Anthropology of Design: how Traditional Korean Architecture is redefining the terms of conservation, collaboration, and sustainable management

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1. The State of Cultural Heritage Management

Hanok, one of the few remaining examples of a uniquely Korean style of architecture developed during the pre-modern period, has been selected by the government to embody Korean cultural identity. Hanok-related projects have received massive funding from Government projects (Bukchon plans: 84 million USD) and corporate grant programs (Samsung Foundation for Arts and Culture) since 2002 (Bukchon Traditional Culture Center [BTCC], 2009). In 2008, Seoul National University sponsored hanok study projects, providing 10,000 USD in grants, and the National Trust of Korea organized the first overseas hanok exhibit to tour in the fall of that year. In December 2008, the Seoul Metropolitan Government issued the Hanok Declaration to expand preservation sites, increasing its preservation budget to 370 million USD for the next 10 years (Seoul Metropolitan Government [SMG], 2008). In January 2009, the Presidential Council on National Branding was officially launched [Markessinis, 2009].

While this investment in cultural heritage, preservation, and international publicity is admirable, little academic research remains about hanok’s cultural provenance. Due to the effects of the Japanese colonization and the Korean War, many hanok have been destroyed and little scholarship has been thoroughly carried out [Palais, 1995]. Debate continues among preservationists, scholars, and government officials on how to re-appropriate hanok and how they relate to Korean cultural heritage.

1.1. Preservation Sites

In the Gahoe-dong-Bukchon area at the heart of historic Seoul, hanok from the
late Joseon Dynasty (1392–1910) through the Japanese “Annexation” (1910-1945) fell under the auspices of an official protected zone (Fig.1). Recently, UNESCO recognized this “preservation zone” for their efforts at preservation and for raising awareness of *hanok* as cultural heritage. However, much of the original community that imbued these structures with meaning have since moved on, and been replaced by expatriates, foreigners, or Seoul locals looking to make second homes. Furthermore, Bukchon has also been criticized for the extent of renovations and demolitions that have occurred despite claims of widespread preservation [Kwon, 2010].

In Andong, Korea, Hahoe Village stands as a uniquely preserved community that, not only has retained its traditional architecture, but also meticulously documents and continues to practice the customs and rituals affiliated with these vernacular structures from as far back as the 14th century (Fig.2). The degree of preservation is such that Hahoe was designated a World Heritage Site by UNESCO in August of 2010 for both tangible and intangible heritage [UNESCO, 2010].

Hahoe Hanok Village, and Bukchon Hanok Village feature as reflexive case studies of intervention. Preservation committees have praised both sites, but an evaluation of preservation in these two sites will demonstrate how Bukchon’s inability to maintain satisfactory levels of preservation speaks to improper policy, while Hahoe stands out as a unique success. Bukchon fell under the rubric of government-led preservation methodology resulting in consecutive failures and violations of the policy; Hahoe, on the other hand, conducted preservation of meaningful, historic sites with minimal government intervention. In addition, cases in which standard preservation practices were ignored or disagreed with, the community tactics at Hahoe proved to be superior to official methods.

1.1.1. Top Down Approach vs. Bottom Up Approach

This research argues that the local community invested in the preservation of architecture at Hahoe Village has developed systems of preservation that evolved in tandem with the techno-static aspects of timber-frame architecture as a response to environmental conditions specific to the Korean peninsula. In Bukchon, these systems have been ignored or undervalued in conservation practices, thus damaging or completely obliterating the heritage values of the structures once policy takes effect.

2. *Hanok* Definitions vs. Preservation Strategies

Residences architecturally categorized as *hanok* (韓屋, 한옥) refers to a style of vernacular architecture built prior to and during the Joseon Dynasty (Fig.4). *Hanok* are structurally composed of a stone base with a heavy timber frame based on the Chinese design of parallel-weight distribution [Lee, 1997]. *Hanok*, at minimum, typically have wattle-mud/clay walls coated in a type of plaster, papered and latticed wooden doors/windows, and either thatched or ceramic tiled roofs. While the timber-frame construction method was imported from China, *hanok* are differentiated by technological innovations and an aesthetic unique to Korea.
With regards to spatial arrangement, hanok are built based upon a modular system of units/bays. These bays are combined to make up quarters, such as the anchae (안채), which are the inner/family quarters, the sarangchae (사랑채) known as the “male quarters” where guests would be received, and the haeng-gnangchae (행량채) that served as either the servants’ quarters or housing for visiting guests and travelers. Upper-class residences would usually have the ancestral shrine stand as a separate building on the residential grounds, but other quarters, such as warehouses, granaries and libraries, could also be built on site depending on preference [Choi, 2007].

All rooms are equipped with a floor heating system known as ondol (온돌) which incorporates stone channels/flues for the purpose of providing warmth in the winter and efficient ventilation for wood in the humid summer months. Rooms with a layer of clay built over the ondol and covered with specially treated paper made up the sleeping quarters, while wooden floored rooms called daecheong (대청) were designed so as to facilitate air flow underneath the wooden floor in order to keep cool in the summer. This relationship to heat and airflow further determines spatial organization.

Bukchon currently has very few hanok that adhere to the typical design. This is due to four major factors:

1) The zone is in the capital: a high-density urban setting that conflicts with space occupied by hanok.

2) The hanok were built during Japanese occupation, placing them at odds with national sentiment.

3) Since the 1960’s Korea experienced an obsession with modernization as defined through industrialization and a persecution of “literati” elements that inherently are embodied in hanok design. This has led to renovations that destroy or obscure the features of hanok, or has resulted in demolition of hanok in favor of high-rise construction or low-rise apartments [Anderson, 1991].

4) The dearth in serious architectural history research leaves government officials at a disadvantage in making applicable, appropriate policy regarding preservation. It also hinders the ability of communities invested in preserving entire zones of hanok to effectively articulate the value they see in their traditional homes [Knapp, 1999, 17-22].

Hahoe stands in contrast to Bukchon as a highly organized community that has tenaciously passed down knowledge of the significance of their hanok across generations [Slote, 2007]. Besides simply preserving the materiality of the timber-frame architecture, Hahoe provides excellent case-study examples of centuries-old systems of maintenance. These strategies can be divided into two categories: techno-static and anthropogenic. Through a cross-disciplinary approach combining architectural history, engineering, and community anthropology, these categories will be unpacked, demonstrating how preservation was addressed in antiquity and can be applied to contemporary efforts at heritage asset management.

2.1. Preservation Technologies: Techno-Static

Design elements and construction techniques address preservation concerns present since at least 600 years ago. Hanok’s significance as sites for lineage
and cultural memory motivated design to evolve towards facilitating maintenance. The goal was to have a structure that could last several generations as the locus of cultural activity and genealogical relevance. The structures were designed to combat environmental stresses caused by wind, precipitation, humidity, and extreme temperature ranges common to the Korean peninsula. Familiarity with these subtle design innovations can vastly improve preservation methods today.
2.1.1 Pre-construction Preventative Measures
Foundations were originally composed of pounded soil mixed with salt so as to prevent uncontrolled vegetation near the structure, as well as unwanted insects. The entire timber-frame structure was set atop a stone base. Posts/columns were always set on a stone base so that the wood would not be affected by moisture retained in soil. Usually, for monumental structures, the beams themselves were “brined” in ocean water so that the salt could prolong the longevity of wooden elements. Regardless, all posts-columns set on stone bases benefitted from the practice of carving out a shallow area in the stone where the stone and wood met, and filling it with salt. Currently, Bukchon preservation methods do not consider the beneficial use of salt, nor properly account for the “problem areas” of timber-frame architecture as highlighted by these traditional methods. A closer examination of traditional methods alerts us to inherent issues that can be easily remedied with modern materials/chemicals that can perform the same function as, say, salt.

2.1.2. Design Features
The roof deserves strong attention, as it is the most exposed and abused line of defense for protecting the integrity of a hanok. While the novelty of a thatched roof may be appealing to some, the far superior design of a tiled roof merits better study and care. Basically, the roof is composed of ceramic tiles arranged in the imbrex and tegula style (Fig.3). The tiles sit atop a layer of low-grade clay that both holds the tiles in place and insulates the structure against both the cold and the heat. Angle, height, and curvature should also factor when determining optimal watershed and snow accumulation. Proportion is key when determining the extension and angle of the overhang of the roof. These elements affect the height and the width of the structure itself. Currently, Bukchon hanok suffer from overexposure to rainfall due to diminished overhang and inadequate angle coverage; the result of contemporary renovations aimed at making structures wider and taller, but unable to increase overhang due to space restrictions and property lines. Without knowledge of this integral relationship between roof and bay dimensions, wood becomes vulnerable to elements, and deteriorates far faster than expected, increasing the frequency of intervention.

2.1.3. Ondol
An exclusively Korean floor heating system called ondol best demonstrates the technological innovations responsible for the longevity of hanok prior to less-successful modern interventions. The ondol design takes advantage of heat absorption-retention with thermodynamic flow vortexes so that heat flows horizontally with nuanced control. Arranged channels of capped, stone pathways stemming from a small heat source allowed heated air to be drawn through the channels, exiting through a chimney structure set a distance from the heat source (Fig.5). The further out the chimney was placed, the faster the heated air would be drawn, allowing for controlled management of heat dispersal. The design of the ondol efficiently transferred warmth to the clay floors above the stone channels across entire areas of the floor, simultaneou-
sly. The clay floors would absorb and retain heat in the winter. The location of the heat source impacted kitchen design and placement. Furthermore, ondol made cold-weather greenhouses possible [Sim, 2007, 17]. However, its most ingenious, yet overlooked use was during humid summer months: ondol also served to draw out moisture, preserving the wood of the structure. Normally, the wooden-floored rooms of a hanok functioned as cooler rooms with increased ventilation options by design (doors, windows, etc.). By extending the stone channels of an ondol under the wooden floors as well, scheduled fires could be used to dry the timber throughout the entire structure. Additionally, small openings near the base of columns helped to both ventilate and dry out these extremely vulnerable portions of the structure. Due to the limits of construction design and the logistics of rainfall, the bases of columns were the most exposed part of the timber structure. Not only was more care given to these locations, such as salt in between the post and the stone base, as well as increased heat exposure for preserving the wood, but the soot from smoke would fill in any cracks or imperfections in the wood, increasing its lifespan as a usable post.

2.2. Preservation Technologies: Anthropogenic
The human component is often neglected in preservation programs in favor of less unpredictable factors. Ideally, the site would be quarantined of humans, or at the very least, human engagement with historic sites would be controlled to some degree. However, the very nature of timber-frame architecture design necessitates human interaction for proper maintenance. The steady presence of people ensured that leaks were immediately identified and drafts were sealed. The design of hanok certainly addressed major issues of exposure to environmental elements, but the human component served to micromanage the endlessly variable degrees in which those elements affected wooden structures. Control of light, ventilation, and precipitation gave birth to careful study and recording of how these phenomena related to space, place, and architecture, resulting in strategies designed to keep the structure intact over generations. When reexamined as an anthropogenic activity, new, minimally invasive preservation tools emerge.

Inclusion of the human component challenges the UNESCO definition of proper preservation methods and policy to think creatively about enforcement and education. It is a problem, but also an opportunity to reexamine architectural theory and preservation techniques in the face of an ever expanding and ever nuanced definition of what a heritage site is.

2.2.1. Geomancy
Korean geomancy, poongsu (Chinese: feng shui, 风水) illustrates how the built environment is mindful of geological features in a scientifically rigorous way. Pragmatic responses to wind, water, and soil conditions evolved over time within geomantic practices to develop codified templates for building design, location, elevation and axis that address topography similar, yet arguably more sophisticated, to the way modern land surveys analyze sites for construction projects. Sites were examined for four seasons so as to account for yearly
climactic conditions. Soil quality, water levels, wind patterns, and erosion/rainfall factored into poongsu. Over time, relationships to topographical features, such as mountains, streams, and cardinal directions were formed, establishing the basis of all siting mechanisms (Fig.6). The degree of sophistication and the amount of information required to properly perform poongsu went beyond a lay understanding, and eventually became a career with its own set of examinations and competing schools aimed at certifying qualified practitioners during the Joseon Dynasty [Yoon, 2006].

If poongsu is viewed merely along the metaphysical elements recorded in historic texts, it would seem that design features were motivated by auspicious association to “energies” or “spiritual” elements. This historic analysis of the texts and decorative elements surely speak to a philosophy of aesthetic that, when studied deeply, augments our understanding of intellectual culture and history. However, the archaeological evidence, when studied through the lens of landscape archeology and cultural anthropology, indicate that design was just as much driven by scientific analysis of the site’s climactic specifics.

2.2.2. Natural Systems
Poongsu was crucial for determining the location for new, stable construction projects, but it went beyond land surveys by incorporating terrain features with the alignment and shape of the hanok structure. Brush growth and wind patterns aided in strategically vacuuming air through and around the hanok, driving out moisture, cooling the space, and mitigating the impact of precipitation on wooden members of the building.

The typical feature of most hanok sites is that they are positioned to have some sort of hill or elevation behind, and facing a body of water placed some distance away. Cool air coming off of streams and guided by the contours of the terrain kept moisture from stagnating in the summer. The same terrain served to block cold winds from the north during the winter months. In some cases, gravel was used in the courtyard to create a heat-sink in the summer months. The shape of the roof with the elevation behind it worked together with the heat-sink formed by sun-warmed stones to generate airflow. Strategically placed windows in the back of the structure worked with open doors in the front to vacuum air through the structure (Fig.7,8). If vegetation was present on the hill/incline behind a hanok, it worked as a “swamp-cooler” using the natural moisture of vegetation to dramatically drop the temperature of air as it rushed through it into the hanok.

While not all hanok can enjoy such ideal conditions, the very concept of design and terrain working together to promote improved conditions for wooden architecture is an appealing area of study that can be woven into policy aimed at the preservation of entire communities of structures. Currently, the renovations in Bukchon that alter height, width, and pitch of roofs seem to be working counterproductively with already established flow vectors beneficial for the control of ventilation and moisture.

3. Research Directions
Through library, and museum surveys, we sought to consolidate the histori-
cal context of hanok, investigate the cultural value of hanok in relation to its historical legacy, and explore its re-appropriation through South Korean heritage management institutions. The preservation of Hahoe Village in Andong in terms of not just architecture, but art, ritual practice, and social customs, provide crucial ground for firmer analysis of similar features found in sites like Bukchon.

The history of preservation innovations tailored to the structures has been passed over for more familiar techniques. This neglect is owed to the fact that little research has taken place prior to implementing preservation techniques, as well as local strategies appearing both novel and lacking the formal auspices of “expert” opinion. The result has been a dramatic decrease in salvageable structures, as well as unsuccessful examples of sustainable preservation practice, prompting either drastic sacrifices to original features in favor of less problematic material, or complete demolition.

Hanok are designed to combat environmental stresses caused by wind, moisture, and extreme temperature ranges. Hanok’s role in cultural heritage engaged human agents, and design evolved to facilitate maintenance. The above are but some examples of how the human component should be included in the preservation methodology. By recognizing these behaviors as preservation pedagogy, and formalizing these tactics through a hybrid syncretism with modern techniques, these methods can apply to lesser-known sites currently at risk of degradation, driving the state of architectural preservation in South Korea to unprecedented levels.

Notes
1 This initial definition of hanok and the subsequent discussion of its various architectural and structural elements is knowledge that the authors compiled through on-site field surveys and interviews in South Korea.
2 Note that the term 사방 (舍房) actually refers to the management of activities. Since men were most commonly in charge of households, the projected term “male quarters” has remained popular in defining the space. However, one must not discount the possibility of women using the space for management of affairs as well. For more information on the role of women and property management, please consult: Martina Deuchler, 1992, *The Confucian Transformation of Korea: A Study of Society and Ideology*, Cambridge, Council on East Asian Studies, Harvard University.
3 Furthermore, this relationship between the center and the strong sense of regionalism during the majority of Korea’s history is a recent exploration among academics, and has yet to be fully developed within scholarship.
4 During this time the architecture may have been influenced by Japanese elements, but more importantly, the fascination and incorporation of Western elements begin to take on a decidedly Korean “flavor.” Again, this period of architectural history is woefully understudied.
5 The rhetoric surrounding the perception of hanok as irreparably “primitive,” and the vested interests that benefit from such an attitude has thwarted both the study of hanok, its preservation, and intelligent development of adaptive reuse regarding hanok features.

References
Abstract
This project examines South Korean preservation methodology as a product of relationships between heritage management institutions, communities inhabiting architectural heritage sites, vested interests’ land development projects, varying levels of awareness of heritage building values, and the understudied features of hanok: vernacular wooden structures from the Joseon Dynasty (1392–1910). The project offers case studies that reveal architectural design driven by multi-disciplinary intellectual and multi-faceted scientific factors to an extent unique in the world of architecture. These preservation zones further offer a case study of architecture tied to people, distinct in the cache of world heritage sites. This research expands on institutional definitions regarding proper preservation methods/policy by reintroducing traditional techniques designed over centuries for maintaining the structure: technologies currently neglected for their preservation potential in a modern context.