From past to present: building skill transfer in Tajikistan

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SUMMARY

This paper investigates the persistence of earthen construction techniques in Central Asia from ancient to modern times with a pertinent case study from Tajikistan. The article describes modalities of skill transfer in relation to earthen architecture and tests a new multidisciplinary approach to investigate the persistence of building practices. Architecture, especially earthen architecture, is one category of material culture that has been relatively little explored from this perspective. Particularly relevant for this case study is the combination of ethnoarchaeology and architectural analysis used to examine skill transfer and relationships between social identities and architecture. On the basis of the comparison between archaeological and ethnographic data, it is possible to determine the process behind skill transfer, its connection to society and the complex relationship between the natural and built environment.

INTRODUCTION

Since the prehistoric period, earthen architecture has been used to build shelters for humans. During the 20thcentury,large-scale excavations taking place in Central Asia discovered urban and rural settlements where standing earthen architecture was well preserved. Most excavation showed complex settlements, often covered by millennia of soil stratification, giving the researchers the opportunity to investigate building materials as adobe in close comparison to the modern day usage(Reutova and Shirinov, 2004; Shroeder et al., 2003;Siméon, 2012; Tulaganov et al. 2005).

In this paper, earthen architecture- particularly skill transfer - is to be analysed as a significant tool, which helps define social roles (Egenter 1992; Miller 2007). Earthen architecture in monumental and non-monumental contexts requires a certain level of technique, acquired skills and organization (Minke 2000).

The study aims to investigate how earthen architecture helps to create social identities in Central Asia and how this correlates to the transfer of technological skills from ancient to modern time in the same geographical and socio-cultural context. Additionally, regarding any observed changes in architectural practices, this paper will try to point out the reasons for such a change.

While a multidisciplinary approach in studying earthen architecture is becoming more and more common(Aurenche, 1981; Love, 2013; Rosen, 1986; Sauvage, 1998), the niche topic of skill transfer and continuity of techniques have not been fully investigated in the Central Asian context.

1. ETHNOARCHAEOLOGICAL PERSPECTIVE

The combination of ethnoarchaeological and architectural analysis gives this study a new perspective and helps to understand the relationship between the natural and built environment, while investigating the continuity of construction techniques and their impact on Tajikistan society. Fodde(2009) wrote an analytical investigation of earthen architecture in Central Asia. Although it does not employ ethnoarchaeological analysis to investigate the permanence of such building techniques through time, the article was a first attempt to address the different building techniques existing in the area. The current paper aims at filling this gap using a specific case study, Sarazm/Avazali, in order to investigate the concept of skill transfer, persistence of building techniques and the role of the architectural process in creating identities in the past.

Ethnoarchaeology is the combination of ethnographic and archaeological studies, where present-days practices are investigated to shed light on the archaeological case studies (Aurenche, 2012; Correas-Amador, 2013; David and Kramer, 2001; Hodder, 1982). Aurenche's works (1981, 1996, 2012)in ethnoarchaeology helped to create a method of analysis widely employed in the Mediterranean and Near Eastern regions. His research could be briefly synthetised, presenting the most significant requirements for an effective ethnoarchaeological research, which are historical, geographical, and socio-economical continuity or comparability.

Material culture is particularly supple at being analysed through ethnoarchaeology as rural villages and pre-industrial societies often present geographical and socio-cultural-economical continuity (Aurenche, 2013; Boivin, 2008; Picon, 1995).

A second aspect of this study is the interaction of natural and built enviroment. Earthen architecture in archaeological and ethnographical contexts is the final product of a complex synergy where different factors intermingle such as cultural influences, technological expertise, social structures and requirements. Manufacturing and construction techniques are deeply influenced by environment, culture and available technology. Thus environment, and particularly soil morphology, plays an important role in the operational chain. The natural resources available must also be analysed in relation to technological skills and socio-economical factors.

Then, there is a socio-cultural aspect, which aims at investigating how people from the same community interact together to build and create architecture.

Thus, the architectural process is linked to specific social roles inside communities and the concept of self-recognition, in which members of society attribute these roles to themselves, as a result of their skills inside the community and their relation to architecture (i.e. master-builder, carpenter) (Fodde, 2009:145-151; Jerome et al., 1999: 39-45).

Furthermore, the transfer and the acquisition of skills have a large impact on the socio-economical structure of small societies. The continuity of building forms and materials is the result of progressive transmission of the same knowledge through generations. The comparison between the archaeological, and ethnographic data aims at providing evidence of the skill transfer process inside pre-industrial communities. In earthen architecture, investigating adobe manufacturing, size, bricklaying techniques and recipes as well as building finish can easily verify the permanence of construction skills.

The case study currently discussed is located in Tajikistan, which has long tradition of earthen architecture both in ancient and modern times, and as a consequence happens to be one of the best geographical locations to operate this analysis. In this small project, ethnographic observations have been conducted on a specific site in the Zerafshan valley, Avazali, and then compared with the archaeological data from the nearby site of Sarazm **(Fig 1)**.

Fig 1: Archaeological remains of Sarazm (Sector 11) and the village of Avazali, 2015. Photo : C. Sadozaï

2. CASE STUDY

In the moutainous country of Tajikistan, the Zerafshan valley runs from the high Pamir chain down to the Samarkand plain. Few kilometers from the modern border between Tajikistan and Uzbekistan lies the Chalcolithic site of Sarazm, with an altitude of 900 m. above the sea level. Buried under cereal fields, the old city, now part of the World Heritage List, was discovered thanks to the uncommon artefacts found on the surface. Researches conducted by French and Tajik archaeologists in the 1980's (Besenval, 1987) revealed that this site was the first to attest agro-pastoral populations dating back to the 4th and the 3rd millenium BC. The city is located on the road of an important commercial network, famous for its mineral resources (metals and semi precious stones), and extended for 150 ha.The site presents manystructures built in cob or bricks, sometimes with pebble foundations, and it has been possible to document four periods of occupation (ca 3500-2000 BC)(Lyonnet and Isakov, 1988).The architectural structuresdocumented are: domestic dwellings, workshops, storages and monumental buildings probably with a religious or prestigious function (Besenval and Isakov, 1989; **Fig 2**). The modern village of Avazali is located close to the archaological site and depends on agriculture for its economy.

Fig 2: *Monumental building on three periods (Sector 12), Sarazm 2015. Photo : C. Sadozaï*

On the surface, Tajikistan does not seem a good case study for persistence of construction techniques and manufacturing processes, as certain technological changes (like the introduction of concrete) have affected vernacular architecture, however the context is more complex when properly investigated. A more in-depth analysis in Avazali and Sarazm showed some differences in manufacturing processes, but the investigation of construction techniques indicated practices that remained mostly unchanged between archaeological and ethnographic case study sites.

The data are based on macroscopic observation of standing archaeological structures, findings reported in published articles, discussions with the director of the archaeological reserve of Sarazm, interviews with the village builders and inhabitants, and analysis of modern buildings and of the operational chain employed in earthen architecture. The macroscopic examination detects some small regional differences in the manufacturing process, which are usually caused by environmental conditioning. The only relevant documented difference occurring in the comparison between archaeological and ethnographic material is the brick size and the type of vegetal temper. Archaeological evidence shows that only wheat straw wasadded during the manufacturing process (i.e. no evidence of rice in Splenger and Willcox, 2013) to avoid cracks and reinforce the clay mix, whereas nowadays rice glume **(Fig 3)** is used in addition to wheat straw. Once the mixing is deemed adequate, the workmen produce adobe through the use of moulds. Thus, the present manufacturing techniques relies heavily on moulds, which can be compared favourably with the archaeological data

Fig 3: *Detail of rice glume in pakhsa, Avazali 2012. Photo : D. Gandreau*

The introduction of a new vegetal temper is linked to environmental conditions and yearly cultivations. Ethnographic research explains the use of rice glume as the type of opportunistic choices builders made to adapt to the local environment and changing agricultural practices.

These changes affect marginally the construction practices as the type of earthen construction such as brick and cob techniques (*pakhsa* in local language) are relatively consistent through time, both in ancient sites and in the modern villages.

As visible from the site of Avazali **(Fig 4)**, the modern construction techniques include a water-resistant socle made of lined-up pebbles set in transversal courses or cement (**Fig 5**). On top of the socle bricks are laid in courses of alternate headers and stretchers. Alternatively, rows of hand-moulded cob are laid down to build up the wall.

Fig 4: *Pebble socle, adobe and hand-molded cob, Avazali 2015. Photo : C. Sadozaï*


Fig 5: *Concrete socle and bitumen fabric, Avazali 2015. Photo : C. Sadozaï*

The stone socle was not always present above the foundation in ancient times (Besenval, 1987; **Fig 1 and Fig 2**), but it can be easily explained as a technological improvement adopted to prevent base erosion and help in containing capillary humidity. Pebbles certainly come from the Zerafshan riverbed, which is close to the site. This selection shows evidence of past and present opportunistic raw source material procurement of stones as building material.

Fodde (2009:149-168) describe show, in Tajikistan society, craftsmen working on earthen architecture are organised and trained to achieve different levels during their career: apprentice, master and head master. The process helps in building social stratification and defines identities inside the same community. It also shows how manufacturing and construction techniques are considered precious knowledge, which are transmitted from master to apprentice and not subjected to external conditioning. The investigation in Avazali, though, highlights a different approach in earthen architecture skill transfer. The village inhabitants, who have a basic knowledge learnt from the masters of the nearby village of Penjikent, carried out all the construction work in relation to vernacular architecture. In Avazali, each person used the clay collected from the village as the main soil component for the bricks **(Fig 6)**. There is no clay selection except for the barn roof, which is built with clays collected from a quarry 20km from the site, reputed to be water resistant **(Fig 7)**. In this small rural community knowledge and skills acquired from the masters have been transferred from one male generation to the other with few adaptations regarding local raw source materials. As a consequence, the skill transfer between master and apprentice was not really observed in this village, where the inhabitants, whom we could define as semi-skilled, are the actual builders instead of skilled masons. The study observations can be summarised in the following table **(Fig 8)**.

Fig 6: *Raw source pit behind the being made house, Avazali 2015. Photo : C. Sadozaï*

Fig 7: *Barn flat roof covered with a special clay, Avazali 2012. Photo : D. Gandreau*

COMPARISON	Archaeological Data Sarazm	Ethnographic Data Avazali
Raw source	- Wheat straw temper. - River pebbles (certainly from Zerafshan river) used for the foundations of the last period (2700-2000 BC). - Soil not yet analysed.	- Rice glume temper or wheat straw. - Zerafshan pebbles. - Industrial cement. - Local soil from the surroundings (usualy on the plot).
Brick Size	50x25x11 cm	Various, mainly 30x30x11 cm
Bricklaying Techniques	- Adobe foundations except for the last period of occupation. - Medium adobe in courses of alternating headers and stretchers linked with soil mortar. - Evidences of cob (but no details in publication). - Rectangular and circular buildings. -Possibly flat earthen roofs (no proof of vaults) (Besenval and Isakov, 1989).	- Pebble stone socle set in transversal courses or concrete socle. - Adobe in courses of alternating headers and stretchers linked with soil mortar or large blocks of cob, or proper cob (pakhsa), or hand-molded cob. - Rectangular buildings. - Ridge roofs of corrugated metal sheets, sometimes flat for barns with a selected clay coat on top.

Fig 8: *Comparison table of Archaeological and Ethnographic data in Sarazm/Avazali*

3. DISCUSSION

There is a dichotomy in the Tajikistan case study as specific evidence simultaneously points to a change in manufacturing techniques, but continuity in construction practices. This reflects a strikingly different process of skill transfer between manufacturing and construction process and between rural areas and urban contexts. Some primary observations can be drawn:

- The hierarchical character of society heavily influences skill transfer in Tajikistan. Knowledge transfer is usually based on an apprenticeship structure or male communities in small rural villages where builders are not present all the time.
- The strict social roles have helped in maintaining, unaltered, the transfer of construction techniques, whereas the technological and socio-economical contexts have progressively changed, forcing some adaptations in the operational chain. Thus the adoption of new building materials has to be integrated with previous knowledge, rooted in society. The combination creates modifications in the traditional earthen architecture, such as the introduction of metal roofs or concrete socles.
- The manufacturing process presents a more complex picture, as traditionally there was no strict social role linked to the collection of raw material sources. As a consequence, the manufacturing methods of producing adobe, or cob, did not remain fixed through time, but are more flexible and adapt easily to the changing environment.
- Evidence of the afore mentioned changes is visible in raw materials adaptation (i.e. vegetal temper), where the variations are both environmental and technological, and clearly linked to the regional agricultural practices.

Generally the macroscopic analysis of the Tajikistan case study confirmed persistence through time of earthen architecture construction techniques.

4. CONCLUSION

A multidisciplinary approach is highly recommended in analysing the continuity of construction techniques. The current paper integrated ethnoarchaeology and architectural analysis in order to conduct a macroscopic study of the persistence of skills transfer in Central Asia. This emphasizes a link between construction techniques, skill transfer and the hierarchical structure of Tajikistan society.

This article aims to feature a new methodology in the analysis of skill transfer and tests its reliability to investigate the persistence of building practices. Tajikistan earthen architecture is an interesting and multifaceted topic that so far has been relatively little explored from this perspective.

The study shows how the continuity of building traditions emphasises an ingrained social component in earthen construction, which pertains to social identities. Knowledge is passed down from master to apprentice in more urban areas, but in rural villages, where there are no skilled builders, the knowledge acquired from the builders is passed down within the same family, or among the men in the community that qualify as semi-skilled workmen.

Furthermore, this research confirms the initial hypothesis, underlining a continuity of skill transfer and construction techniques in the study area, but also determines that part of the operational chain is subject to changes forced by environmental and technological factors. The reasons for these changes are mainly opportunistic, such as the direct link between the vegetal tempers used and the products cultivated in the region.

Future research should focus on integrating microscopic analysis in order to have a fuller dataset regarding earthen architecture. It would also be of value to compare the results with neighbouring geographical regions to see if a similar process of skill transfer is attested.
Finally, the integration of this study with geoarchaeology will widen the current body of research and allow the consolidation of comparative and multidisciplinary prospective in analyzing earthen architecture.

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