization is an ancient civilization based on huge area encompassing entire south Asia. It consists of more than one million square kilometers region where five million people lived. The history is deep rooted from Paleolithic period to onwards. After long years; it was time of 2800-2600 BCE when settlements started to grow larger and cultural complexity intensified and urban centers appeared. It has been debated whether urban centers emerged

through external stimulus or indigenous development. Earlier diffusionist models have been largely rejected in favor of frameworks emphasizing local trajectories (Shaffer, 1984; Kenoyer, 1998).

Excavations at sites such as Kot Diji, Rehman Dheri, Amri, Kalibangan and numerous others demonstrate that this temporal horizon represents not an isolated culture but a regional interaction sphere characterized by shared material traditions and settlement planning (Possehl, 2002; Mughal, 1990).

Theoretical Framework

Classical evolutionary frameworks proposed by Service (1975) and Fried (1967) conceptualize social development as a progression from bands to tribes, chiefdoms, and states. However, the situation during this phase was different than this given schema and this temporal phase might be interpreted as a time of amalgamation marked by increasing hierarchy and domination. Yoffee (2005) explains that early complex societies often exhibit heterarchical organization, where power is distributed across multiple social domains rather than centralized (Wright 1977, 2010).

Applying these models to the archaeological evidences proposes having factor of personal identification and ownership as hierarchical domination, for instance, the potter mark or graffiti; presence of non-local commodities providing strong indicators of regional integration and interaction. This notion further indicates that some person i.e. artisan families had control over their production which elevated their social status. Another factor emerged as a practice of standardization in craft production and fortification around the settlement. Thus, this time is better understood as a processual stage of consolidation, rather than a fully developed centralized complexity i.e. the 'state'.

Settlement Fortification

One of the most striking features of this phase of 2800-2600 BCE, is the widespread presence of fortified settlements, particularly at Kot Diji and Rehman Dheri. These fortifications, often constructed with stone or mud-brick, indicate perhaps the control over space and resources; collective labor mobilization and a symbolic demarcation. Kenoyer (1998) interprets such features as early expressions of corporate organization, while Wright (2010) links them to emerging administrative coordination. Mughal (1990) further demonstrates that settlement hierarchies begin to emerge during this phase, with larger centers exerting influence over smaller satellite sites an important precursor to urban networks.

Ceramic Standardization

The ceramics of 2800-2600 BCE has regional variation(s) as the highland had polychrome and lowland riverine alluvial plains had red ware with black painted motifs. In both wares, the black was commonly used in both communities and another factor was standardization in production served as main indicators of cultural integration. The widespread distribution of these ceramics across geographically distant sites strongly suggests the inter-regional exchange networks. Shaffer (1984) argues that such uniformity reflects cultural conjunction rather than political unification, making interaction sphere significant. The potters mark and graffiti indicate personal and /or familial identification. At the same time, Kenoyer (1998) emphasizes the role of craft production in constructing social identities and group affiliations.

Craft Specialization and Economic Assimilation

Archaeological evidences reveal diversity and complexity in craft technology. The basic focus included on (a) bead production from carnelian, steatite and other material (b) metal objects copper/bronze and (c) ceramic mass production. According to R.Wright (2010), such

developments signal the emergence of independent specialists, reflecting more complex economic organization. Possehl (2002) interprets these patterns as evidence for regional trade networks, linking highland and lowland zones. Mughal's (1990) surveys in Cholistan and Mallah's (2010) survey in Thar Desert, further demonstrate that settlement distribution corresponds closely with resource zones, indicating systematic economic planning and adaptation. Taking these descriptions granted, it is argued here that it was greater amalgamation of cultural dynamics through pervasive interaction system which consequently bulged the settlements at greater level perceived as 'cities'.

Social Differentiation: Hierarchy or Heterarchy?

The question of social hierarchy during the developing phase i.e. 2800-2600 BCE phase remains debated. While fortifications and settlement hierarchies suggest unquestioned differentiation. Appearance of technical complexity and choice i.e. metal workers, ceramic producers, shell workers and stone workers became supportive factor of social differentiations. The social differentiation or social hierarchy issue is further supported by putting identification marks for ownership separate the social position and indicates that power may not have been centralized where each activity could have been related to the central authority. Yoffee (2005) argues that early complex societies often operate through multiple overlapping authorities, rather than a single hub (state apparatus). During the phase under discussion, authority may have been distributed across the familial groups of craft communities who had established regional exchange networks. This supports a model of **heterarchical** complexity, where integration precedes stratification.

Transition to Urbanism: Continuity and Transformation

The transition towards the Mature Harappan phase urbanism illustrate both continuity and transformation of features such as standardized bricks, fortified settlements, craft specialization, and raw material resource exploitation which intensified in the Mature phase (Kenoyer, 1998; Possehl, 2002). However, cultural complexity in regional interaction added a new community of merchants for commercial activities and connections between artisan, public and resource regions. Consequently, new developments highlighted include writing system (Indus script); standardized weights and measures and Large-scale urban planning. Shaffer (1992) emphasizes that this transition reflects cultural continuity rather than abrupt change, supporting an indigenous trajectory of urbanization.

Discussion: Rethinking of Transformative phase

Synthesizing archaeological and theoretical perspectives, this phase can be characterized as (a) a regionally integrated interaction sphere (Gregory L. Possehl, 2002); (b) corporate, community-based system (Jonathan Mark Kenoyer, 1998); (c) heterarchical socio-political and commercial structure (Norman Yoffee, 2005) and (d) a stage of institutional experimentation leading to urbanism (Rita P. Wright, 2010). It is argued here that even Elman Service's "chiefdom" category doesn't fit here but this phase represents a complex adaptive system, where multiple processes like economic, social, and ideological converged to produce urban civilization. It is a **decisive stage** in its formation and reflects a **long-term process of social** and economic integration, characterized by innovation, interaction, and institutional development. By situating this phase within broader theoretical debates such as state formation, it becomes clear that Indus urbanism emerged through gradual, indigenous processes rooted in heterarchical complexity, rather than centralized **political** authority.

Comparative Perspectives of Ancient Civilizations

A comparative analysis of development of the initial cities with contemporaneous in Mesopotamia, Indus and Ancient Egypt, the all three regions witnessed increasing socio-economic complexity but their trajectories differ in terms of political centralization, material expression, and institutional development

Mesopotamian Phenomenon

The emergence of urbanism in Mesopotamia during the Uruk period (ca. 4000–3100 BCE) presents one of the earliest examples of emergence of cities and the state formation. The cities like Uruk and Ur exhibit the monumental temple architecture, centralized administrative systems, writing (cuneiform) and redistributive economies. Robert McCormick Adams (1981) is of opinion that Mesopotamian cities developed through temple-based economic controlled surplus production and labor which lead and triggered the institutional hierarchies and bureaucratic governance (Yoffee 2005).

In contrast, the during this phase Indus lacks these factors as seen in Mesopotamia but brought up craft specialization, scattered authority and regional interaction, in which artisan and trader suggesting a fundamentally different organizational logic in corporal and heterarchical pattern (Kenoyer 1998).

Ancient Egyptian Situations

The emergence of cities with ultimate state formation in Ancient Egypt happened with divine force of early dynastic pharaoh named as Narmer 3100 BCE who is depicted “Narmer Palette” with two crowns associated with upper and lower Egypt. He had (i) strong centralized kingship as a divine ruler; (ii) monumental architecture of tombs and temples; (iii) symbolic representation of authority like iconographic insignia; and (iv) control over agricultural surplus along the Nile river. Scholars such as Barry J. Kemp (2006) argue Egyptian complex cultural system i.e. state formation was driven by ideological centralization, where kingship unified economic and religious authority.

When compared to the Indus phenomenon; no direct evidence of kingship or divinity are discovered; large palaces are absent, but entire settlements were fortified; authority appears to be personified or familial which may have elevated with merchant communities who were involved in the trade of multiple commodities. Nevertheless, Egypt represents an authoritative system with strong ideological consistency; at that time Indus represents the emergent large settlements without centralized sovereignty.

The Indus Trajectory

The sequential era of 2800-2600 BCE is generally known as Kot Dijian phase which is actually Late Regionalization era (Rajput 2026) depict a unique position when compared to Mesopotamia and Egypt. Gregory L. Possehl (2002), proposes the Indus Civilization developed through a “regionalization, integration and localization” sequence. Rita P. Wright (2010) highlights that in this sequence developments were rooted in (i) economic interdependence (ii) craft specialization and (iii) settlement planning without obvious political centralization. This supports Jim G. Shaffer’s (1992) argument for indigenous cultural continuity, rejecting diffusionist explanations and Tooba Shafaq Rajput recently reevaluated sequence in which Late Regionalization era which stands as Kot Dijian phase represents the change as occurrence of early city settlements having significant sociocultural systems that lead the integration (Rajput 2026).

Comparative Synthesis: Multiple Pathways to Complexity

From a theoretical perspective, the comparison highlights the Norman Yoffee's (2005) argument that early civilizations followed "multiple, historically contingent pathways". The fundamental comparative contrasts among three leading civilizations are as under:

Feature	Mesopotamia	Egypt	Indus
Political Structure	Centralized institutions	Divine kingship	Heterarchical
Monumentality	Temples, ziggurats	Pyramids, tombs	Fortifications only
Writing	Early (cuneiform)	Early (hieroglyphs)	Absent- personal identification marks- graffiti
Economy	Redistributive	State-controlled agriculture	Regional interaction networks
Social Organization	Hierarchical	Highly stratified	Moderately differentiated

Within this comparative perspective Indus carries an alternative civilizational logic, where complexity emerged through coordination, standardization, and regional interaction rather than centralized power as perceived in other civilizations. This distinction is critical for rethinking global models of emerging urbanism of Indus Civilization as a unique case in world archaeology.

Beyond Economic Intensification: Basic factors of Cultural Change

Factor 1: Coordination

In scholarly discussions, the economic growth requires mechanisms to coordinate labor, regulate resources, and resolve conflict. Douglass C. North (1990) argues that institutions (formal rules and informal norms) reduce uncertainty and enable complex exchange. Norman Yoffee (2005) shows that early complex societies often lack a single centralized state, instead operating through multiple overlapping authorities such as temples, kin groups, and councils. Rita P. Wright (2010) emphasizes administrative practices like standardization, accounting habits, and spatial planning are as precursors to formal bureaucracy. It is suggested that surplus alone does not create complexity; but rules and coordinating practices are highly significant. The inter and intra community interaction indicate full scale coordination among the Indus societies.

Factor 2: Ideology, Symbolic Systems, and Social Identity

It is clear that the shared beliefs and symbols legitimize authority, structure cooperation, and stabilize social relations. Clifford Geertz (1973) highlights the role of symbolic systems in organizing social life. Jonathan Mark Kenoyer (1998) links Indus material culture e.g., standardized forms, and iconography to shared identities and corporate organization rather than obvious displays of elite power. Bruce G. Trigger (2003) argues that ideology and ritual are central in early civilizations for maintaining order and mobilizing labor. Hence, it is articulated that the cultural change depends on meaning-making systems, not just production.

Factor 3: Environment, Climate, and Risk Management

It is visible that the ecological conditions shape where and how intensification is possible and how societies respond to stress. Karl W. Butzer (1982) demonstrates how environmental constraints and opportunities structure cultural trajectories. Dorian Q. Fuller (2006) shows that crop choices and agricultural regimes are adaptive responses to local ecologies. Thus, the

argument here is that the intensification is context-dependent; climate variability, river dynamics, and soils affect outcomes and resilience.

Factor 4: Demography and Settlement Dynamics

Population growth and aggregation increase interaction density, fostering innovation and social differentiation. Esther Boserup (1965) argued that population pressure can drive agricultural intensification. Robert McCormick Adams (1981) linked settlement hierarchies and regional systems to rising complexity. Hence, it is visible that the more people in closer proximity; the more coordination problems and more opportunities for specialization and institutions.

Factor 5: Power, Inequality, and Political Strategies

Leaders and groups actively shape systems through competition, alliance-building, and control of resources or information. Timothy K. Earle (1997) emphasizes chiefly strategies of finance, ideology, and warfare in building power. Michael Mann (1986) identifies multiple sources of power like economic, ideological, military, and political that interact rather than follow a single path. As an implication, it can be said that the economic growth can enable inequality, but political action determines how it is organized and sustained.

Factor 6: Networks, Connectivity, and Information Flow

Exchange is not just about goods; it is about information, skills, and standards. Gregory L. Possehl (2002) describes regional interaction spheres where shared practices spread without political unification. Carl Knappett (2011) shows how network structure hubs, and connectivity shapes cultural transmission. The argument is here that the structure of connections influences innovation, standardization, and resilience.

Factor 7: Technology and Knowledge Systems

Technologies embed skills, learning traditions, and constraints that channel future developments. Andrew Sherratt (1981) highlighted the “secondary products revolution” as a suite of innovations with wide social effects. Rita P. Wright (2010) links production technologies to organizational change and labor structuring. Nonetheless, it is maintained that the Innovation is cumulative and path-dependent; early choices shape later possibilities.

Argument Amalgamation

Agricultural intensification, craft specialization, and expanding exchange are core enabling processes, but they generate constant cultural change only when combined with (i) institutions that coordinate and regulate (Douglass C. North, 1990; Henry T. Wright, 1977, 1984; Norman Yoffee, 2005); (ii) ideologies and identities that legitimize practices (Clifford Geertz, 1973; Jonathan Mark Kenoyer, 1998; Bruce G. Trigger, 2003); (iii) environmental adaptations that stabilize production (Karl W. Butzer, 1982; Dorian Q. Fuller, 2006); (iv) demographic pressures that increase interaction density (Ester Boserup, 1965; Robert McC. Adams, 1966, 1981); (v) power strategies that organize inequality and authority (Timothy K. Earle, 1997; Michael Mann, 1986); and (vi) network structures that transmit standards and knowledge (Gregory L. Possehl, 2002; Carl Knappett, 2011). These concepts help explain social growth and intensification in emergent cities where the standardization in commodities and crafts, fortification around settlement(s), and regional integration without clear centralized kingship. Here cultural complexity emerges through coordinated practices and networks rather than a single dominant authority.

The increasing socio-economic complexity can be viewed through agricultural intensification, craft specialization, and the expansion of exchange networks. These processes must be understood within a broader framework of organized coordination, symbolic integration, and

regional interaction. While use of far-flung resources, surplus production and specialized crafts with the technological refinement of forms exhibit the material basis for complexity generate social transformation. As argued by Douglass C. North (1990) that economic growth regulates production and exchange systems. Jonathan Mark Kenoyer (1998) emphasizes that Indus craft production reflects not only economic specialization but also shared cultural practices and social identities. Gregory L. Possehl's (2002) concept of a regional interaction sphere, in which connectivity facilitated the transmission of both goods and ideas without necessitating centralized political authority. Norman Yoffee (2005) equating material standardization with hierarchical state formation, instead proposing that early complex societies often operate through heterarchical arrangements of power. In this light, the patterned production, circulation, and contextual use can be interpreted as evidence of emerging institutional practices and shared symbolic frameworks that structured social interaction. Therefore, cultural change in this period is best understood as the outcome of interacting economic, institutional, and ideological processes, in which material culture particularly ceramics, beads, shell and metal objects served as both a medium and a mechanism for the integration of increasingly complex social systems.

Case Study in the Land of two Rivers: The Indus and Hakra

From the excavation of Kot Diji site, the sequence of 16 cultural layers were documented (Khan 1965). In this sequence, a distinctive cultural material assemblage was identified exhibiting a separate cultural tradition which was later on discovered and recorded from other settlements of the Indus Valley for instance, Jailpur (Mughal 1974), Sarai Khola (Halim 1972), Gumla (Dani 1971), Rahman Dheri (Durrani 1981) Mehrgarh, Harappa (Kenoyer and Meadow 2000; Meadow and Kenoyer 2001). In total 122 settlements exhibit Kot Dijian material. This cultural material was given 2800-2600 BCE temporal bracket. In other words, the morphological similarities of cultural material observed based on analogical parallels depicted a pervasive presence of a cultural tradition known as 'Kot Dijian'. Main emphasis was on the ceramic object having (a) short neck (b) a black band around the neck and (c) fish-scale as a painting motif; became common characteristic feature for identification of Kot Dijian tradition at other settlements of Indus Valley. Following this simplistic morphological scheme, 29 sites in Thar Desert were identified revealing reasonably complex socio-economic pattern. The future field investigation might add sites to this present number. The settlements recorded during present investigation shown considerable density of cultural material mainly the potsherds and chert tools. The settlements depict three types i.e. mounded, surface scatters and chert tool manufacturing workshops. At the mounded sites the traces of hearth / kiln, vitrified slag and bead workshops were discovered. The surface scatters showed availability of pottery along with other cultural material. The majority of surface scatter sites contained geometric stone tools which are actually associated with the earlier periods i.e. Mesolithic/ Hakra. During survey some spots were encountered with very thin presence of artifacts suggest short occupancy i.e. the campsites. In the Rohri Hills at least at two locations Bypass and Kandharki, the chert tool manufacturing workshops were documented.



Fig.1: Location map of sites mentioned in this paper

For understanding of the cultural phenomenon some important sites are discussed here having clear profile of given time slot of 2800-2600 BCE. The settlements are: Loal Mari, Per Sarihiyo, Ganero8, and Dubi4 just to name a few (fig.1). In lieu of the comprehending fuller and clear picture, the geographical background of the region is provided here.

Geography of Area

The sites are located along the western edges of the desert where it conjoins with alluvial plains and Rohri Hills. The Thar Desert generally constitutes on great Thar of India and Pakistan- the Pakistani portion of desert covers entire eastern part of Sindh province. In contemporary geographical setup, the Nara canal flows all along the western skirts and submerge into Rann of Kutch towards Arabian Sea. The Nara canal in its northern portions created a narrow alluvial valley. There is a huge sandy region in the west of the Nara valley which is covering the Rohri Hills in north. This portion was getting water from Indus System during high flood seasons. The sites are also discovered along the western edges as explained below.

The Nara valley starts from Saleh Pat where it has the traces of ancient river course known as *Karo-Naro*. The valley ends at Jamaro Head along the Nara canal. This is a small narrow valley that has Rohri hills joined with sand dunes on the west and the Thar Desert on the eastside. The deserts on both sides of the valley create an identical environment that further holds several micro niches including smaller alluvial valleys, and lakes. This region received water from Indus and Hakra river systems. Indus is still alive and Hakra is dried. The present Nara canal is actually rejuvenated bed of Hakra River and flows all along the western skirts of desert and submerges into Rann of Kutch towards Arabian Sea. The smaller alluvial valleys and lakes along the east sides of the Nara valley were watered by Hakra and on the west side by Indus River system. The archaeological sites are scattered all over the region, therefore the focus of survey remained mainly on the lakes, valleys and ancient river courses.

Types of the sites

As mentioned earlier that at this stage of research, at least 29 sites are documented; many more are expected in future as research is still going on into the region. The sites are classified into three types (a) mounded sites and (b) surface scatters(c) Chert tool manufacturing Workshops. The mounded sites are reported where the desert conjoins with plains and the ancient river channels are present. At these sites a variety cultural material along with architectural evidences and other features like hearths and kilns are recorded. The surface scatters are dispersed into Desert where architectural features are absent and the other features are found with limited viscosity of artifactual repertoire. The Dubi4, Charbaro1, Ganero 8, Khuth cluster of three sites and Nerr are few surface scattered sites among others present in the Thar. Artifacts belonging to other period like Mesolithic geometric tools and Hakra type pottery are present along with typical Kot Dijian pottery suggesting the continuity of habitation until this period. For example, Dubi4 site where lots of geometric tools along with Hakra type pottery and Kot Dijian material is gathered. Within the chert raw material outcrops of Rohri Hills at least two locations i.e. Bypass and Kandharki area, the tool manufacturing workshops were documented.

Loal Mari

This settlement is located at 27°.41' North & 69°.18' East, 05 kilometers north of the modern village Syed Imam Ali Shah in Taluka Pano Akil, district Sukkur Sindh. The site occupies 180 meters N-S in length and 143 meters E-W width. Total area of the site is 25740 square meters (figure 2). The site is consisting of small mounds approximately one-meter-high from ground level and the huge amount of pottery is scattered on the surface that includes Indus sherds as well. During the examination of surface, a distinct feature the kiln was observed locating in the western part of the site, where so many vitrified slags were spread everywhere in its immediate vicinity. The pieces of debitage from various semi-precious stones were also observed on the surface of site indicating the bead manufacturing workshop. No any other feature was recorded.



Figure 2: General view of the Loal Mari

The artifacts from this site were collected as plain and painted pottery with various designs. The pottery is mostly short necked typical Kot Dijian, the other pottery design includes as black & red colored and nail impression, perforated pottery and buff color pottery. The chert blades, chert micro drill, Terra cotta cakes, T/C toy cart frame and wheel vitrified slag's make

diverse cultural object repertoire of this settlement. Additionally, diversity of the finished, unfinished, broken during manufacturing process, and flaked debitage of various semi-precious stones, white disc beads, copper/bronze objects have been discovered (Fig2)



Figure 2: Scattered Cultural objects and pottery collected from the surface of site. The fascinating items discovered from site are of various types of exotic semi-precious stone such as (1) Agate and its types like red carnelian stone and Chalcedony; (2) Opal like white translucent / crystalline and milky white; (3) Emerald in green color, (4) black stone, and (5) faience. Additionally, the copper and chert are the part of collection from the Loal Mari workshop (Fig 3).



Figure 3: Various types of semi-precious stones showing complete manufacturing process

Taloor-ji-bhit

The site of Taloor-ji-bhit is situated ten kilometers in northeast of Kot Lalo, at latitude 26°.42'.58" north and longitude 68°.23'.30" east. The site measures as total of 443 meters East-West and 467 meters North-South and cover a total of 206881square meters area. The site was reported by M. Mukhtiar Kazi in 1992. The site is divided into two portions designated as (A) mounded and (B) surface scatter (figure4). The mounded part of site is located on the west side within alluvial plain area and consists of at least two mounds elevated almost three meters in height from the ground surface areas. The second part; i.e. surface scatter, is situated on the sand dune at least 02 to 04 meters higher from the surrounded plains. This is a very large site occupied during the Kot Dijian period and continued until the Indus period. The

robbers ditch was examined closely and several Kot Dijian objects were found, however the entire site is densely covered with Indus period artifact. The cultural assemblage includes huge variety of pottery in different shapes and sizes and decoration along with other items like terracotta cakes, beads, toy cart frames, wheel cones plain and decorated, bangles and animal figurines. The other items like shell bangles, copper pieces, chert blades, white disc bead and one greenish barrel type stone bead was also collected (figure5). Most importantly, a rectangular steatite object with "X" marks was found could have been a dice. At Taloor – Ji-Bhit some bits of pigment stone are found (Pers. Observation). Two types of stone were used for pigment (a) *hematite* or iron oxide and *goethite* or hydrous oxide (Ahmed et al 1992, as cited by Law 2001:184). Through these pigments pottery was painted locally at the settlement.



Figure 4: General view of the site



Figure 5: Cultural objects collected from site include short neck pottery, fish-scale painting motif

Bhir Site

This site is situated on the left bank of Nara Canal within Nara valley Plains some six kilometers east of Rohri hills at 27°.28'.30" North & 69°.01'.09" East degrees in Nara region of District Sukkur. The site is approximately 2 meters high from surrounding cultivated land and perhaps the settlement was extended towards the area now under cultivation.

The limestone blocks were found in large quantity in various parts of the site indicating limestone used for house construction. The different stratigraphical layers were observed in

the burrows where the cultural material was embedded in the section, showing different occupation levels, wherefrom some Kot Dijian period sherds were collected.

The northern part of the site is higher than the southern and the later contained various features like hearths, chert stone flaking and copper smelting area where the vitrified slags were noticed with heavy presence of copper pieces. A pottery piece, perhaps a crucible having with copper droplets also attested copper smelting/processing activity within southern part of the settlement.

The other artifacts from this site include terracotta cakes, perforated pottery, bangles, chert tools steatite beads, jasper, steatite disk beads, small cylindrical carnelian bead, broken pieces of shell bangles and terracotta figurines, limestone hemispherical ball and pottery in various shapes and sizes.



Figure 6: general view of the site and some objects including short neck pottery

Peer Sarihiyo

This settlement is situated at the distance of three (05) kilometers from Rohri hills near Adhm Sultan ja Quba and seven kilometers northeast of Kot Diji site at 27. 23 N and 66.48' E degrees (Shaikh 1995, Laghari 1990). Site is located at latitude 27°.23' North and longitude 68°.48' East. The site is located in Deh Rajpari, Taluka Kot Diji, district Khairpur and about ½ kilometers northwest of the present village of Khannan Buraro, and about 01 kilometer east of pump station No.33.

The site consists of two small mounds designated as “A” and measures as 49x45 meters covering an area of 2205 Square Meters and “B” measures as 42x41 meters covering total area of 1722 square Meters. and raise at height about one meter from surround agricultural lands. On the mound “A”; tomb of saint is built and is thus saved from further destruction. However, the mound B might have been leveled for agricultural purposes. From this site, the Kot Dijian and Indus period pottery, terracotta cakes, bangles, chert flakes, blades, and core and grinding stone were collected. This is a fairly small Early Indus village settlement that was continuously occupied up to the Mature Indus period. G.M. Shar (1995) has reported hundreds of chert flakes and huge flaking debris within one square meter which solely indicated that people of this settlement had not only the knowledge of chert knapping but chert tool manufacturing was the vital part of their economy. It is suggested that the excavation of this site will be helpful to understand that process of growth and development of stone tool technology from Early Indus to Mature Indus period.

The finds recorded from this site includes pottery, terracotta cakes, terracotta bangles, chert blades, chert flakes, chert cores and grinding stones. Total 767 objects have been collected, which include 177 sherds 33 terracotta objects and 557 lithic objects.

Ganero-8

Site is located at least six kilometers southeast of the modern town of Thari in the sand dunes between salt lakes of Ganero, to the north, and Sanso Sim to the south on the flat surface of the sand dune some 500 meters south of the Ganero Lake. The location of site is very strategic because it has two lakes on both sides and the desert environment best for domesticated herds. The site is located in south of Ganero Sim on high sand dunes on the relatively flat surface at 68, 39.40 E and 27, 05, 25N degrees near Thari Mirwah town in Khairpur District. The site was first reported by Biagi & Veesar in 1998-99 and revisited by present author in early 2007 (Mallah 2007). The material mainly the pottery in various sizes, shapes and designs including fish scale and short necked typical Kot Dijian period is spread in significant concentration on the surface. After close examination of the surface, some white paste disc bead, carnelian bead and copper pieces were collected. The other material from this site includes Terracotta cake pieces, chert blades, flakes, and hammer suggesting that probably stone tools were manufactured here. The presence of such scale material suggests that this was a permanent village settlement of Kot Dijian period entirely made of thatch houses. The spot was not decline forever but was re-visited by Mature Indus herders. As on the eastern slopes of the mound some Mature Indus period objects like pottery and stone tools present thinly were collected. The nomads/ pastoralists of Mature Indus period may have establish the temporary camp.

In the same locality Biagi and Veesar in 1998-99 has reported another Kot Dijian period site and designated as Ganero-12. The site is located on the northeastern banks of the Sain Sim (the name is incorrect – the correct name is Saneso Sim). The Ganero-12 site consisted of surface scatter of various types of chert stone tools and manufacturing debris along with Kot Dijian pottery. One terracotta broken bead was also reported.

A little further into desert in Northeastern direction is the Jamal Shah Sim and a site was also discovered there as designated Jamal Shah-5. At this site hundreds of blades ranging in between 8.5 to 18.0 centimeters in length and 1.5 to 4.5 centimeters in width have been reported along with pottery associated with Kot Dijian period.



Figure 7: Cultural material collected from surface of the site

The site has revealed rich variety of artifacts including pottery, chert stone tools, terracotta bangles, and cakes. The pottery consists of both plain and painted sherds which also includes typical Kot Dijian fish-scale decoration. The stone tools include the core, hammer stone, parallel sided blades, and crested blades. The white disc beads, shell bangle, T/C games – men, and other artifacts were also gathered (Fig7).

Dubi-4

Site is located at latitude -27, 08, 34 degrees north and longitude 68, 40, 48 degrees east. This site is located at the border of Nara Taluka and Thari Mirwah near Mirwah canal R.D. No.135, in Taluka Thari, District Khairpur. This site lies on sand dunes in eastern direction modern village of Dubi. In the western side lake Bakri Waro. Site locates on the flat top of the eastern part of the same sand dune. The lake of Bakri Waro is from the eastern side. The cultural material is in good quantity that includes potsherds and micro flaking. The majority of flint pointed tool was collected. Chert implements including blade, pointed tools, arrow head, copper pieces, shell bangles, T/C figurine, Bangles, bead, white dick beads, and other objects were collected.



Figure 8: Cultural material collected from surface of the site- some arrowhead collected At another spot located as 27, 08, 23N and 68, 40, 41E degrees at about 150meters in southwestern corner from the site DU4 many arrowheads were collected. These arrowheads are both in complete and in broken condition. There was lots of micro flaking. Pottery was somewhere in good concentration and scanty on the other spots. At about 30 meters eastern side, a complete and perfectly leaf shaped arrowhead was discovered (figure8). Similarly, towards southwestern corner at location of 27, 08, 23N and 68, 40, 43 E degree, some more pointed tools were collected which include a small limestone arrowhead. All these indicators suggest this spot as camp where these tools were manufactured. Besides the stone tools; some pottery sherds and T/C bangles were and gathered.

Bhando Qubo

The Bhando Qubo settlement is situated at 27.48 North degree and 68, 21 East degrees, at least four kilometers east of Ratodero and 37 kilometers N/E of Mohenjo Daro, on the Indus Highway. The total extent of site is 350x300 meters and comprises of 4.50 meters high from surrounding plain areas. The site is preoccupied by a historical tomb named as “Bhando Qubo” built in 1740 ACE (Cousens 1929:163); prominently increases the total height of the site. This site was accidentally discovered when Indus highway was being constructed and a portion of the site on the northern side and was exposed and damaged. In December 1997, the team from Department of Archaeology Shah Abdul Latif University documented the

exposed section stratigraphy and opened a small test pit measuring 1x2 meter to verify the continuity of cultural occupation. The excavation continued up to three meters depth till water level appeared. This investigation confirmed that site was initially occupied during Kot Dijian (2800-2600BCE) and continued into succeeding Mature Indus period (2600-1900BCE).

After the cleaning of exposed section and test pit collectively depicted a sequence of 13 layers among which three layer 1 to 6 are associated with Mature Indus period; layer 7 and 8 carry the mixed data which suggest transition and the layer 9 to 13 are associated with Kot Dijian period.

In the artifacts collected from Bhando Qubo include pottery, terracotta cakes, bangles, dish-on-stand, mud and burnt bricks, shell bangles, chert stone blades. The steatite beads, terracotta, figurines and other material were found. The typical Kot Dijian pottery with black band around the neck, fish scale and intersecting circles was present. Most importantly the buff color sherds were also noticed showing that site had relations with Baluchistan settlements as well.



Figure 9: Cultural material from the site including Kot Dijian and Highland buff ware pottery

In geographical context, the site was located strategically into Indus plains on the left bank of one of the prominent Indus course named as “Warah Course” (Flam 1981 fig. 3). The presence of buff color pottery shows the connection with settlement of Baluchistan Highlands. The site also locates on the route towards Harappa via Lakhn Jo Daro; and might have played very important role in the development of urbanism and its economy.

Chert Tool Manufacturing Workshops

Recently, two huge workshops clusters of Chert tools manufacturing are discovered at different locations in the Rohri hills. In the southern portions “Kandharki1” where some *in-situ* features of chert heating technology have been scientifically recorded and another was found in the northern part of the hills called Rohri Hills Bypass.



Figure 10: Cultural material collected scattered on the surface of the site

The presence of hundreds of flint artifacts including large size complete and broken cores, flakes crested blades and nodules, all are associated with kiln for backing purposes (figure 10-11). It is visible from pinkish as well as black effects on the artifacts littered in and around the kiln. The viscosity of artifacts suggests the industrial scale of production which is not found anywhere else in the entire Indus valley at this quantity.

Kandharki

The Kandharki site is located in the area where Rohri Hills and Desert are conjoined together and the desert is encroaching over the hills and many low-lying or small hills are already covered under the sand; this process continues. Three spots are noteworthy such as Kandharki-I which is a Kot Dijian chert tool producing workshop located at $68^{\circ}.44'.00''\text{E} - 27^{\circ}.05'.25''\text{N}$ degrees and two mature Indus workshops designated as Kandharki-II $68^{\circ}.44'.50''\text{E} - 27^{\circ}.05'.30''\text{N}$, and Kandharki-III $68^{\circ}.44'.52''\text{E} - 27^{\circ}.05'.30''\text{N}$.



Figure 11: trace of stone heating kiln where stones were cooked for further process

On the surface of adjacent hills, the upper Paleolithic tools and flakes are scattered thinly and on the sand dunes several Kot Dijian workshops having with remains showing all stages required for tool producing process. These workshops were called as Kandharki I, and in the southern side of workshops, some kilns with burnt limestone and chert stone nodules were documented suggesting chert heating cooking/heating activity.

The Kandharki-II & III are the Mature Indus chert tools manufacturing workshops where the bullet cores were found. No any heated nodule was recorded on the Indus period workshops.

The significance of this site can be perceived from the presence of Upper Paleolithic remains because the people were becoming aware of desert resources and extending their activities towards the fringes of Rohri Hills into the desert. This trend was intensified in Mesolithic period when some subsistence resources niches such as valley and lakes were extensively exploited by them. Another important feature of this site is the craft activity indicator with new technology i.e. chert heating.

Material Culture and Economic Pattern

At this stage of research, at least 29 sites are reported which are classified into two types (a) mounded sites and (b) surface scatters. The mounded sites are reported where the desert conjoins with plains and the ancient river channels are present. At these sites a variety cultural material along with architectural evidences and other features like hearths and kilns are recorded. The Loal Mari, Taloor je Bhit and Bhir are the major sites that have perhaps achieved higher cultural complexity and may have served as second tier in settlement pattern after being the Kot Diji at top tier and survived continuously until the Indus period.

The surface scatters are dispersed into Desert where architectural features are absent and the other features are found with limited viscosity of artifactual repertoire. The Dubi4, Charbaro1, Ganero 8, Kandharki and Nerr sites are few among other present in the Thar. Artifacts belonging to other period like Mesolithic geometric tools and Hakra type pottery are present along with typical Kot Dijian pottery suggesting the continuity of habitation until this period. For example Dubi4 site where lots of geometric tools along with Hakra type pottery and Kot Dijian material is gathered.

At above mention sites and others no any pottery manufacturing indicator is recorded; therefore, the ceramics and other terracotta objects like cakes, terracotta bangles, and figurine; shell bangles, white disc beads, and copper bits and grinding stones are not manufactured in Thar Desert settlements. However, there are other features like kilns and hearths and lots of vitrified slags shows some kind of pyrotechnical activity.

There are solid evidences of semi-precious stone bead making workshop at Loal Mari and chert tool manufacturing workshops at Kandharki; where the chert implements were manufactured by applying heating technology.

Fascinating items were discovered from the workshop of Loal Mari site (**Figure**). From this workshop various types of exotic semi-precious stones such as (1) Agates and their types like red carnelian stones and chalcedony; (2) white agate: white translucent / crystalline and milky white; (3) green agate, (4) black stone and (5) steatite.

Drawing on recent scholarly work associated with the Kot Dijian period, and based on both excavations and surface analysis of several settlements, it now appears clear that during the Kot Dijian period (2800-2600 BC) urbanism was increasing and trade networks with strong managerial attitudes were expanding. This was a time of "ownership, authority and control" over the trade economy (Kenoyer and-Meadow 1999:6). Various commodities were being strategically moved via water ways and land routes throughout the Indus Valley. Typically, these transactions: (a) maintained local traditions and (b) laid a strong foundation for later unified and standardized socio-economic patterns of life.

The evidences of cities from the Kot Dijian period is coming from Harappa and Kot Diji excavations where massive Kot Dijian platforms and city walls have been discovered (Kenoyer and Meadow 1999, Khan 1965). The walled houses were made by using mud-bricks and covered with wooden thatch consisting of *Saccharum bengalense* Retz. (Sarr or Borro in Sindhi) (Madella1995). The diversity of everyday household vessels increased. The elegance

and delicacy of the potters is obvious from their painting of fascinating designs by applying black and red colors. The special-occasion and/or ritual objects were carefully manufactured with distinctive designs like the 'horn deity' (Khan 1965). Evidence of the higher living standards is reflected in the ornamentation and hairstyles of the T/C figurines discovered from Harappa (Kenoyer and Meadow 1999:5).

Besides pottery, new forms of material culture were created and were added to previously existing shell, steatite, and copper processing technologies. The new additions to technology were based on the glaze and faience beads and inlay and the repertoire of gold objects (Kenoyer 2000). The seals, inscriptions, and measuring mechanisms (i.e., stone weights) indicated a developmental step towards the socio-economic complexity and intensification of long distance trade networks (Kenoyer and Meadow 1999:6-7; Kenoyer 2000).

What was happening in the Upper Thar region at this time became apparent through the examination of 29 settlements located at different parts of the area. All these settlements were located near river channels and deep into desert. Two important sites, Kot Diji and Pir Surahiyo were located near the Rohri hills flint and limestone resources. Long-distance commodities in both shapes such as raw material and finished product like marine shells, copper, steatite, white disk beads and other semi-precious stone beads have been discovered from other contemporary settlements. A workshop of semi-precious bead making was established at the settlement of Loal Mari. These commodities indicate trade relationships with other neighboring communities and suggesting that these settlements might have participated in intra-region and inter-region trade networks.

At about this time (2800-2600 BC), Kot Diji was serving as a primary center in this region. Kot Diji was constructed on the top of a three tiered-hierarchical settlement system and included other smaller villages and pastoralists camps in its organization. Both Pir Surahiyo and Loal Mari are mounded settlements and indicate a higher degree of involvement in the craft specialization activity. The discovery of chert workshop at Kandharki showed involvement of heating technology. A high volume of chert flaking debris was collected from 1x1 meter trenches at the depth of almost 10 cm at Pir Surahiyo (Shar 1995), and a huge workshop at Bypass area of Rohri Hills, which confirmed that chert knapping was one of the commercial activities of the villagers. The discovery of several items manufactured from semi-precious stones, chert stones, terracotta, and marine shells provided convincing data to support trade network assumptions. One problem however, is that all data come from the surface of sites mixed with other period objects. Therefore, some sort of excavation is required at mounded sites to confirm the evidence from surface of the sites.

Nevertheless, any single period site, consisting of a surface scatter and/or a mound, might provide some insights about trade network connections. In this regard, evidence suggests that a village like Nerr was exploiting purely desert resources but marine shell, steatite, white disk beads, grinding stones and chert tools also arrived. The arrival of these items provides some evidence of the pervasive trade networks of the Kot Dijian period.

The discovery of white disc beads, carnelian bits, copper, shell bangle from Ganreo8 and shell, copper lapis bit and other item from Dubi4 attest that the bead produced at Loal Mari may have reached deep into desert and long chert blades produced at Kandharki were received at Dubi4 and newly discovered site Bhandu Qubo though not the heated variety. Similarly, the presence of rough-outs of different kinds of semi-precious stones like agate, carnelian, and translucent milky white stone nodules with cortex indicate the arrival of raw nodules and processed at the settlement Loal Mari. This further indicated the establishment of long

distance trade and interaction systems. These commercial contacts intensified and standardized in the Indus period. The existence of towns (i.e. Kot Diji, Loal Mari and Taloor-Jee-Bhit) along with villages (Ganaero⁸, Dubi⁴ etc) and camps constitute three tier settlement patterns and degree of complexity in social system in which the work distribution is started, for example, Kandharki chert tool workshop and Loal Mari lapidary workshops are obvious arrangement of work division. Taking note of settlement pattern and presence of craft activity areas, it may be concluded that Kot Dijian period have paved strong basis for existence of Mature Indus cities. The transition from the Kot Diji period to the Harappan period was marked by appearance of extensive urban centers, inscriptions, seals and sealing, banded chert weights, stone sculptures, T/C and bronze figurines, and tools and vessels (Kenoyer and Meadow 1999:6-7; Kenoyer 2000). New modes and means of transport, like boats and ships appeared. This was the time of the appearance of the socio-economic and politico-ritual hallmarks of the Greater Indus valley civilization archaeologically known as the Mature Indus period and the integration era of the Indus tradition.

Trade Routes / Interaction Networks

The Kot Dijian period settlements within Thar Desert contribute very important socio-economic role and established new trends. Settlements grew along the River channels. Production was made on greater scale and exotic commodities started arriving in Thar in both shapes i.e. raw material and finished products. The Kot Diji site is located at the accessible distance and could have served as the top-tier settlement within settlement hierarchical system within Thar Desert. Several routes spring out and the rivers were perhaps used first time for communication purpose. The Kot Diji established interaction networks (a) the Loal Mari connected northern communities of Cholistan and Punjab Plains through Hakra River system; (b) the western societies of Mehrgarh Baluchistan were connected via Bhandu Qubo site and (c) southern communities of Amri and Balakot were connected via Taloor ji Bhit site. No any Kot Dijian site is discovered from Gujarat which shows possible cultural extension towards the southeast. Nevertheless, the Thari People participated in the pervasive interaction networks and established inter-regional and intra-regional commercial contacts through which they traded their chert and other perishable products and received exotic items specifically ceramics, semi-precious stone beads, shell and copper and other items and redistribute them into the settlement of Thar Desert.

Conclusion

When the documented 29 settlements placed on the map, already known site of Kot Diji was the largest settlement thus may have served as a primary center. The other sites like Loal Mari, Peer Sarihiyo, Taloor, Bhir, Dubi⁴, Ganaro⁸ and many others were the village settlements. There are many campsites that were used for pastoralistic purpose. All these settlements constituted a three tiered-hierarchical settlement system. Peer Sarihiyo and Loal Mari, Bhir and Taloor are mounded settlements and indicate a higher degree of involvement in the craft specialization. As Dr. Nilofer Shaikh explained that in Peer Sarihiyo site, at the depth of almost 10 cm, a huge workshop chert tool manufacturing was found. Others were at Bypass and Kandharki area of Rohri Hills; all confirmed that chert knapping was one of the commercial activities of the villagers. From Loal Mari, the discovery of bead making workshop showed that several beads were manufactured from various kinds of semi-precious stones. In addition to this several finished products of terracotta, marine shells, and fiancé, provided convincing data to support trade network assumptions.

Nevertheless, many single period sites consisting of a surface scatter might provide some insights about trade network connections. In this regard, evidence suggests that a village like Nerr and Ganero⁸ and many others were exploiting purely desert resources for pastoralism but marine shell, steatite, white disk beads, grinding stones, copper pieces and chert tools also arrived there through regional interaction system. The arrival of these items provides evidence of the pervasive trade networks of the Kot Dijian period. Which further suggesting the Indus region increased community coordination, and in Mesopotamia, urban centers such as Uruk illustrate growth as a nucleated settlement with administrative functions (Adams, 1981; Wright, 2010).

Agricultural intensification as *Rabi* and *Kharif* crops played a central role in this cultural change which ultimately advances not only in the crop production enabled the generation of surplus but had irrigation system as 'Gabar Bands', and facilitate the animal husbandry, which supported population growth and non-subsistence activities. Archaeobotanical data from both the Indus and Near Eastern regions show the cultivation of wheat and barley alongside the management of domesticated animals, indicating diversified subsistence strategies (Possehl, 2002; Wright, 2010). The non-subsistence activities created bases for craftsperson such as in ceramic production, metallurgy, and bead-making technologies. The artisan organized their workshops and craft systems that extended beyond household-level production (Kenoyer 1998, Possehl 2002, Wright 2010). It consequently, expanded the social organization and exchange networks across wide geographic areas and can be argued as the diversity of pathways through which complexity emerged (Yoffee 2005). In other words, the Late Regionalization Era, specifically during 2800-2600 BCE strongly paved bases for broader patterns, illustrating how regional integration and institutional development laid the groundwork for the emergence of urbanism in the Indus Civilization.

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