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Interrelations of Ancestral Textile Handicraft Weaving and Tangible Vernacular *Karkhanehs* (Workspaces) in the Historic Destination of Yazd, Iran

Somaye Seddighikhavidak ^{1,*}  and Tazim Jamal ² 

¹ Department of Interiors, College of Design, University of Kentucky, Lexington, KY 40506, USA

² Department of Recreation, Park and Tourism Sciences, Texas A&M University, College Station, TX 77843, USA; tjamal@tamu.edu

* Correspondence: somaye.s.khavidak@gmail.com

Abstract: This research studies the traces of an ancestral textile produced in *karkhanehs* (workspaces) located in the historical city of Yazd, Iran. The case study undertaken here demonstrates how an intangible heritage of textile weaving through generations of families in Yazd, Iran, interrelates with tangible vernacular architecture and tourism at three different scales: (i) in everyday life in *karkhanehs* at home, (ii) in the neighborhoods, and (iii) the UNESCO World Heritage city of Yazd. The three scales related to the enactment of this vernacular handicraft are examined using architectural methods to examine structures ranging from 90 to 600 years in age. This was complemented by discussions with local weavers and residents, as well as direct observation in domiciles, neighborhoods, and the city. Actor-Network Theory helped to trace the networks of actors and relationships between the tangible built architectural heritage and intangible cultural practices of weaving, showing how different genders, ages, worldviews (beliefs) and practices came together to produce this heritage textile. Actor-Network Theory also helped to study the relationships between economy, culture, society and tourism, with respect to the evolution and transformations of the historic urban dwellings, vernacular architecture and vernacular weaving handicrafts through the three scales examined. Implications for sustaining and conserving this ancestral tradition of textile weaving and managing tourism's positive as well as disruptive influences on cultural heritage conservation are discussed.

Keywords: *karkhaneh*; *kargah*; textile; weaving; vernacular industrial heritage; heritage tourism



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1. Introduction

This paper examines economic, cultural, social, and environmental influences on vernacular and industrial architecture and ancestral weaving practices in the historic city of Yazd, Iran. Weaving activities took place in *karkhanehs*, traditional workspaces, but transitioned to more industrialized forms with modernization in the 20th century. The case study undertaken traces the architectural evolution in the built heritage (tangible heritage) as well as in the intangible weaving heritage, showing changing practices and complex gendered networks and relationships and touristic spaces in Yazd. In 2017, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) added the historic city of Yazd to its list of World Heritage Sites (<https://whc.unesco.org/en/list/1544/>) (accessed on 21 May 2022), validating its historical and traditional importance to the region and to global heritage. This designation has significantly increased tourism to Yazd, but has also contributed to gentrification and alteration of historic quarters to accommodate tourism services and accommodations [1].

The interrelationships between the textile, its weavers, and the historic places and vernacular architectural spaces, *karkhanehs*, are theoretically and methodologically studied through Actor-Network Theory (ANT) as proposed by Bruno Latour, John Law and Michel Callon [2], and the “vital/vibrant materiality” [3] (p. 470), [2] described by Jane Bennett.

ANT is attentive to human and non-human actors, and Bennett brings attention to thing-power, “the material agency or effectivity of non-human or not-quite-human things” [4] (p. ix). In this study, textile as a commodity acts as a vibrant materiality and interacts with both human and non-human beings. Textiles in the modes of *Shaarbafi*, *karbafi* or *daraibafi* (terms explained below) embody in Bennett’s sense of thing-power the relationality and heterogeneity of Yazdi social structure that is co-constituted of different groups of genders, ages, and even worldviews.

Therefore, the research undertaken here makes a valuable contribution by focusing closely on the interrelatedness of tangible and intangible cultural heritage. Tangible heritage refers to aspects like vernacular architecture as built heritage, as well as objects like textile materials and weaving looms. Intangible heritage refers to things like ancestral weaving customs, rituals, and methods of spinning, dyeing, and weaving. Among other insights, the case study reveals women as vital actors that have played a key role in enacting this ancestral cultural heritage, but modernization marginalized their role and participation. Implications for sustaining this ancestral tradition of textile weaving and managing tourism’s positive as well as disruptive influences on cultural heritage conservation are discussed. This includes tourism’s role in facilitating or inhibiting the cultural heritage conservation of *karkhaneh* and the well-being of the weaving community of Yazd.

The paper is structured as follows: the first section considers Bruno Latour, John Law and Michel Callon’s discourse on ANT and Jane Bennett’s concept of “vital/vibrant materiality”. The following section presents the case study and explores transitions in Yazd vernacular architecture, specifically *karkhanehs*, and weaving practices. The research approach is primarily architectural analysis, aided by discussions with local weavers and residents, as well as direct observation of domiciles, neighborhoods, and the city. Three different scales are examined here, ranging from Yazd vernacular houses to neighborhoods and industrial factories in the historic city of Yazd. The subsequent section traces textile weaving as a network in shaping Yazd vernacular architecture and urban planning and as an intangible cultural heritage for tourism. The final section concludes the findings of the research, focusing on the three themes of textile weaving, *karkhaneh* and tourism. Study limitations and directions for future research are noted here.

2. Actor-Network Theory and Thing Power

Actor-Network Theory (ANT) is a “process of heterogeneous engineering in which the social, technical, conceptual, and textual are puzzled together and transformed”, which was primarily developed by Bruno Latour, John Law, and Michel Callon in the mid-1980s [2,3] (p. 472). Indeed, ANT can be considered as a collective sociotechnical activity. This theory gives “equal analytical status and attention to human and non-human actors” [3] (p. 470), and states that all entities acquire their significance in relation to others, human or non-human. ANT aims “to understand complex social situations by following actors and how they associate” [3] (p. 470). In ANT, the volitional actor, as Crawford notes with respect to the actant, is “any agent, collective or individual that can associate or dissociate with other agents” [2] (p. 1). Therefore, a network of relationships exists through which actants, human or non-human, acquire their names, substance, and activities. Regarding networks, as Crawford states, they are “processual, built activities, performed by the actant out of which they are composed” [2] (p. 1). Consequently, networks acquire their resistance, coherence, and consistency internally [2].

Overlapping with ANT, Jane Bennett highlights the active role of non-human materials in everyday life, which she refers to as “thing-power” [4] (p. 2). This power is a vitality that is intrinsic to materiality [4]. Through this power, according to Bennett, inanimate things act, and produce dramatic and subtle effects [4]. Bennett argues that materiality as an efficacy or effectivity may have the potentiality to be embodied in more ecological and sustainable modes of production and consumption [3,4].

The concept of thing-power overlaps with the notion of actant. Bennett states that actant is “Bruno Latour’s term for a source of actions”, human, non-human or a combination

of both [4] (p. 9). The thing-power appears when things arrive at independence; when things are affecting other bodies that can enhance or weaken their power within “a heterogeneous assemblage” [4] (p. 23). According to Bennett, each actant has a certain vitality in one assemblage and displays consistency and the ability of self-ordering to group and mesh elements together, working as “an agency of the assemblage” [4] (p. 24). Therefore, an assemblage not only has a distinct history of formation, it also has an indeterminate lifespan [4].

Actor-Network Theory strongly influences the following reading of Yazd vernacular architecture that has gained momentum within tourism research [5]. In this study, textile/weaving works as an actant and a vibrant matter that develops networks. Weaving, carpentry, blacksmithing, dyeing, spinning, etc., operate and act in a network alongside the textile and other materials. Arguably, textile as the vernacular handicraft of Yazd City could be perceived as an object, which travels from residents’ homes or workspaces to bazaars and touristic cities or countries of origins while remaining the same. This vernacular textile lies within a network of relations that made possible its existence and visibility.

Through the regional material and technical and managerial approaches of skilled weavers, textile changes its production process, including spinning, weaving, and dyeing, in domiciles, and neighborhoods in Yazd. The craft of weaving occurs within a network of fluid professions and practices in which it is embedded. Carpentry, blacksmithing, dyeing, spinning, and other parallel professions sustain and stabilize the weaving network. These professions have developed and changed within a network, and in the three different scales of domiciles, neighborhoods, and the city. Most neighborhoods have acquired their names through the relative crafts of weaving/textile as the main player in Yazd City [6]. It would be a serious omission not to consider humans and their social, belief constructions as elements of this network/assemblage. ANT, as used in this study, helps trace tangible networks that encompass the vernacular architecture where intangible networks such as weaving crafts as social and cultural heritage are concretized. As is shown in this case study, tourism can be constructed, reproduced, and reinforced through the vernacular textile weaving industry, including materiality, performance, and vernacular architecture [7].

3. Case Study: Tracing the Relationships of Textile-Weaving and Karkhaneh

3.1. Research Setting and Background

Yazd, a desert city in central Iran, has played a significant role in the history of Persian civilization as a sanctuary for multiple religious ideologies [1,8]. The city has been receptive to different followers of Judaism, Zoroastrianism, and Islam in the passage of time [1]. The history of Yazd dates back to the pre-Islamic era (3000 BCE) [9,10]. Its earthen architecture and urban texture have developed in a unique way in the passage of time as each era of history has integrated the previous culture into its current architecture, which has made Yazd an example of a homogenous architecture and urban planning [1].

The historical structure of Yazd was developed during the Kakuyid era, from the 10th to 12th century, and flourished during the period of the Al-e Mozaffar in the 14th century, which comprises a collection of public and religious architectural forms that reflect the use of local resources [11,12]. Yazdi vernacular earthen architecture is characterized by thick, tall earthen walls as well as *badgirs* or wind-catchers, *qanats* or hand-dug tunnel systems, traditional courtyard houses, bazaars, mosques, synagogues, and Zoroastrian temples [1,11,13].

The traditional city of Yazd is one of the best-preserved traditional cities of substantial size to survive in Iran [14,15]. In 2005, the traditional part of the city was listed as a national monument [10]. The Ministry of Cultural Heritage, Tourism and Handicrafts (MCTCH) [16], and Yazd Cultural Heritage Handicrafts and Tourism Organization (YCH-HTO), a government body responsible for cultural heritage, handicrafts, and tourism marketing and management in Yazd [17], preserve and manage this part of the city see also: <https://www.mcth.ir/english/Ministry/Organizational-Chart> (accessed on 21 May 2022) [10]. In 2017, the traditional city of Yazd was inscribed on the UNESCO List of World

Heritage Sites [10]. According to YCHHTO, the number of international travelers, mainly from Italy, China, Germany, and France, increased by 32% in 2019 [10].

While Yazd is recognized for its tangible built cultural heritage [1], less attention has been paid to the rich intangible heritage that is closely interwoven with the tangible heritage. Vernacular handicrafts, such as textiles, are based on traditional knowledge and traditional methods using materials derived from local or national sources. *Shaarbafi*, a plain weave in different colors and often with stripes [18], *karbafi*, a plain cotton weave in a single or a few colors with occasional stripes [18], and *daraibafi*, a silk textile [19], are valued for their distinctive weaving techniques, especially *daraibafi*, where warp or weft threads, or both, are tie-dyed before being woven into a richly colorful fabric [19–21] (Figure 1). The history of Yazdi traditional textiles date back to the early Islamic era [22]. For several centuries, weaving was common in Yazd [23]. Weaving gained importance during the Kakuyid era and many bazaars were built. The textile industry became prosperous during the Timurid era in the 14th–15th century [11]. The Safavid era, between the 16th–18th century, witnessed the rise of “the importance of Yazd for regional trade and the construction of caravansaries on major routes from Yazd to regional trade centers” [11] (p. 127). Accordingly, Yazdi textiles became famous in Europe, India, and China [11]. The traces of weaving are obvious in houses of these times, especially in domestic workspaces known as *karkhanehs*, where men and women gathered and produced textiles.

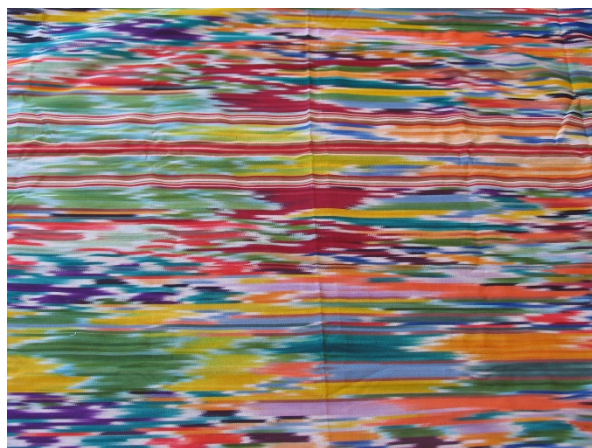


Figure 1. Daraibafi Textile, Yazd, Iran. Source: Reproduced with permission from Efat Amiri [24].

Interrelated economic, social, and cultural implications arise around the production and consumption of this traditional textile in local everyday and touristic spaces. Tourism forms an important activity in Yazd because the city is located in an ecologically fragile arid area and its earthen architecture and ancient culture are built on limited resources [10]. Nationally, Yazd has been a tourism destination for its culture, heritage, and handicraft, especially its silk textiles [10]. Tourists proceeding into the traditional urban texture will find a variety of textiles offered for sale and hung in front of shopping stores, especially in the traditional bazaars of Yazd. Fabric products such as shoes, bags, shawls, scarfs, clothes, etc., add ubiquitously to the selection of products displayed for the tourists. The weaving heritage, therefore, introduces them to the traces of intangible and tangible cultural heritage in the historic urban texture of the city.

3.2. Research Methods

The spatial architecture of vernacular *karkhanehs* was a starting point for this research, leading to the architectural exploration of historic neighborhoods and industrial factories. The architectural study is complemented by discussions with nineteen local weavers and residents who facilitated the tracing of textile weaving and related networks. Conversations about the weaving profession as well as tourism relationships were further supported by direct observation over the summer of 2019 period, plus the first author’s extensive

background in Iranian cultural heritage. The first author studied fifteen vernacular homes, nine vernacular workshops/ateliers, and four vernacular factories randomly in different neighborhoods of the historic city of Yazd over two months between 18 May and 29 July, 2019 at three different scales (i) in the workspaces at home, (ii) in the neighborhoods, and (iii) in the historical city of Yazd (Table 1).

Table 1. Buildings studied in the three scales: the home domicile, the local neighborhood, and the city of Yazd.

| Scale | Name | Neighborhood | Current Condition |
|--------------------|---|---|---|
| Home domiciles | the Shaarbaf House | the Fahadan District | renovated and reused |
| | the Haghighat House | the Fahadan District | in the process of renovation |
| | the Ra’sol-hoseini House | the Fahadan District | renovated and reused as a textile museum |
| | unnamed (I) | the Lard-e-asiab District | abandoned and ruined |
| | unnamed (II) | the Lard-e-asiab District | abandoned and ruined |
| | unnamed (III) | the Lard-e-asiab District | active—Foreign workers living here |
| | the Padiav House | the Baazar-e-no District | renovated and reused as a hotel |
| | the Arabshahi House | the Shah Abolqasem District | renovated |
| | the Doost (Friend) House | the Shah Abolqasem District | renovated and reused as a hotel |
| | the Ranjbar House | the Sar-e Jam District | abandoned |
| | unnamed | the Sar-e Jam District | active—living and working (textile weaving) |
| | unnamed | the Sheykhdad District | active—living |
| Local neighborhood | unnamed | the Fahadan District | active—living and working (textile weaving) |
| | the Baghaiepour House | near the Gazorgah District | active—living and working (textile weaving) |
| | the Peyvandi House | near the Gazorgah District | active—living and working (textile weaving) |
| | unnamed kargah | near Kamalieh Madreseh in the Fahadan District | ruined |
| | the Khojasteh Daraibafi Kargah (I) | the Vaght-o-saa’t District | active—working (textile weaving) and selling textile products |
| | the Khojasteh Daraibafi Kargah (II) | the Vaght-o-saa’t District | renovated |
| | Maleksabet Family Daraibafi Kargah | the Yaghoubi District | active—working (textile weaving) |
| | Karkhaneh-ye-sefid: Yazd Sefid Textile Econo-Museum | the Baazar-e-no District | part of it is renovated as a textile museum |
| | unnamed kargah | near to Kooshk-e-No Water Cistern in the Kooshk-e-No District | abandoned |
| | unnamed kargah | the Lard-e-asiab District | abandoned and ruined |
| City of Yazd | the Azadi Kargah | the Fahadan District | selling textile products |
| | Malek Daraibafi Kargah | the Fahadan District | active—living, working (textile weaving) and selling textile products |
| | the Eghbal Factory | the Sar-e Dorah District | renovated and reused as the Yazd Science Technology Park |
| | the Saadat Factory | near to the Fahadan District | renovated |
| | the Dorakhashan Factory | Near to Zartoshtiha District | abandoned and ruined |
| | the Jonub factory | out of Historic city of Yazd | renovated and reused as seasonal exhibitions |

Some clarification of the term *karkhaneh* is valuable to introduce here. In the past, the intersection of weaving and participants occurred in a common space in the context of vernacular architecture: *karkhaneh* [25] (p. 17962). *Karkhaneh* and *kargah* [26] (p. 17974) are Persian language terms, consisting of two words: *kar* and *khaneh*. *Kar* can mean either “work”, in general, or a specific type of work, such as a textile product. *Khaneh* means “home”. *Kar-khaneh* altogether means the “house of work”. However, in *kargah*, the *-gah* is a suffix meaning “place”. Therefore, *kargah* means the “place of work”. *Kargah* in comparison to *karkhaneh* refers more to the large-scale production space than to the home or living space. Nowadays, the term *karkhaneh* is used for modern factories in everyday life and this term has lost its original meaning as a space in residential buildings.

3.3. Research Findings

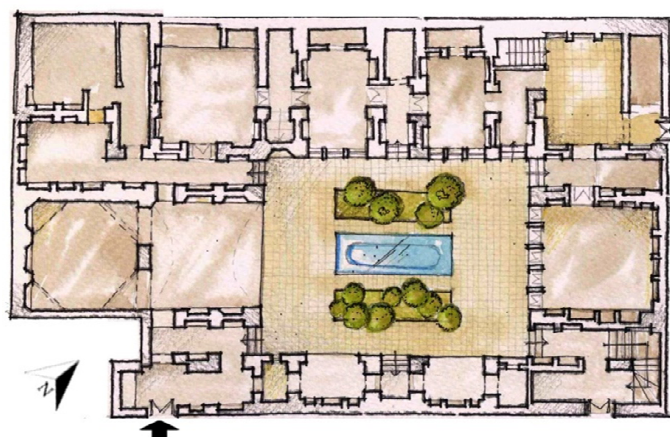
The case study results presented below focus on the vernacular architecture of *karkhaneh*, its formal and material expression and transitions, as well as the changing weaving traditions and practices interrelated with this built heritage. The ancestral weaving profession and networks of economic, social and cultural around it (including tourism relationships)

are studied in relation to the built heritage in the three scales noted above: (i) the home domicile, (ii) the local neighborhood, and (iii) the city of Yazd. Section 3.3.1 below describes the aspects of working and living in the vernacular home; Section 3.3.2 examines the neighborhood scale of vernacular workspaces; and the subsequent Section 3.3.3 explores the city scale of factories.

3.3.1. Living/Working Vernacular Architecture: The Home Domiciles

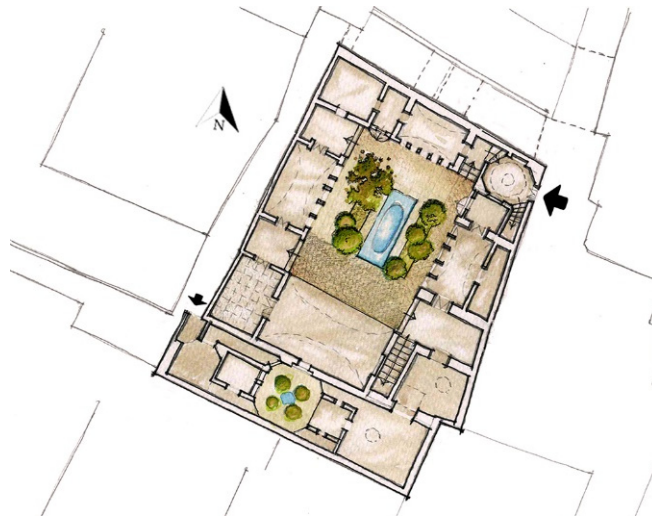
A traditional Iranian home is a place with no determined boundaries among functional spaces. For example, the term “bedroom” is not used in this architectural space because it is devoted to sleeping at night but other practices during the day, such as dining, working, and having tea. In general, the name of a room is determined according to its physical form, morphology, and only rarely according to its function, such as use as a kitchen [27]. The name corresponds to the number of existing doors facing the courtyard. For instance, in traditional Iranian homes, spaces like ‘*sedari*’ (“*se*” means three and “*dar*” means door or window, and “*i*” is a noun-making suffix), *panjdari* (5), and *haftdari* (7) [28] (p. 97) serve either as a bedroom, a living room, or a guest room, respectively. However, for this paper, the location, geometry, and area of the space that determine the number of doors are not addressed. In residential structures, living and working spaces are not separated, although, in some cases, specific furniture placement denotes living or working functions. Based on current and past Persian vernacular architectural layouts, the traditional homes appeared to be a female-dominated architectural space, where women played a critical role not only in the raising of children and household responsibilities, but also in the economy of the family [23]. In Yazdi homes, workspaces exist alongside the living spaces. Traditionally, these domestic spaces were exclusively female territories within which to produce textiles. However, men gradually gravitated toward these spaces and appropriated the art of weaving, transporting the practices to factory-scale spaces outside the domestic realm. Changes in the economy and the political environment likely spurred this appropriation and marginalized women besides spinning wheels at home.

In the Yazdi homes, weaving took place in a dedicated space called *karkhaneh*. The textiles produced were called *kar* (work), and consequently, the spaces devoted to the *kar* production process were called *karkhaneh*. In Farsi, *Khaneh* means house. This space then means *khaneh-ye-kar*, the house of work. Traditionally, what was produced as a handicraft was based on personal use, only later becoming an art to be commodified and commercialized for profit as 20th-century modernization took hold. Textiles were woven to fulfill family needs and the surplus was then sold from home. Though *karkhanehs* have typically been located near spaces that functioned as kitchens and living rooms, their locations in the homes varied over time. In some instances, they were isolated in places like basements (Scheme 1) or near service spaces.



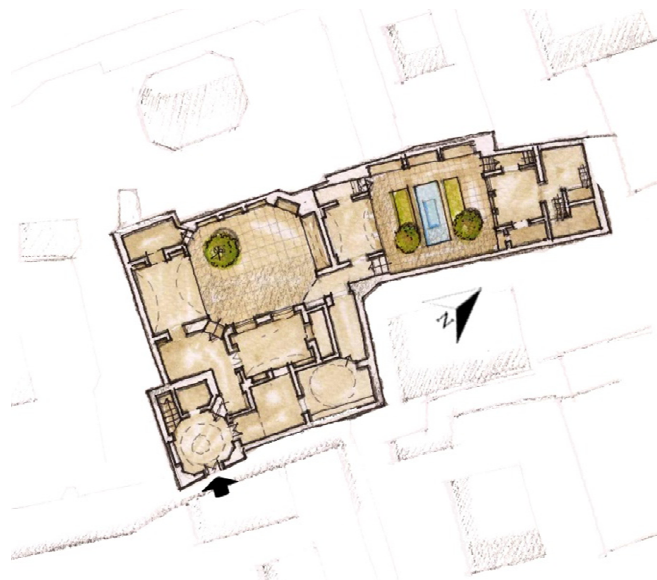
Scheme 1. The ground floor of the Shaarbaf House, Yazd, Iran. Source: Reproduced and presented with watercolor by the first author [29,30].

In some cases, the *karkhaneh* faced a cozy and small yard called *narenjestan* (the yard of sour orange), or it was located on the roof facing an alley (Scheme 2). These transitional locations were the shaping force that transferred centralized communal workspaces out of the home and into the neighborhood, transforming the traditional urban texture. With the passage of time, the *karkhaneh* gradually became exposed to the outside world.



Scheme 2. The ground floor of the Arabshahi House, Yazd, Iran. Source: the first author [30].

The location of *karkhanehs* in homes gradually moved near the entrances, where neighboring women could easily enter to work (Scheme 3). The relocation of the *karkhaneh* reflected a changed labor pattern; weaving no longer existed solely in the family domain but also as a form of employment for the neighborhood. This transitional movement eventually contributed to *karkhanehs* and *kargahs* moving entirely outside the homes.



Scheme 3. The ground floor of the Lard-e-asiab House, Yazd, Iran. Source: the first author [30].

As a transitional space between inside and outside of the home, the *karkhaneh* takes on a specific meaning: it is a place of ritual gathering instead of only a workspace. It maintains social bonds and familial ties within the community. Connecting this space even closer to the outside world is the foyer, or *hashti*, that leads from the outside directly into the *karkhaneh*. It is a welcoming entrance space [31]. It, too, functioned historically as a gathering space

prior to the start of the workday. The gathered women's songs accompanied their work behind their looms. These songs serve important functions. Weaving from a mapped pattern, one woman sings the map to the other woman as she ties in the appropriate color. Once the ties are completed, a response is sung in affirmation. These songs reinforce the communal spirit, and they also help to get the job done efficiently and with fewer mistakes.

Karkhanehs at in the homes produced an environment full of vitality and serenity appropriate for living and creating woven fabrics and products. It is this art of the Yazdi people that has attracted tourists—tourism is not only due to Yazd's earthen architecture as a tangible culture but also due to its ties with its intangible culture, weaving. Yazd has been a main tourism center in Iran for its "culture, heritage, and handicrafts such as silk textiles and confectionaries" [10] (p. 525). Today, a few of these valuable homes are perceived as attractive and appropriate ritual and cultural prototypes and have been appropriated for the tourism industry as well as for artistic and commercial activities [1]. They are renovated, restored, and adapted as facilities in the tourism infrastructure, serving as boutique hotels, and traditional restaurants, as well as cultural and scientific centers [10]. However, few of them show the Yazdi intangible culture of weaving [32], less than 10. In most of them, small recessed areas that are related to *karkhaneh* are filled with soil (covered up) to accommodate and facilitate the gentrifying processes of the tourism industry. However, Yazd's inscription in 2017 to the World Heritage list by UNESCO has increased local and international visibility. Yazd attracted 850,000 national and international tourists in 2018 and 1.5 million ones in 2019, with 180% growth in overnight stays [10,33]. This necessitated more spaces for accommodation and resulted in the alteration of *karkhaneh* spaces, as discussed below.

3.3.2. Social/Working Vernacular Architecture Transition: *Karkhanehs* and *Kargahs* Ateliers in the Local Neighborhood

Part of Yazd's rich cultural heritage is a long history of producing textile, particularly of silk textile woven with the two-woof technique from the Sassanid era [34]. Climate factors, such as low precipitation with intense evaporation, distance from high seas, and, consequently, the scarcity of vegetation, made it impossible for Yazd to boost an economy based on agriculture and animal husbandry [23]. This led to the emergence and flourishing of "a dynamic economy based on trade and commerce in the region" [23] (p. 15).

Gradually, the boundaries of textile weaving extended from homes into the center of neighborhoods, where they could integrate more groups of people, particularly men. Gradually, "women were beside the spinning devices and men wove at the *kargahs*" [23] (p. 15). Now women played a secondary role, and men became the main orchestrators in the weaving. Other skilled professions, such as carpentry, blacksmithing, dyeing, spinning, etc., also operated alongside the weaving at the neighborhood scale. These workspaces (*kargahs*), like the homes, had multiple functions. In one capacity, they provided the opportunity to increase people's livelihood because they supplied the space to produce the wares peddled at the bazaar. These *kargah* spaces can be thought of as pre-bazaars, where the locals occupied physical space and time with weaving. Socially, they were also stomping grounds where people could congregate, meet, gossip, and plan current or future events.

In the local neighborhoods, two terms are used in referring to workspaces: *karkhaneh* and *kargah*. The *karkhaneh* refers to the place of weaving work in the home; it points to the living space where most *karkhaneh* activities are attached to the homes. By contrast, *kargah* refers to the place of work outside of the home.

The Maleksabet family is one prominent example. This family's ancestors have been involved in weaving *darai* for more than 150 years [35]. Still today, their *karkhaneh* architecturally illustrates the combination of living and working (Figure 2). All the family members, including women, men, and even children, collaborate in the process of weaving, from spinning strings to dyeing and weaving. According to the Maleksabet family, there were other weavers practicing in their homes in the past. But due to the expansion of the city in the modern era [36], the weavers have moved their *karkhanehs* to neighborhoods near to the historic part of the city, or they have changed their professions [35]. Therefore, the

Maleksabet's *karkhaneh* is one of the few active places in Yazd where the weaving craft is being undertaken in the traditional home. Here, Maleksabet's brothers and one of their sisters administer the *karkhaneh*.



Figure 2. Maleksabet Family Daraibafi Karkhaneh, Yazd, Iran. Source: the first author [37].

One brother, Mostafa, currently weaves in the family *karkhaneh*. This building has been part of their house for generations [35]. Recently, it was separated from the house by a wall, and the house is now in ruins. Mostafa supervises the *karkhaneh* and has local workers. The *karkhaneh*'s layout has three bays. In each bay, there is one weaving device. On the adobe walls, there are some holes used to prepare and divide warps for dyeing and then binding, a process known as *kartooni* [35]. In the past, the action of *kartooni* was carried out by children in the alley [35]. Now, in another house two blocks away, one sister and her family do *kartooni*. The sister first spins and twists drawn-out strands of fibers together to form yarn or warps (*Massoreh-bar-koni*) [35]. This process used to be done by a small manual device, but now it is done by electrical devices.

Another Maleksabet brother and a cousin are involved in the profession of dyeing [38]. They work in another house located in a village near the historic part of the city. A Zoroastrian family built this home and it retains some traces of weaving in the architectural details [38]. They use a typical dyeing technique to dye each part separately. They use rubber bands to tie warp threads before dyeing [39]. Colors penetrate each other through these rubber bands (Figure 3), resulting in a variety of colors for each thread, and unique patterns appear in each weaving [40] (Figure 4). When weaving warp treads, weavers play pedals in the lowest part of the loom with their feet to move warps and use their hands to pass wefts through warps [39]. This technique makes each textile unique even before weaving.



Figure 3. Dyeing in the Maleksabet Kargah, Yazd, Iran. Warp threads are tied with rubber bands during dyeing. Source: Reproduced with permission from Efati Amiri [24].



Figure 4. Dyeing in the Maleksabet Kargah, Yazd, Iran. Warp threads are untied after dyeing. Source: Reproduced with permission from Efat Amiri [24].

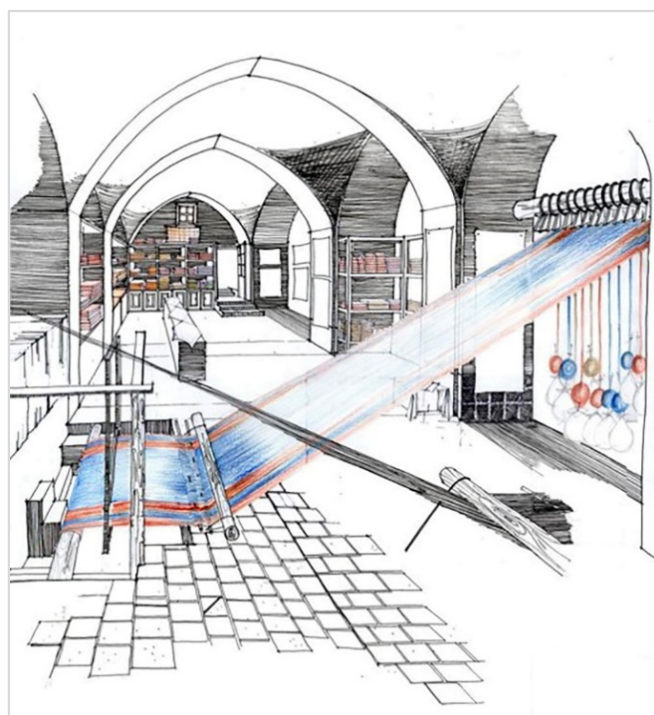
Their uncle, Ghazanfar, also had been working nearby. His house was destroyed due to modernization in urban planning and he and his family have moved to a house in the center of the historic part of the city, the Fahadan district. They undertake all the weaving process themselves, from spinning strings to dyeing. After his passing, his children have continued their father's profession, *darai* weaving, till now. There is a small contiguous space in their home that functions as *kargah* since it integrates mostly with the neighborhood. It has two entrances: One of them connects the house to the *kargah* from inside, and the other one connects *kargah* to a narrow alley. The *kargah*'s roof is a *Kolombu*, a square-shaped hole in the middle of the dome whose diameter is about 40 inches. The *kargah* performs as a space for both weaving and selling textiles made in traditional weaving looms (Scheme 4).



Scheme 4. The Malek Daraibafi Kargah, Fahadan District, Yazd, Iran. Source: the first author [39].

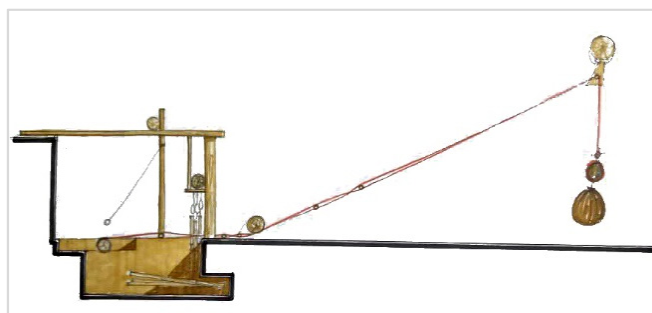
The Khojasteh Darai-weaving Kargah is another example of a social/working space that is situated beside the center of the neighborhood, the Vaght-o-saa't square (Scheme 5).

This *kargah* plays a more prominent role in organizing local people of the community. However, the exterior façade of the building has no demonstrable decorations and is covered by a layer of clay. There is a small door on the left corner and a tiny window in the middle. Inside, the *kargah*'s floor is lower than the square's by about five stairs. Interior adobe thatch walls are covered by plaster. The roof of this *kargah* has five *kolombu*, a vaulted structure consisting of a small dome. There is an opening in the middle of each *kolombu* whose diameter is 20 inches. On top of each opening is a *kolahfarangi*, an architectural element on top of buildings that allows for light and air to flow in and out of the building [41]. Its floor is covered by *ajor-e Abanbari*, a kind of water-resistant brick used in the past for surfaces of Cistern Waters [42]. Traditional weaving looms made by local and area-based artisans occupy this space, as shown in Scheme 5.



Scheme 5. The Khojasteh Daraibafi Kargah, Yazd, Iran. Source: the first author [39].

It should be noted that both terms, *karkhaneh* and *kargah* are applied interchangeably within the weaving culture. Architecturally, workspaces are located either in the basement or the ground floor where the temperature is fixed, an important component to maintain the thread and textile integrity. The weaving looms are installed on top of small recessed areas. Scheme 6 shows one of these traditional looms in cross-section. Workspaces can be separated from alleys by steep stairs. Typically, except for the entrance, the only openings are a combination of a small window or one or more holes for lighting, although the small holes mostly function as ventilation. As a result, noise can pass through the holes, and the sound of the weavers working can be heard by anyone passing in the alley. In the Khojasteh Darai-weaving Kargah, one local *daraibafi* weaver creates the textile for exhibition to tourists. The noise of the weaving instruments can be heard from a distance and guides the way for tourists to find them. Weaving activities in just a few such ateliers, or workshops, less than five, within neighborhoods have become cultural attractions that can lure the attention of local and foreign tourists [32]. Reviving such historical practices of weaving and textile fabrication offer the potential to supplement the local economy, especially when weaving is supplemented with other economic activities like blacksmithing and carpentry, and forgotten activities like raising and nurturing silkworms in *tootestans*, the place of white berry trees. Therefore, dyeing and spinning can also be revitalized again as part of the conservation of both tangible and intangible cultural heritage.



Scheme 6. A Section from a Daraibafi Loom. Source: Reproduced and presented with watercolor by the first author [43,44].





3.3.3. Vernacular Industrial Architecture in the City: From *Karkhaneh* to Industrial Manufacturing

As mentioned in the last two sections on the home and neighborhood scales, *karkhanehs* were traditionally in homes and used mostly by women. Gradually, *Karkhanehs* appeared in the neighborhoods. This evolution from homes to neighborhoods resulted in more space for skilled weavers to increase weaving production. A high volume of skilled workers in one place, the suitability of Yazd's hot and dry climate that helped to maintain the thread's integrity, and the advent of modern industrial technologies led the city to embrace an industrial revolution in weaving [1]. Large-scale industrial buildings appeared one by one in the margins of the city [23] that embodied the industrial heritage of the city [45]. This type of building was still called *karkhaneh* but with an evolving meaning and scale, starting from a house before transitioning to neighborhood *kargahs* and, most recently, a factory. As defined earlier, nowadays, visitors associate *karkhanehs* with factories rather than what they used to be.

Throughout the world, vernacular buildings were under great architectural pressure from the early 20th-century technological innovations and the steady process of globalization during the early twentieth century. The large-scale factories that began to arise in Yazd in the early part of the 20th century were contextualized and adapted to incorporate social-cultural forms and functions (Table 2). The Yazdi *karkhanehs*, known as large-scale factories, were able to maintain their existing vernacular architecture almost through to the 1970s [46]. Eventually, however, as state-of-the-art industrial technologies increasingly entered the city, factories lost their identity and harmony along with the existing historic urban texture. Many other new buildings and architectures were affected by these modernizing technologies as well.

New textile manufacturing machineries and industrial forms began to be increasingly imported from Europe and the United States as the 20th century progressed [46]. With the introduction of these new western technologies in Yazd, textile manufacturing expanded into a commercial industry, and newer, more modern factories appeared. The first new industrial buildings built close to the end of old historic residential neighborhoods retained some vernacular accents, for example, the use of a central courtyard, portico, *badgir* or wind-catcher, as well as traditional techniques such as brick columns, vaults, and domes [46] (Table 2). These early factories reveal an industrial process incorporating vernacular urban texture with vernacular architecture and hired local weavers. However, factories built within new modern districts and in the cities that grew around the early-textile factories became purely commercialized. Women were displaced from the modernizing and commercialization of weaving and textile manufacturing, as men dominated jobs in the factories and ran these new operations as well. The transformation of gender roles and weaving practices threatened the survival of this cultural heritage as it was also accompanied by the loss of traditional loom making by local artisans, as well as decline of traditional dyeing and spinning activities.

Table 2. List of Textile Factories/*Karkhanehs* in Yazd (1931–1963) [46] (p. 5), [47].

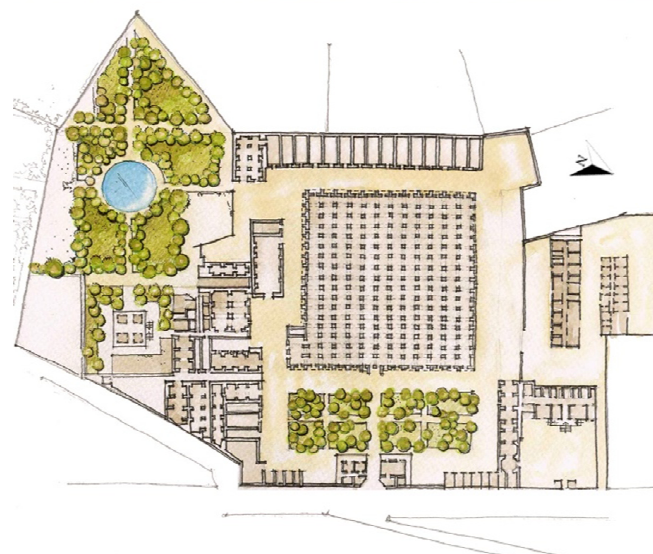
| | Establishment Year | Current Condition | View |
|---|----------------------|----------------------------------|---|
| Eghbal | 1931 | Renovated and reused |  <p>Source: Hossain Gorgui, 2002 [48] (p. 8)</p> |
| Saadat Nasadjan | 1934 | Renovated and reused |  <p>Source: Alireza Rahmani, 2012 [49] (p. 9)</p> |
| Dorakhshan (Herati) | 1935 | Abandoned and ruined |  <p>Source: Hamidreza Amiri, 2005 [44] (p. 32)</p> |
| Seyed-Mohammad Agha Dastbafan YazdBaf | 1948 1948 1956 | Abandoned Abandoned Active | |
| Jonub | 1959 | Renovated and reused |  <p>Source: Dinyar Shahzadi, 2003 [50] (p. 20)</p> |
| Afshar | 1963 | Active | |

The first industrial *karkhanehs* in Yazd also reflected local activities and traditional professions in the area. For example, Eghbal Factory is the first modern factory in Yazd [48]. Built traditionally by Yazdi architects and builders, vernacular architecture has been adapted by the introduction of new technology (Figure 5 & Scheme 7). In this building, the architects purposely avoided steel, concrete, and glass, the symbols of the industrial revolution [48]. The architects referred to existing architecture textures and patterns; they considered vernacular architecture as a potential, not a limitation. Architectural support for the use of local, renewable, accessible, and economical materials was important and so was the availability of skilled workers. The severe climate made the transition of traditional techniques to such hybrid structures critical. To preserve its valuable vernacular industrial architecture as the first modern factory of the region, the site was renovated and equipped to provide modern facilities and residential areas for those working in the region. Now, it is called the Yazd Science Technology Park [51].

According to the well-established work on vernacular architecture by Amos Rapoport, an architect and one of the founders of Environment-Behavior Studies, vernacular industrial architecture is a treasure of professional experiences, and its production results from within a local region and interacts with vernacular architecture [52]. It is a subset of vernacular architecture that reflects the technological development of the city and reveals the social and cultural heritage of the community.



Figure 5. The main hall of Eghbal factory, Yazd, Iran. Source: the first author [37].



Scheme 7. The ground floor of the Eghbal Factory, Yazd, Iran. Source: Reproduced and presented with watercolor by the first author [30,48].

4. The Industrializing *Karkhanehs* and Touristic Alterations

The uniqueness of Yazdi architecture and its long history in earthen architecture and Yazd as the destination for world Zoroastrian pilgrimages have attracted regional and international tourists [7]. Lured by tourism industry with a promising future to bring more income to the area, authorities have tried to facilitate new, attractive businesses and better job opportunities, but struggle with modernization and transforming urban mobilities. Former residents of the historical city of Yazd have moved to newly on-established suburban neighborhoods, resulting in diminished residential character in the historic core and replacement by foreign workers. Over time, the area has been revitalized for foreign tourists, consequently modifying and converting the region into a touristic area [10,53].

Currently, about ten *karkhanehs* and *kargahs* which were studied in this research are active, and almost half of them have a theatrical display aspect for visitors and tourists. Little data on the weaving heritage is available, and this is mostly in the form of oral memories of local resident. Due to the national monument designation and the UNESCO inscription of the historical texture of Yazd, tourism began to grow and both *karkhanehs* and *kargahs* were renovated to new functions such as restaurants, coffee shops, hotels, etc. (Figure 6). Any remaining architectural traces, were buried underground to accommodate new developments. Other weaving-related professions, especially traditional dyeing techniques and practices, also gradually disappeared.



Figure 6. The Shaarbaf House, Yazd, Iran. Source: the first author [37].

Karkhanehs and *kargahs* being renovated into souvenir shops, hotels, and restaurants, etc., and continued tourism growth began to impact quality of life, cost of living, and sense of local identity [10,54]. Fortunately, aided by Yazd's inscription in UNESCO, authorities and residents have begun to pay attention to their intangible cultural heritage of weaving. Now, filled recesses at *karkhanehs* are being restored to their original function, or at least, are attempting to show the traces of weaving that used to take place. The socio-economic role of *karkhanehs* is becoming highlighted as an important part of tourist offerings and is paving the way for increasing heritage tourism and cultural conservation of Yazd's rich weaving tradition and its interrelated vernacular heritage. The tourism industry is emphasizing traditional professions like dying that may "enhance the identity of the residents and encourage localization in an exceedingly globalization" [46] (p. 2). Local skilled people are being employed to show the craft of weaving and the culture of weaving in Yazd is being revitalized with the help of the tourism industry. However, local residents feel that the quality of life has not improved since the inscription of the city on the World Heritage List [54].

Awareness is rising of the importance of its cultural survival, carrying on from generation to generation, by being protected and preserved as well as practiced (albeit in a highly commercialized form). Interest from foreign tourists has increased Yazdi people's awareness of the value of their weaving heritage, and renewed interest in learning about the textile's traditional colors, patterns, and materials as traditional techniques of dyeing and weaving attract tourist attention. The color and pattern of the textile and the music of weaving instruments, as discussed previously, fill the touristic space and lure visitors (Figure 7).



Figure 7. The Khojasteh Daraibafi Kargah, Yazd, Iran. Source: the first author [39].

Sadly, Iran continues to suffer from a negative destination image among international tourists [10]. Lack of effective tourism planning in Iran and specifically in Yazd has led to challenges in the use and conservation of available valuable spaces in the historical center of Yazd, and while positive changes are occurring, much remains to be done to share the rich cultural heritage with Iranians and foreign tourists [55].

5. Discussion

This study explores the tangible and intangible cultural heritage of weaving in Yazd, Iran. The *karkhaneh* bridges living and working in the first scale, i.e., in the domiciles. They are intertwined with each other. Women have dominated the *karkhanehs* at this scale. In the second scale, weaving workspaces gradually appeared in the spaces between residential homes and neighborhoods, or completely independent of the houses and in the centers of neighborhoods (these were known as the *kargah*). In the third scale, at the scope of the city, the *karkhaneh* and neighborhood *kargah* have transitioned to a factory form amidst a complex modernization that fostered vernacular industrial architecture. These city-scale factories are quiet and non-polluting. More importantly, as noted earlier, they are integrated into the surrounding texture of residential areas. The later factories were completely modernized and lacked both vernacular industrial architecture and the presence of women. Textile production and factory operations were solely run by men, transforming the gender relations that existed in the traditional *karkhanehs* and neighborhood *kargahs*.

In the few active remaining cultural workspaces today, there has been a resilient economic infrastructure, and ongoing practices of weaving and textile manufacturing feeding different parts of society and engaging women and men to serve tourists. This historic craft has provided a means of employment for not only the family but also the neighborhood. Weavers require skilled workers to assist with spinning, binding, and dyeing threads and strings for the craft. Producing the textile is not the final step; it must still be tied, displayed, and sold. The entire process is gendered and encapsulated within a complex cultural and economic network. As illustrated here with the help of Actor-Network Theory, textile weaving occurs within a network of relations and actors that acquires its existence and visibility through historic and transformative relations over time and space.

In the past, existing Yazdi professions such as carpentry, blacksmithing, dyeing, spinning, etc., flourished by supporting the weaving tradition. An inclusive, sustainable, and productive weaving industry and culture have shaped the rich cultural heritage of the region for many generations [46]. The vernacular architecture that is interrelated with the weaving heritage has also prevailed in various forms, adding to the cultural identity and heritage of the region, and housing the artisanal weaving looms and traditional weaving practices [56]. Today, this continues in commercialized workspaces as well as in touristic spaces where various buildings and once-filled recesses in *karkhaneh* are being revitalized and devoted to craft production. The result is a productive and generative process that strives to attempt to sustain vernacular built heritage and intangible craft heritage in Yazd [57].

The transformative history of the *karkhaneh* contributed to a social, religious, and economic environment that was highly gendered. For example, different genders interacted collaboratively historically, with the women producing the delicate parts of weaving and men contributing in other ways. A peaceful coexistence also existed historically among groups of widely differing political systems and religious ideologies. While strong evidence in written history is lacking, Yazd oral histories suggest the weaving process included collaborative work done by Jews, Muslims, and Zoroastrians [1,58]. Yazd's arid and dry climate also played a key role in product importing, exporting, and quality control of material. Therefore, the weaving profession fostered interaction and collaboration at many levels within a complex social system. Today, cultural heritage, residents and tourists interact and continue to re-shape the weaving heritage of Yazd.

Valerio Simoni states that tourist destinations associate with “emblematic things that do not just represent, but actively help constitute them” [5] (p. 869), [59] (p. 2). In the case study undertaken here, drawing on Actor-Network Theory, textile weaving is considered as an ordinary non-human object that helped to shape the heritage and growth of Yazd. As the tourist approaches and enters traditional neighborhoods in the city’s historic center, the sporadic textile weaving *kargahs* increase in intensity. Connecting with tourism, textile weaving as a mutable mobile has changed from a practical everyday object to a commodified decorative exhibition object or souvenir as its network of relations transformed. But commercialization has also enabled the revitalization and continuity of *karkhaneh* and the cultural heritage of weaving in Yazd. UNESCO inscription has tried to increase the livelihood and well-being of local people [10], but it “did not lead to an improvement in the inhabitant’s quality of life” even by considering the growth in the tourism sector [54]. However, tourism facilities and infrastructures are benefiting local populations [53].

Applying ANT and considering Bennett’s thing-power [4], textile weaving plays the role of multiple and dynamic relationships between humans and non-humans. The power of textile weaving vitalizes the *karkhanehs* and *kargahs*, and interrelated intangible and tangible cultural heritage as the last-chance tourism destination [32]. Weaving professions vitalize different materials, for example, cotton and silk, different patterns and colors in the modes of Shaarbafi, karbafi or daraibafi from one *karkhaneh* to another *karkhaneh* and reinforce intangible heritage as well as self-ordering of genders.

On the scale of domiciles, according to the architectural traces of small recessed areas, now often filled by soil during modernization, the primary role of women was evident in the *karkhanehs*. Textile weaving at home enhanced the living aspect of *karkhanehs*. On the scale of neighborhoods, *karkhanehs* became associated with mostly men in the economics of trade and labor. Gradually, supporting professions to produce the wares appeared in the center of neighborhoods or near markets/bazaars. On this scale, the weaving profession extended residential architecture to social, economic, and cultural spaces in Yazd neighborhoods. In the third scale, the weaving profession transitioned to vernacular industrial architecture in the city, *karkhanehs* as large-scale productive sites. First, *karkhanehs*/factories appeared in the outskirts of the historic part of the city and were dominated completely by men. This movement prefaced the establishment of new commercialized, modern factories in Yazd in the 20th century that has made Yazd one of the main hubs of textiles production in Iran [46].

The women were highly visible and present in the *karkhaneh* located in home domiciles. While they were not involved in the production of textile in neighborhood *kargahs* which were operated by men, the women were collaborating in other steps of textile production then, for example, spinning. The process of transforming gender roles continues in the third scale, too, where factories and new modern workspaces appeared that were run mostly by men due to both cultural and economic reasons.

As it is evident in shifting from one scale to another, textile is not a static agent, but is a variable and vibrant actant “whose characteristics are formed through its shifting network of relations with other actors” [3] (p. 482), [60] (p. 4). Historically, various steps of preparation, weaving and selling were undertaken through the collaboration of different religious people, including Jews, Muslims, and Zoroastrians [1]. Most weavers were Muslims, and Zoroastrians were active in the transaction and trading textiles to other regions. The textile weaving process, production, and commercialization were aligned with different genders, ages, and beliefs. Within these heterogeneous relations and practices, inspired by ANT approaches, humans and non-humans are both treated alike as vital participants [61]. The *karkhanehs* are actants in various networks where inhabitants and local residents as well as tourists are relational actors, relating to each other, the *karkhanehs* and the city. Textile sovereignty as a “vibrant matter” [4] and weaving as an intangible cultural heritage continue to refer to community engagement, including women and men, in the revitalization, conservation and continuity of Yazd’s weaving traditions with the help of tourism’s ambivalent role –commercializing, commodifying, putting on theatrical

display and yet also reviving and continuing a rich cultural heritage through enactment and performance. The intangible, creative weaving handicraft is interrelated closely with the vernacular earthen architecture as tangible heritage, that produces touristic products for economic gain. These and the creative weavers and their skills are one of the tourist attractions of this city [62]. Tourist experiences of different vernacular weaving traditions and vernacular industrial heritage of this city help to contribute to preserving local identity and cultural heritage in Yazd [46]. Vernacular industrial heritage not only integrates workspaces, *karkhanehs*, and *kargahs*, as shown in this study, but also textiles as products, processes, and transformations of gendered skills.

6. Conclusions

Drawing on ANT thought, this case study has mapped and traced weaving and textile manufacturing in Yazd, Iran, as a rich cultural heritage and local identity. Transformative practices integrate human and non-human relationships, practices and materials, and tangible and intangible associations in *karkhanehs* as they transform over time. Such a mapping reveals an intricate network of relations between the textile, local practices, *karkhanehs* and tourism as it grew in Yazd, aided by UNESCO inscription of the historic city. Cultural heritage processes and tourism help to create the context for textile sovereignty and democratic relationships among local residents by promoting their participation in weaving and related tourism projects, activities, committees, etc. Such participation and relationships facilitate not only heritage conservation and cultural survival, but also social well-being as a convivial and co-creational community.

This study highlights the need to pay attention to spatial-temporal and networked relations between human and non-human others, such as in this study, where weaving takes on a vibrant, gendered and performative materiality through the interactions of built heritage, historic cultural practices and related materials (e.g., artisanal looms, dyes, silk, etc.) associated with this craft. ANT and Bennett's "thing-power" offer valuable approaches to study intangible and tangible cultural heritage and the relations between them. The study sheds light on *karkhanehs* in a non-hierarchical negotiation with human beings and the weaving profession, revealing rich relations and effects among vernacular *karkhanehs*, textile weaving, residents, visitors, cultural heritage and tourism.

The case study undertaken here was limited architecturally by the lack of information on the quantity of traditional *karkhanehs* in the scale of homes and neighborhoods. Furthermore, no scholarship exists to show the status of traditional weaving workspaces in Yazd yet. The study also was limited to a primary focus on architectural methods guided by Actor-Network Theory. This was complemented by a limited number of discussions with weavers and local residents, as well as direct observations of activities in *karkhanehs* in local and touristic spaces. Despite the study's limitations, the findings add rich understanding of the interrelations of textile weaving and vernacular *karkhanehs* in the city of Yazd, and the transformations being brought by modernization and tourism. Collaboration between architecture and tourism studies was extremely valuable in this study. Cross-disciplinary research that transcends field-bound areas of specialization to address heritage, conservation and tourism is highly recommended.

As this case study illustrates, studying human and non-human participants in relational networks offers ontological and epistemological insights that merit greater attention in future research that seeks non-dualistic, non-anthropocentric approaches that are sensitive to gender, race, and power as enacted in indivisible relations with tangible (material) and intangible cultural heritage [63]. The case study also points to the importance of future research to attend more closely to the interrelatedness of built heritage with intangible cultural heritage in order to better understand and implement strategies for heritage conservation and tourism development. Future research could explore collaboration between heritage conservation organizations and participatory approaches to involve local communities and local weavers in tangible and intangible heritage management and conservation, for example, preparing a comprehensive plan for renovation and restoration of historic

karkhanehs, engaging local people in decision-making, and holding training workshops by local weavers to train future generations of weavers.

Qualitative research exploring the perceptions and experiences of local residents and weavers, as well as their involvement in planning and decision-making on the use of *karkhaneh* and their weaving heritage for tourism, is critical. Those who stand to be most impacted by tourism development must be included in decision-making of their cultural heritage. Qualitative research exploring tourists' experiences of Yazd's weaving heritage is also highly recommended. Future research can examine how tourism and tourists themselves can further contribute to conserving the historic *karkhanehs* and the cultural tradition of weaving in Iran.

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