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Rural Sustainability: Children's Libraries as A Tool To Revive Rural Villages in China.

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ABSTRACT

Rapid decline of rural Chinese villages poses a significant concern, driven by phenomena such as village hollowing and industrialization, which result from the migration of the working populace seeking improved employment opportunities. As a result, these villages face the risk of cultural erosion, with only young children and elderly residents remaining amidst the transition. The replacement of traditional timber dwellings with concrete structures further accelerates the loss of cultural heritage which for centuries has been the identity of their culture. The Dong ethnic minority, constituting one of China's 56 ethnic groups, inhabits regions with a rich history dating back to the Tang Dynasty, encompassing more than three million people. This study focuses on two Dong villages situated in southwest Hunan Province, profoundly affected by this rural transformation. By implementing two architectural prototypes, the research endeavours to foster social resilience in these villages, aiming to preserve their cultural identity and advocate for the integration of social architecture paradigms within rural Chinese communities.The Gaobu Book House and Pingtan Book House, named after their respective villages, serve as multifunctional spaces catering to various community needs, including leisure for the elderly, communal gatherings, and experiential learning for children. The research delineates the comprehensive development process of these prototypes, encompassing problem identification, stakeholder engagement, fundraising efforts, architectural design, local carpentry collaboration and book provision. Through these initiatives, children in Gaobu and Pingtan villages are afforded opportunities for educational enrichment and cultural connection, thereby revitalizing the communities and reinforcing their sustainability within the rural landscape. When communities develop an affinity for their architectural structures, sustainability inherently ensues as it fosters feelings of pride and belonging.

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1. Introduction

This paper exposes an often-forgotten issue relating to rural sustainability, vis-à-vis how vernacular village morphologies and traditional architectural typologies contribute to a socially sustainable rural society. In this respect, our hypothesis relates to how heritage can be integrated with modernization and contribute to a sustainable village. Rural Chinese villages are disappearing at alarming rates; Chinese urbanization is a phenomenon widely studied, yet its implications on rural villages are slowly emerging as a collateral side effect [1]. Our departing point wishes to explore the potential of adjusting and working with the existing local heritage to obtain a "calibrated contemporary village approach" [2], resilient and evolving from traditions that have been developed over centuries.

Our research endeavours aim to challenge the conventional understanding of sustainable architectural practice. We seek to identify a novel hybrid approach which we term "Amphibian," inspired by the insights of sociologist Powell [3], where Research and Practice operate concurrently, mutually enriching each other. This innovative mode of architectural practice is an active and collaborative process, heavily influenced by the writings and theories of anthropologist Tim Ingold, who asserts that "To teach architecture is to practice architecture; to practice architecture is to teach it" [4].

The work showcased stems from Condition_Lab, operating as both a laboratory specializing in "*Action Based Research*" [5] and a registered social enterprise located within the Chinese University of Hong Kong. The two highlighted projects are the outcome of extensive collaborations and direct engagement with the community. They represent endeavours where we directly interact with local residents, learning through immersion in their environment, a process that evolves slowly and relies on mutual trust. Each project seeks to blur the boundaries between Teaching, Research, and Practice by actively participating in socially impactful prototypes. In the context of this paper, we aim to steer the discourse on sustainable architecture towards an approach that recognizes the value of heritage and traditional building techniques. By drawing insights from history, we strive to develop improved sustainable solutions for the future.

1.1 Dong Minority Villages as Sustainable Rural Settlement

Dong Minority villages constitute a distinctive architectural phenomenon within rural China. Over centuries, these villages have evolved as self-sustaining entities centred around rice cultivation and refined carpentry practices. They exhibit a nuanced social organization based on the Kuan, a form of hierarchical social organization, linking blood-related households to form a larger family unit [6]. Situated invariably adjacent to rivers, these settlements depend heavily on rice cultivation for sustenance. The Dong ethnic group maintains its unique phonetic language, and until recently, timber was the exclusive construction material, with the Dong House "Ganlan" [7], serving as the fundamental architectural unit.

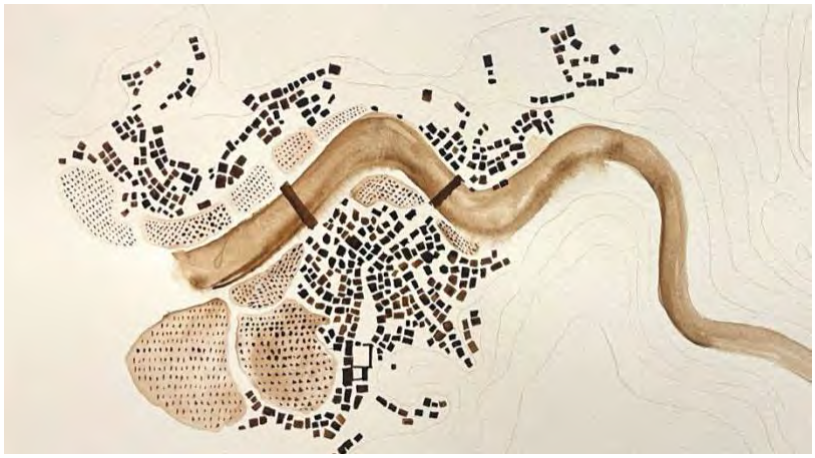

Fig. 1. Settlement of Gaobu Village, situated invariably adjacent to Pingtan Valley

Presently, numerous Dong villages are confronted with significant existential challenges, primarily stemming from the emigration of working-age individuals to urban centres, a phenomenon called "Village Hollowing" [8]. Compounding this issue, many remaining villagers aspire to modernize their residences, particularly by erecting new homes on unused agricultural land at the village periphery. This trend has spurred the widespread adoption of concrete, a material that has fundamentally reshaped the architectural landscape. Concrete structures are proliferating, driven by families eager to upgrade their living spaces with modern amenities like showers, washing machines, and toilets. However, this rapid expansion has engendered two critical issues: 1) the loss of local carpentry jobs, as carpenters struggle to find employment within the community, and 2) severe environmental pollution stemming from inadequate infrastructure, resulting in detrimental effects such as the contamination of local rivers.

There is still hope. The Dong village demonstrates a remarkable level of resilience. They are meticulously planned according to robust Feng-Shui principles [9], with each edifice strategically oriented along an East/West axis to optimize natural cross ventilation. Of significance is the "Ganlan" timber frame construction, engineered to accommodate expansion and contraction without necessitating substantial structural modifications. Not only is Dong timber a sustainable building material, sourced from rapidly regenerating China fir [10], but the timber frame itself boasts remarkable flexibility, capable of adapting to diverse topographical terrains. Consequently, the Dong house generates elevated dwellings shielded from the elements, adept at mitigating the humid climatic conditions prevalent in the Dong areas.

Fig. 2. Traditional houses built in timber

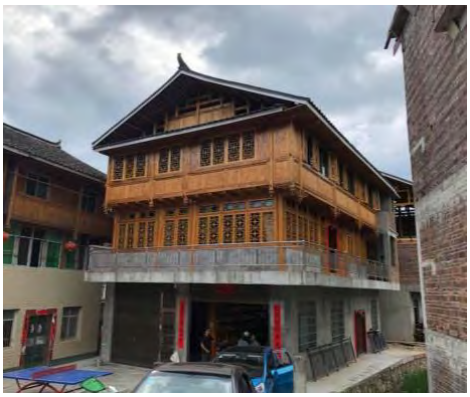

Fig. 3. New houses built in timber and concrete

1.2 Dong Public Architecture

To contextualize the role of architecture within Dong society it is important to identify two significant architectural typologies that define Dong Villages: the "Wind and Rain Bridge" and the "Drum Tower". These structures constitute the social foundation of the settlement, encapsulating the essence of Dong architecture. They serve as communal edifices with specific functions. The Wind and Rain Bridge functions as a communal gathering space for villagers, embodying Confucian principles by delineating zones for interaction between men and women [10]. Typically situated at pivotal points along the meandering rivers, it serves as a social hub, exemplifying the outdoor-centric lifestyle of the Dong community—a place for gathering, socializing, and exchanging. Conversely, the Drum Tower, another important civic Dong building, holds a dominant position in the cultural and spiritual life of families, symbolizing their prosperity and social standing [11].

Fig. 4. Daily life at communal space on "Wind and Rain Bridge"

The allure and vitality of "Dong Life" evolve outside the house, the community meet in the interstitial and residual spaces, alleyways and small squares, the by-product spaces fruit of the village's complex morphology. These public areas serve as dynamic stages where residents gather and engage in communal activities such as dancing and dining, forging bonds and fostering social cohesion. Through extensive field research, we have discerned the remarkable adaptability of these public spaces over time. Rather than relying on fixed outdoor furniture, villages have ingeniously devised a system of portable, temporary furniture that is transported across the village, facilitating the creation of spontaneous gathering points. This form of ephemeral architecture not only enriches community life but also contributes to its sustainability, characterized by its lightweight, practicality and flexibility [2].

1.3 Sustaining Communities Through Carpenter Expertise

The reason why Dong architecture and Dong villages embody a socially sustainable ethos is principally due to the role of the carpenter. Speak of a carpenter in the context of Dong architecture, and the word does not convey his importance within the community. There are several categories of carpenters with different degrees of skills, the highest status being the "Ink Master", who has the roles of leading the construction team, controlling the design and construction process, as well as being responsible for overseeing rituals and ceremonies. Ink masters hold a quasi-religious status within Dong society, endowed with powers to safeguard the house from daemons and ensure the well-being of the residing family.

There are two forms of knowledge the ink master must acquire: Technical and Ritual [12]. The technical focuses on mastering the "ink codes", a unique set of characters and symbols marking the spatial orientation and naming of each component, vis-à-vis pillar, beam, and purling. The codes recall tattoos inscribed onto the modular timber pieces to aid with assembly. Ritual knowledge, on the other hand, consists of orchestrating ceremonies aimed at invoking the favour of deities like Lu Ban [13], showing reverence to past masters, and coordinating communal singing and feasting events with fellow community members.

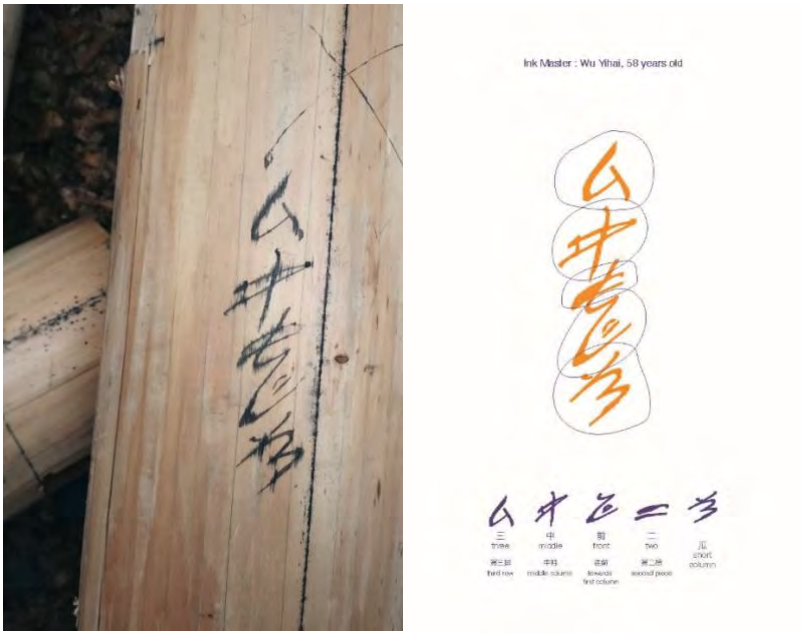

Fig. 5. Set of characters and symbols on timber components

The carpenter's role embodies a traditional form of "sustainable" knowledge, which is transmitted across generations, fostering a continual lineage of practices aimed at fostering a balanced, holistic, and human-centred built environment. All timber components of a Dong building are prefabricated and conceived in the mind of the ink master. In the absence of working drawings, the master must mentally elaborate the height, depth and width as well as coordinate the number of rooms, windows and stairs locations in the abstract. This compound array of tasks is achieved by utilizing a set of modest tools, including an inkpot (containing ink and string), a square ruler, bevel gauges, levelling plumb lines, and crafting tools such as an axe, chisel, plane, hammer, along with bamboo measuring rulers, that converge to facilitate the sophisticated construction process.

1.4 Two Urgent Issues Confronting Dong Villages

The research presented in this paper addresses in a normative design manner, two urgent problems affecting the Dong community resulting from the unprecedented pace of transformation that has occurred across rural China since the early 2000s. Traditional heritage and cultural practices, such as the use of the local Dong phonetic dialect, Dong timber craftsmanship, and culinary traditions, are gradually eroding from everyday life. As a consequence, villages are experiencing depopulation as working-age adults migrate to urban centres in search of employment opportunities.

The first problem addresses the diminishing demand for local carpenters, leading to redundancy and a scarcity of work opportunities in their native villages. The emergence of new construction materials like concrete, coupled with a preference for modern architectural homes, has further exacerbated this trend. As a result, carpenters are compelled to seek employment in distant locales, often resorting to leisure and tourism resorts where there is a demand for imitation "Dong" heritage

structures and interiors. Adding to the challenges faced by remaining local carpenters is a national regulation prohibiting them from working outside their villages after the age of 60, thereby limiting their mobility and opportunities for employment beyond their immediate communities.

The second issue concerns the lack of amenities and the consolidation of primary schools in larger villages, resulting in the closure of smaller schools in remote areas. As a result, children are faced with the dilemma of either relocating to nearby towns for access to better educational facilities or attending boarding schools, thereby disconnecting them from village life. In the Dong village of Gaobu, which has been under our observation since 2015, the prevalent scenario involves children being raised by their grandparents until the age of ten. Subsequently, due to inadequate educational resources, they are compelled to depart for nearby urban centres to pursue their studies. Educational infrastructure, including schools and libraries, is substandard, leading to children spending considerable time in makeshift computer gaming rooms while consuming sugary snacks. The imminent consequence is the erosion of Dong's cultural and linguistic heritage, as children gradually lose fluency in their dialect and familiarity with traditional practices and customs.

2. Methodology

The above-outlined issues underscore the impetus behind our proposed design interventions. We propose to present two pilot design and build projects, which we have identified as prototypes aimed at tackling the two challenges 1) The decline of traditional carpentry expertise and the consequent marginalization of Dong architectural heritage, and 2) the provision of a communal facility centred around children's education and recreation. We have named the project "Book House," which entails establishing a network of children's libraries along the Pingtan Valley, emphasizing the idea of "Learning by Playing".

The genesis of the project stems from working in the Dong Village of Gaobu and the establishment of Condition_Lab as an architectural research laboratory. These two facets are intertwined in the project's development and are, in many respects, interdependent; without either one, the realization of the two Book Houses presented here would not have been possible.

2.1 Sustainable Practices in the Dong Village of Gaobu

Gaobu, a small rural Dong village comprising approximately 2500 inhabitants, is situated in the southwestern region of Hunan province, nestled within the Pingtan Valley, roughly 40 minutes drive from the renowned Dong town of Tongdao that acts as its municipal capital. The Pingtan Valley is celebrated for hosting nine Dong traditional villages, which have been nominated for UNESCO Heritage protection (UNESCO, 2013). Owing to its remote location, Gaobu remained largely autonomous until two decades ago, gradually integrating into a broader Dong tourism zone under the control of the local heritage committee.

Condition_Lab, in collaboration with the Department of Architecture at Guangzhou University under the leadership of Professor Cai, has been conducting summer architectural workshops in the village since 2016. The outcomes of these workshops have been documented in a paper [2], detailing the extensive research conducted by the two universities to understand the village's morphological characteristics and foster a sense of trust within the local community. In 2017, we embarked on a design initiative aimed at translating our workshop findings into tangible architectural proposals to enhance the quality of life for the 100 primary school children of Gaobu. With the support of a government research grant and a generous donation from the Chan Cheung Mun Chung Charitable Fund in December 2018, we inaugurated the first Book House in the village of Gaobu.

In terms of methodology, understanding the influence of teaching and associated summer workshops on the eventual design of the two prototypes is essential. These workshops, spanning over two weeks each, with the participation of 50 architectural students residing in the village, facilitated

the systematic mapping and documentation of the village conditions. The compiled data encompasses diverse findings including architectural surveys of dwellings, ethnographic examinations of domestic life, sociological inquiries into gender dynamics and family arrangements, analyses of livelihood practices and resource procurement, average household incomes, and documentation of spiritual customs seldom mentioned in the literature. Notably, a significant discovery pertained to the Dong language, through the research we discovered the absence of a word for "waste" in the local language. These insights illuminated a holistic approach to environmental living, exemplified by practices such as repurposing leftover food from meals to nourish fish living in the rice paddies.

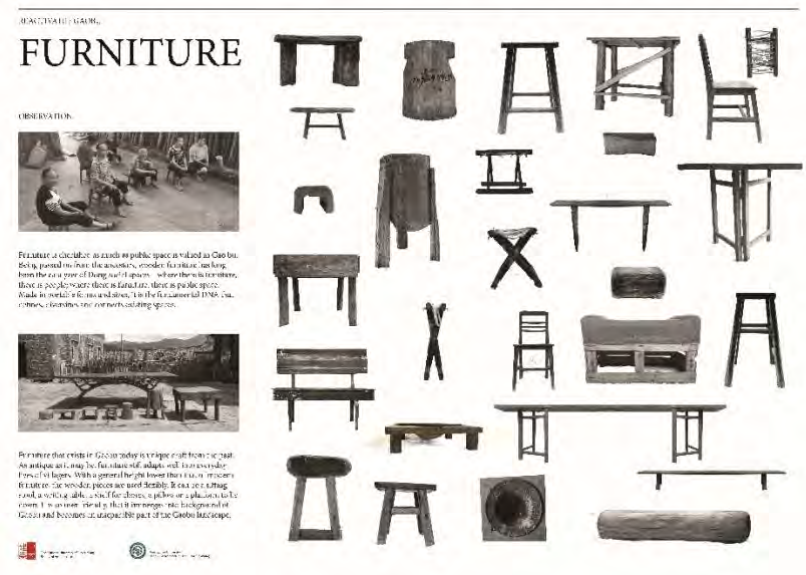

Fig. 6. Architectural surveys of outdoor lives in terms of furniture

Proximity to the community aided the team's immersion in the local context, nurturing active engagement with local villagers and enabling us to understand their perspectives, address genuine concerns and align interventions accordingly. Unlike some rural design projects characterized by hastily implemented solutions, our approach emphasizes a deliberate and respectful process developed over time. Through iterative participation sessions, we jointly develop design proposals informed by local knowledge, fostering a symbiotic design evolution. These projects exemplify a "slow and caring" architectural design process.

2.2 The Prototype as a Research Vehicle

Prototype is a term that has multiple meanings and associations within the architectural community. In the context of this paper, it refers to a full-scale "built" prototype building constructed to gain insights into how the traditional Dong house can be adapted as a contemporary architectural typology. At the core, a design prototype embodies the concept of extracting insights from errors, a development process marked by "design failures", setbacks from which the team gains valuable knowledge.

The prototype operates as a platform for experimentation. Building a 1:1 artefact not only nurtures a relationship with the community but also generates an exchange of knowledge, tools, and finances. The prototype assists the research team in being in direct contact with the reality of the Dong community, aligning design solutions with the inhabitant's needs. The prototype empowers the designer to actively listen to craftspeople, learning from the implementation of practical design solutions rooted in local knowledge. Concurrently the prototype facilitates communication; through

collaborative work, a strong connection is formed between the team, builders, and the household. The prototype acts as a vehicle that promotes the reception of alternative design solutions.

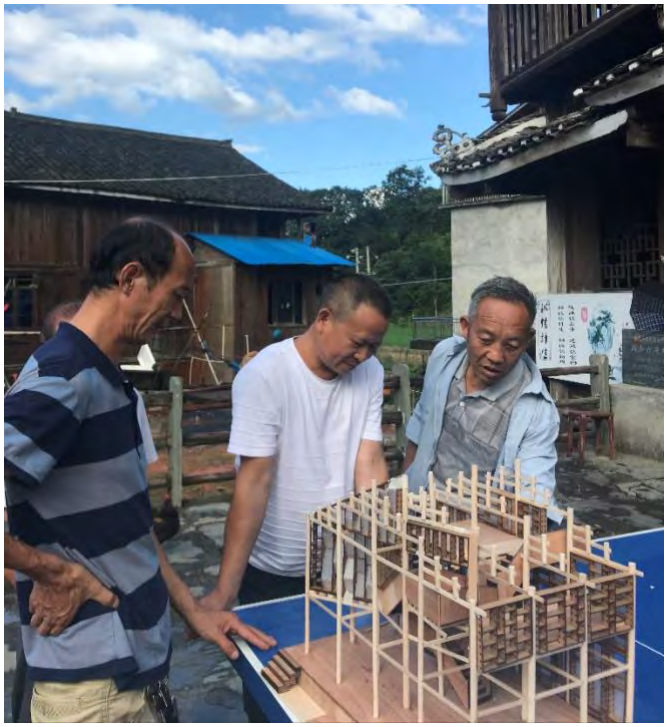

Fig. 7. Team of carpenters and builders in Book House

There is a fundamental difference between prototype and building in the context of this paper. The two prototypes presented may seem like a typical building to most readers, yet the qualities we value relate to experimental design aspects that interpret, deviate, and reconfigure conventional customs into design approaches. Our reading of the prototype defines it as a design process, a system from inception to post-occupancy. Through direct interaction with local stakeholders, a methodology is established that translates design ideas via observation, consultation, participation, adjustment, execution, inhabitation, and readjustment.

3. Results

3.1 Prototype 1, Gaobu Book House

In 2018 we initiated our first full-scale project with the collaboration of the community. Rather than accept urban migration as a given, this project aims to restore dignity and induce development by proposing a small children's library for the village of Gaobu. Playing and curiosity come naturally to children, hence our design generates an "active" architecture that allows children to engage and absorb knowledge through playing, the motto of the Book House.

Every Dong building follows a set of unwritten rules which are interpreted by the carpenter and adapted according to the site. This process establishes a sort of architectural genetic code where no two buildings are the same, yet belong to a common language. Our design takes the traditional Dong house as the creative starting point, where local timber is used for the framing which is adapted and reconfigured to accommodate different programmatic and spatial configurations. This spatial subversion generates a building that at first glance appears traditional, however on closer inspection, new unconventional relationships emerge. By working within the system, materiality and craftsmanship inject new life back into the village.

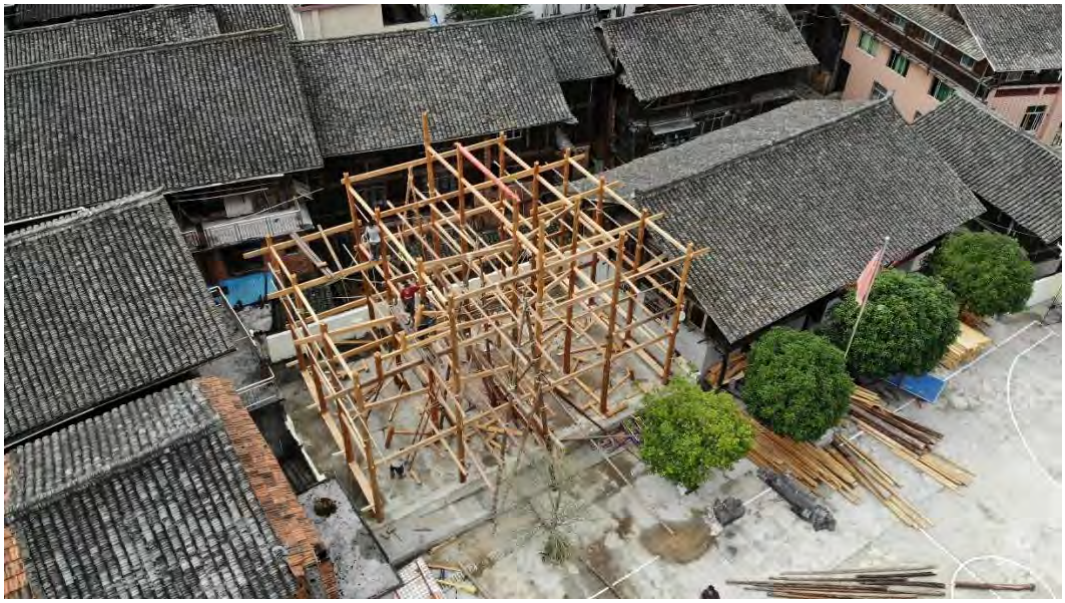

Fig. 8. Framework of Gaobu Book House

Most children within Gaobu are raised by their grandparents until the age of ten when they are forced, due to lack of facilities, to leave and study in nearby towns. Educational facilities such as schools and libraries are scarce, hence our idea was to offer an educational incubator, a house for children to learn through playing. The 200m² timber 2-story structure revolves around a central stair that acts both as a means of circulation and identity of the building. The ground floor is conceived as a covered open space for public gatherings and local exhibitions, while each wall of the above house is dedicated to a specific educational theme. The internal spaces become rooms where people can engage in classes and public events while the stairs act as a reading area. By activating the façade through the design of the stairs, the building becomes a dynamic vessel for villagers to interact with rather than a static object building devoid of life. At a time when the digital world seems to have embraced all facets of contemporary society, books offer the children of Gaobu a means to disconnect and dream about their future [14].

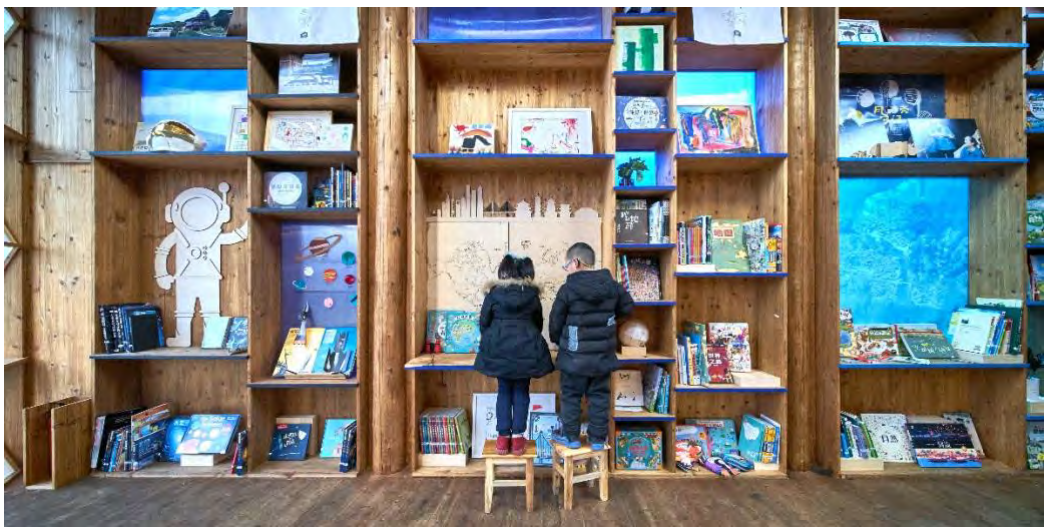

Fig. 9. Interior of Gaobu Book House

3.1.1 Pioneering architectural solutions

The research question behind the Gaobu Book House seeks to discern the viability of translating Dong architectural principles into a design that addresses contemporary sustainability challenges in the form of timber construction, while simultaneously preserving and evolving traditional craftsmanship within the context of a contemporary architectural discourse.

The Gaobu Book House project programmatically explores the integration of Education, Research, and Design into a collective practice, adopting a "learning by doing" approach to directly engage with local communities. Through Book House initiatives in Rural Dong Minority Villages of Hunan Province, significant contributions have been made to the understanding of Rural Contemporary Chinese Timber Architecture. Firstly, the projects identify the potential of local Dong timber architecture as a sustainable alternative to prevalent concrete structures in rural China. Secondly, they foster connections with local craftspeople and academics, cultivating a network promoting the concept of "Living Heritage," [15] where traditional architecture evolves to suit contemporary needs. Lastly, the projects showcase the latent potential of vernacular Chinese timber architecture to the international community, acquiring recognition through awards.

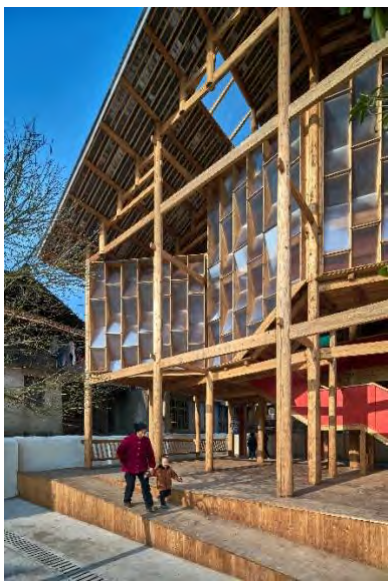

Fig. 10. Contemporary materials for façade design at Gaobu Book House

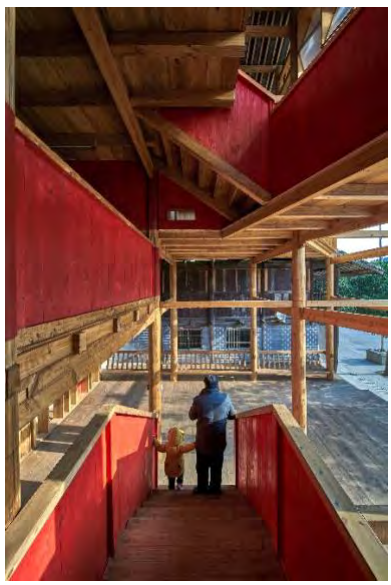

Fig. 11. Insertion of main staircase within traditional Dong house framework

Gaobu Book House is a research-by-design project grounded in active fieldwork. The research team have worked in Gaobu for over seven years, gaining the trust of the local community. The project sits at the opposite end of the design spectrum from fast architecture, where the key ingredient is speed at every step. Our modus operandi is slow and collaborative and founded on the idea of "architecture for people", resulting in the following three points of findings.

3.1.1.1 Translating local customs into contemporary design

The project strives to understand and translate local customs into contemporary design. The process is transparent, inclusive, and always responsible in terms of listening to the needs and the voices of the community. Having witnessed how stairs become a key architectural element in Dong daily life, a place where people usually congregate around and especially a place where children love to play, stairs became the generating idea of the building. The Book House becomes a dynamic circulation and

programmatic vessel for villages to interact. The idea is that while children are playing, they can also stop and read books or listen to a story, rather than a chore, reading becomes fun.

3.1.1.2 "Living Heritage"

We argue that the Book House project assists Dong Communities in moving forward and adapting to modernization because it is grounded in direct public engagement with the community, vis-à-vis it is based on listening and the participation of local villagers. This project also makes important contributions to how the concept of "Living Heritage", compared with the notion of "Museum Heritage" that is sweeping rural China, can become a real alternative form of social development, if Dong villagers are kept alive and functioning through direct participation there is a greater chance tradition and culture will be kept alive.

In this case, the traditional Dong house "Ganlan" represents the heritage. Every Dong building follows a set of unwritten rules which are interpreted by the carpenter and adapted according to the site. This process establishes a sort of architectural genetic code where no two buildings are the same, yet belong to a common language. Our design takes the traditional Dong house "Ganlan" as the creative starting point, where local timber is used for the framing and the timber frame is adapted and reconfigured as to accommodate different programmatic and spatial configurations. This spatial subversion generates a building that at first glance appears traditional, however on closer inspection, new unconventional relationships emerge. By working with-in the system, rather than against the system, materiality and craftsmanship inject new life back into the village.

The idea of adjusting existing building typologies is a notion that has always resonated within Dong culture. Villagers, by a process of osmosis, construct buildings similar to their neighbours. Hence if one family builds a concrete frame house, others quickly follow suits, attracted by the modern conveniences the new system brings. Following the same philosophy, should our prototype be seen as a success, it could inspire other neighbouring villages to introduce similar programmes and in the process launch a network of book centers.

3.1.1.3 Adapting into contemporary challenges

Finally, the built project deepens the current understanding of how rural Chinese villages can adapt to contemporary challenges, including environmental, social, and economic issues. By working in the field, directly with local people on real projects that get built, the prototype becomes the medium for generative and transfer knowledge.

The team has been working in Gaobu over seven years, we deeply understand the challenges the village is facing, especially on the risk of "Village Hollowing". While children have been moving out of the village, the educational resources have been reducing. This situation is a continuing unpleasant situation, getting into a vicious circle. Therefore, the insertion of Gaobu Book House is a turning point for the children, as well as the village. It is a focal place for the community that children play and read and elderly meet up while looking after the children.

3.2 Prototype 2, Pingtan Book House

Two years following the completion of the Gaobu Book House, thanks in part to the positive impact of the first project within the community, Condition_Lab was commissioned to design a new Book House in a larger village downstream. Nestled in the rural village of Pingtan, Hunan Province China, this architectural prototype takes the form of a spiral staircase embraced by a translucent, gridded façade. The staircase, adorned with expressive timber structures incorporating bookshelves, pays homage to the village's traditional architecture under threat from prevailing contemporary construction methods.

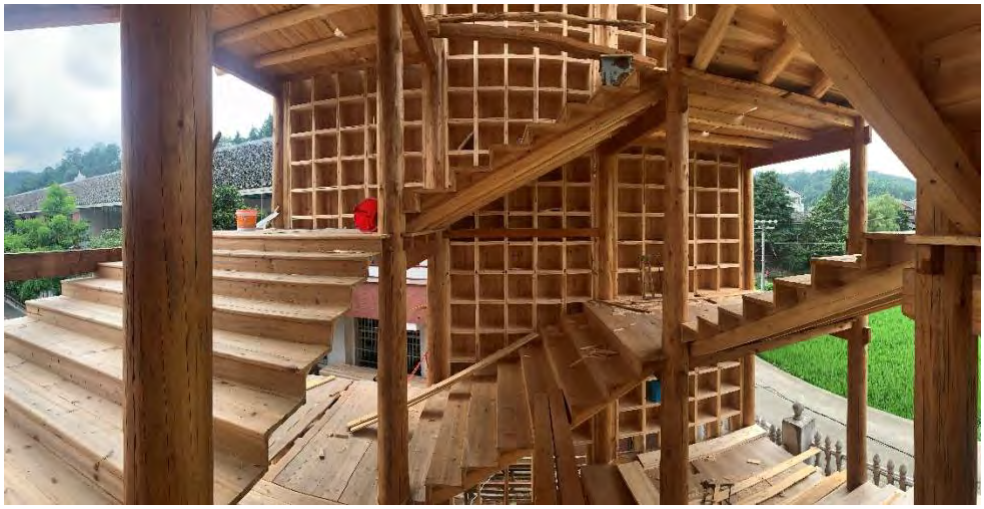

Fig. 12. Intertwined staircases and bookshelves of Pingtan Book House

Collaborating closely with local carpenters and architecture students from CUHK, the team emphasizes the project's attributes of being local, slow, and attentive - vital for gaining community trust and securing sponsorships. Through its deliberate focus on local engagement, heritage preservation, and education, the Pingtan Book House emerges as a catalyst for positive social change, breathing vitality into the fabric of Pingtan and serving as a model for sustainable community development.

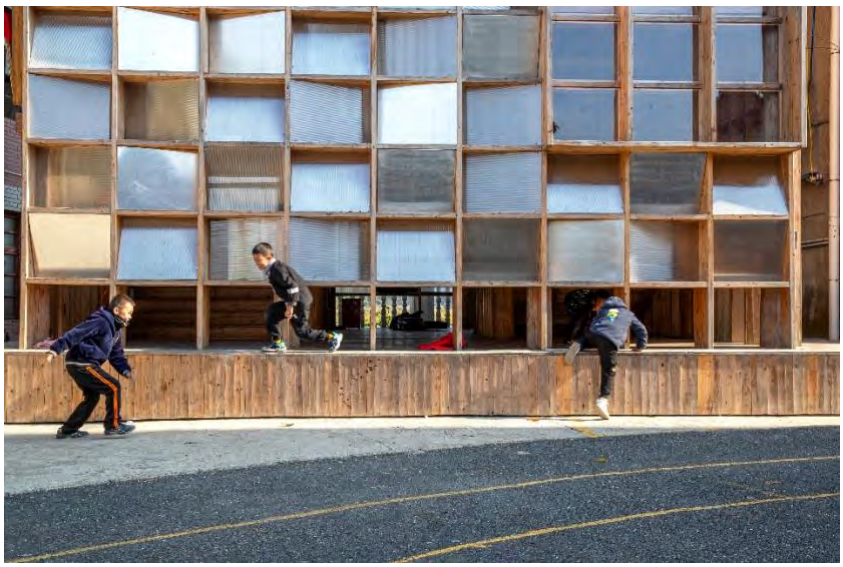

Fig. 13. Contemporary façade materials at Pingtan Book House

This research aims to address several key questions about the integration of innovative educational approaches within architectural design and community development. Firstly, it investigates methodologies for incorporating the “Learning by Playing” concept into the design framework of educational heritage structures. Secondly, it explores strategies for tailoring the design of educational infrastructures to seamlessly blend into the social dynamics of rural communities, thereby promoting meaningful community engagement. Lastly, it seeks to identify effective strategies for scaling up the Book House project from an individual concept to a cohesive network of educational facilities, spanning not only the Dong Region but also extending to broader geographical areas. Through empirical investigation and theoretical analysis, this research endeavours to contribute valuable

insights into the intersection of educational innovation, architectural design, and community development. From an originality perspective, this project distinguishes itself on multiple fronts. Firstly, the incorporation of a double-helix-like spiral staircase, constructed entirely from timber and adapted to the column and beam frame system, represents a notable departure from traditional Dong architecture. Dong architecture, renowned for its absence of vertical circulation, sees this innovative design introduce staircases as communal interstitial spaces fostering indirect learning experiences for children.

Fig. 14. Interior of Pingtan Book House

Secondly, the project's adherence to a minimal budget prompts a radical reinterpretation of the Dong facade, maximizing natural light usage. This departure is particularly significant given that traditional Dong buildings typically exhibit dim interiors with limited visibility. Therefore, this design presents a unique reversal of this characteristic, enhancing luminosity and spatial openness. Finally, the design further distinguishes itself through its contemporary reinterpretation of Dong traditional houses. Serving as a benchmark for future developments, it offers a forward-looking perspective on seamlessly integrating traditional architectural elements into modern design paradigms. Thus, it shapes a reference point for subsequent endeavours in this domain.

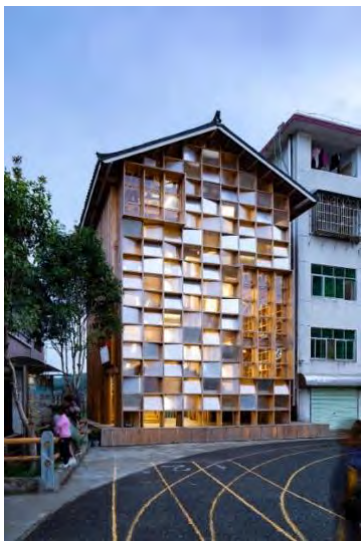

Fig. 10. Reflective effective of façade design

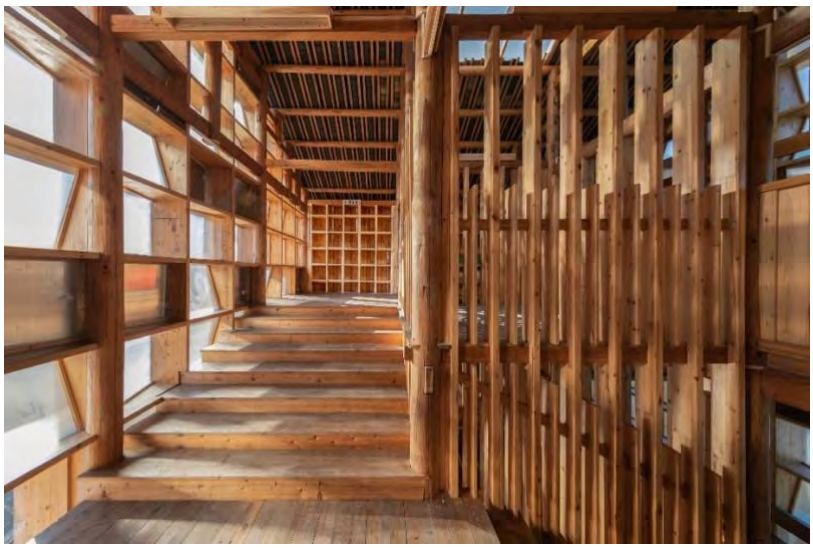

Fig. 11. Effect of natural light inside Pingtan Book House

3.2.1 Significance and impact of the project

The development of the Pingtan Book House spanned two years, during which the research team orchestrated multiple design workshops involving primary school students, university scholars, professors, and local craftsmen. Throughout the construction phase, a dedicated research assistant resided in the village of Pingtan, overseeing all aspects of the project. The research objectives were collaboratively discussed and refined with the school's principal, aligning with the school's specific needs. The design process remained transparent and involved consultations with the local heritage committee of the Tongadao region, incorporating insights from community consultations, with the final approval secured by the village chief. Structurally, the building's feasibility gained approval from a certified structural engineer, supplemented by the expertise of the Dong "Ink-master," responsible for construction.

3.2.1.1 Heritage preservation amidst modernization

The preservation of meaningful built heritage in the face of advancing modern materials represents a significant concern for the Dong community. The Pingtan Book House tackles this challenge by exploring innovative ways to seamlessly integrate traditional Dong architectural elements with contemporary design, ensuring that the cultural legacy remains relevant and significant.

Built predominantly with Chinese fir, the Pingtan Book House introduces only one “foreign” element: polycarbonate panels adorning the façade. These panels not only allow natural light to filter in during the day but also create a luminous facade at night. As a dynamic educational space, the library empowers the community, especially the younger generation, fostering a deeper connection to their cultural roots.

3.2.1.2 Connecting youth to disappearing heritage

Another pressing issue relates to connecting the local youth and the gradually vanishing heritage. Most of the new village houses as well as the school campus buildings are mainly built in concrete, which this material has no connection to the cultural heritage of the minority. Young children have no chance to connect to such identity of their home. Through the realization and occupancy of the Pingtan Book House, the project offers an example of how to engage and captivate the younger generation. Within the ring of concrete school buildings, Pingtan Book House, as a timber house, fills the gap of the ring as well as the disappearing heritage. By incorporating design elements that resonate with contemporary aesthetics and educational methodologies that focus on playing, it strives to bridge the generational gap and foster a sense of pride and connection to their cultural roots.

3.2.1.3 New ideas for education in rural schools

Introducing fresh and effective educational approaches in rural schools is the third challenge. The Pingtan Book House is an innovative model for redefining educational spaces in rural settings. Concepts such as “learning by playing” are not just theoretical but are implemented and observed in action, providing a practical framework for transforming the educational landscape and fostering a dynamic and engaging learning environment.

As the Pingtan Book House becomes a reality, it not only provides practical solutions to these challenges but also becomes a testament to the resilience and richness of Dong culture. Design and education converge as powerful tools, not only preserving heritage but ensuring its continuous evolution and relevance within the local community. Through this project, the Dong community have at their disposal an example of how tradition and modernity can harmoniously coexist, contributing to a vibrant and proud community.

4. Conclusion

4.1 Insights Gained

From the design, implementation and commissioning of these two Book House prototypes, 5 key points can be learnt related to sustainable minority rural villages in China. Each lesson is the fruit of direct interaction and implementation of a "real" built architectural prototype that acts as a catalyst for a sustainable rural society. We argue that this "Active Participatory Research" process produces valuable knowledge and awareness about understanding the magnitude of the issues at stake, helping in the process avoid preconceptions and establishing the possibility to co-create a new "calibrated" sustainable future.

4.1.1 A locally engaged learning platform

Understanding the cultural and environmental fabric of rural villages necessitates direct involvement with their social context. In this regard, the prototype serves as a learning platform, facilitating comprehensive engagement by the research team to observe, comprehend, and generate knowledge through practical involvement. Sustainable development initiatives must prioritize the well-being of individuals, their lifestyles, and the preservation of the distinctive cultural heritage prevalent in China's minority rural villages. Preserving traditional practices, encompassing languages, arts, and rituals, which constitute integral aspects of community identity and unity, mandates a Heritage Harvesting process. This entails mapping and assessing cultural traditions and architectural typologies to understand how they are utilized and perceived by the inhabitants.

4.1.2 Slow, sustainable rural design through education

Through collaboration with a higher education institution and the organization of recurrent summer workshops within the same village, our research team cultivated trust and backing from the local inhabitants. Emphasizing a gradual and compassionate approach, we refrain from hastily prescribing solutions and instead initiate a process of attentive listening. Being immersed in the village environment allows us to gauge the community's pulse, partake in daily life, and collaboratively propose solutions aligned with their beliefs. Operating at a "slow" pace fosters a unique form of engagement that can only be achieved through residing within the community, enabling design proposals to address realistic and practical concerns. Student participation has a pivotal role in dismantling the typical "top-down" approach prevalent in architectural circles by facilitating interconnectedness. Concurrently, this process empowers students to assert their values within a sustainable architectural framework. They serve as conduits for fostering novel concepts and reinstating a sense of community pride.

4.1.3 Embracing learning through play

The Book House concept seeks to redefine the role of libraries in rural villages by establishing a space where children engage in learning through play, complementing rather than conflicting with their standard curriculum. These venues are designed to encourage exploration and creativity, with the architecture creating inviting spaces. Additionally, each Book House aims to integrate contemporary design with local cultural heritage, incorporating materials, craftsmanship, and traditional architectural styles. This fusion ensures that children absorb knowledge by osmosis, fostering a sense of cultural pride and belonging. In the process, the Book House becomes a focal point for community engagement, connecting the families (children, parents and grandparents) to their cultural environment through

promoting education and entrepreneurship to enhance livelihood opportunities and the quality of life in minority rural villages.

4.1.4 Empowering communities and fostering sustainable capacity building

Rural minority villages in China are undergoing transformations, with residents expressing a desire to modernize and integrate into urban society. This aspiration takes shape in two distinct ways: firstly, through the desire for modern housing equipped with amenities such as toilets, showers, and gas kitchens; and secondly, through the universal desire among rural families for improved education for their children. The establishment of Book Houses serves as a means to introduce a new educational resource that not only enhances learning but also infuses joy and fun into the process. While the community's response to this initiative has been positive, it is evident that for the project to expand into a larger network, there is a need for capacity building in terms of managing and operating the facilities.

4.1.5 Sustainability as a unifying force

Throughout our design endeavours, we've come to understand that villagers harbour aspirations for design and architecture. As amphibian Architects, part researchers and part practitioners, our role is to listen attentively and translate these aspirations into tangible realities. Through direct engagement with people, we advocate for a paradigm shift in the profession—a system where users are integral, and architects collaborate with the 90% of the population who lack the means to engage commercial architects. We firmly believe that sustainability transcends mere technical building performance; it revolves around fostering connections and delivering aesthetically pleasing structures that instil a sense of pride in the community and its surroundings. This human-centred approach to architecture has the potential to profoundly impact society and cultivate a newfound sense of belonging.

4.2 Knowing From the Inside

In his book “Making: Anthropology, Archaeology, Art and Architecture.” [4] the anthropologist Tim Ingold deliberates on the importance of “making” in relation to acquiring knowledge. According to Ingold, only through protracted engagement, “doing things ourselves”, can you understand the reality behind the appearance. The process of inquiry, he contends, encourages thinking through observations rather than after them, emphasizing understanding through practical experience rather than the passive acquisition of culture.

Prototypes as design tools, act as a means of transmission of knowledge, exposing in Ingold’s terms “a new way of learning”. As an empirical vehicle, it helps avoid formulaic design solutions based on preconceived ideas. Importantly, it changes the way we interact with the community, and in the process, architecture ceases to be an act “for” people”, to become an undertaking “with” people.

The Book House projects serve as an example of a non-traditional approach to architectural practice, contrasting with the conventional commercial models. In this innovative framework, architects can waive fees thanks to institutional backing (such as support from the university and research grants), transitioning to a pro Bono work process and simultaneously trying to raise funds to cover construction expenses.

These concepts are not new; similar models are delineated in the book "Spatial Agency" [16]. However, what distinguishes the two examples highlighted in this paper is their emphasis on maintaining “Locality” throughout the design and construction phases. Each house is constructed with the involvement of local carpenters from the respective villages, thereby exemplifying a fresh approach to sustainable involvement where the projects also bolster the economic livelihood of local workers.

The construction funds from donations support the projects while simultaneously providing financial support to local carpenters through wages, thus fostering a sustainable ecosystem.

This critical awareness of the underlying conditions could only be achieved by direct engagement in the process critically interrogating the status quo and making a small change for the better. Sustainable architecture must be responsible; the book house projects aim to achieve this by understanding the limitations of the context. Sustainable architecture and sustainable villages share a common word in our opinion and that is "agency", through actions, as the Italian architect Giancarlo de Carlo maintains, things can change. De Carlo goes on to state "In reality, architecture is too important by now to be left to architects" Giancarlo De Carlo 1969 [17].

4.3 Applying in the Future

Gaobu Book House and Pingtan Book House are two pilot prototypes in Hunan Province. They are the vehicles for us to learn how people interact with the project from inception to post-occupancy, and to generate knowledge through the findings and strategies derived alongside. With the abovementioned findings, the strategies shall be applied further in different context, yet sticking to the concept of children libraries as a tool to revive rural villages in China, including: (1) Adaptation of local customs into contemporary solutions; (2) Combining old and new materials to preserve and revive heritage; (3) Adopting the notion of "learning by playing" in the concept of the project.

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