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People's Architecture:
Architect HSIEH Ying-Chun and his post-disaster reconstruction work in East Asia

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Abstract

Over the past 18 years, architect HSIEH Ying-Chun and his team - Atelier-3 – have constructed more than 3000 houses in the post-disaster areas in East Asia. Facing critical and diverse site contexts and socio-political conditions, HSIEH and his team established - using their innovative reinforced light-weight steel frame - three fundamental principles for reconstruction: 1) single-line drawings for participatory design; 2) simplified joints for collaborative construction; and 3) open system for adopting and submitting to local condition. Based on these principles, this paper reviews the architectural practices of HSIEH and his team with examples from selected projects. These examined projects closely present how they initiated, articulated, communicated and implemented their architectural principles in different contexts. The analyses conclude that 'self-reliance' could be seen as

their fundamental philosophy encapsulated in their architectural practice on the notion of low-cost sustainable construction, green building, cultural preservation and creation of local employment opportunities. Following their philosophical ideal, Architect HSIEH and his team have treated the survivors as the 'producers' of their houses, instead of the 'consumers'. Meanwhile, by designing and constructing their houses together, the survivors could re-build their communities and re-establish the intimacy between architectural production and everyone's everyday life. As a critique of the unstoppable trends of consumerism, elite aesthetics and overwhelming professionalism seen in today's architectural practices in general and humanitarian projects particularly, Architect HSIEH and his team's work provides an insight into the society of East Asia and illuminates its challenges and opportunities.

Introduction

On September 21 in 1999, the '921 earthquake' hit central Taiwan. More than 2000 people died, and more than 4000 houses were destroyed. The disaster zone included the settlement of the Thao tribe – the smallest aboriginal group in Taiwan. With limited financial aid from

the society, Architect HSIEH Ying-Chun and his team conducted their first post-disaster reconstruction work with the survivors of the Thao tribe. This important experience stimulated HSIEH to change his career path significantly: he relocated his practice and home to the rebuilt community of the Thao tribe **(Figure 1)**.

Figure 1: Architect HSIEH and his working place in the rebuilt community of Thao tribe, photo taken in 2016. Source: Atelier-3.

After reconstructing the community of the Thao tribe, HSIEH and his team focused on the post-disaster reconstruction work in East Asia. With more than 3000 houses rebuilt in post-disaster areas, HSIEH received the Curry Stone Prize in 2011 delivered by Harvard GSD,

recognizing his contribution in the field of humanitarian architectural work. Based on their personal experiences and empirical knowledge, HSIEH and his team have developed a working method to conduct varied reconstruction projects. This article discusses their working method and underlying intentions. The discussion underscores the varied challenges and difficulties they faced in different disaster zones in East Asia, and provides an insight into its building culture.

Light gage steel as the key structural material

In every post-disaster reconstruction project, the cost and stability of construction and efficiency of building process are the top priorities of HSIEH and his team's consideration. While building construction was strongly related to its structural system and its applied materials, HSIEH and his team abandon the idea of applying reinforced concrete structure for their reconstruction work to achieve efficiency and contain costs, despite concrete being the most popular material used in the housing industry of East Asia. HSIEH and his team applied light gage steel, produced by bent sheet metal with the process of hot-dip

galvanizing, as the key structural element **(Figure 2)**. These standardized and mass-produced steel elements make the house structure lighter, stronger and cheaper than applying reinforced concrete construction. More importantly, with factory production and onsite assembly, steel elements also help the architects to shorten the period of constructing structure. No doubt, steel is recyclable and much more sustainable than concrete to our environment.

Figure 2: Light gage steel applied in HSIEH and his team's post-disaster reconstruction work.

Source: Atelier-3.

Vernacular-architecture-inspired steel frame

In their reconstruction work, HSIEH and his team did not apply the panel wall system, commonly seen in the steel frame structure in Europe and the United States. Their design of steel structure was inspired by the timber frame of vernacular architecture in Southeast Asia. In their inspired frame, the post played a key role in shaping the roof form and for formulating a series of lateral frames to construct the whole house. By further applying cement to reinforce the steel elements and adopting lateral bracing and shear walls to reinforce the inspired structural frame, its stability is significantly improved to withstand potentially destructive forces from earthquake and typhoon **(Figure 3)**. Comparing with the panel wall system, the usage of steels was significantly reduced, and the weight of the structure is much lighter. This means

its cost is lower and the building process more efficient. Meanwhile, this vernacular architecture inspired steel frame was much easier to be used by local survivors in East Asia in which its composition was very close to the structure of their original houses.

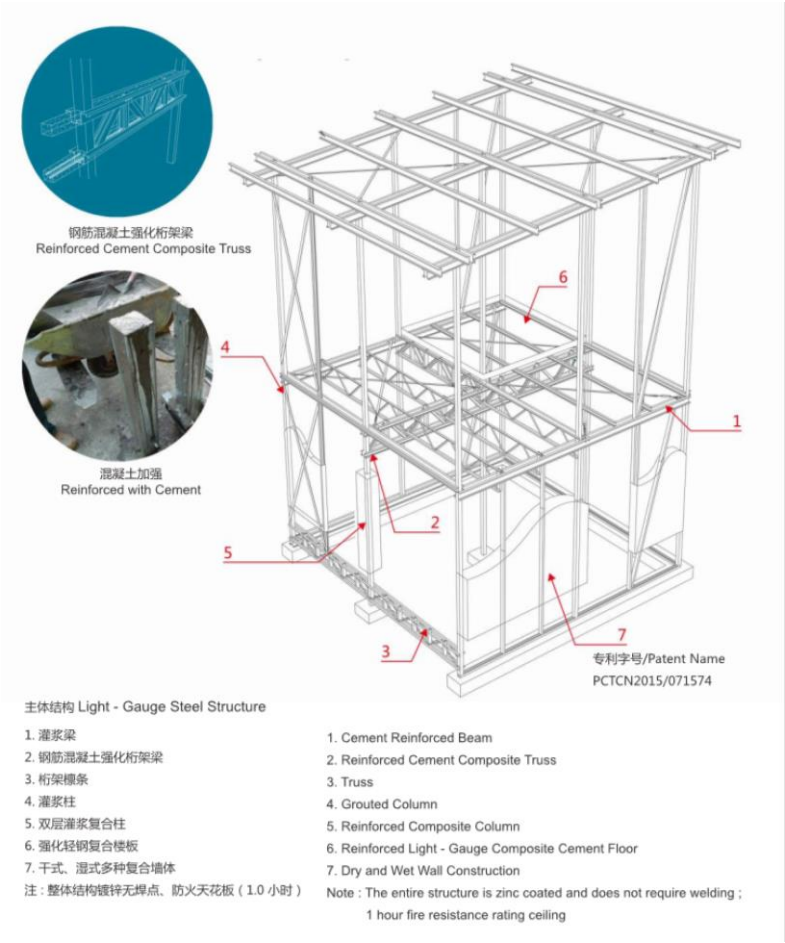

Figure 3: Vernacular-architecture-inspired and cement reinforced steel frame in the diagram made by HSIEH's team. Source: Atelier-3.

Collaborative construction

One of the guiding principles of HSIEH and his team for post-disaster reconstruction was that they did not build houses for the survivors, instead, the survivors should build houses for themselves. This was the result of careful considerations from HSIEH and his team. They believe, in every post-disaster zone, human resources are extremely valuable. Survivors should participate in the construction work to rebuild their houses to reduce the costs, time and resources of building process. In most cases, the survivors in the rural areas in East Asia knew exactly how to build houses, and to HSIEH and his team, this local knowledge and resource ought to be adopted in the reconstruction work. From a psychological perspective, daily work for rebuilding their own houses could be a good therapy for the survivors' mental well-being, because after the disasters, survivors could be deeply traumatized. To Hsieh and his team, survivors should never be treated as persons passively awaiting assistance; in contrast, the survivors should participate as "contributors" and deliver efforts to rebuild their own community **(Figure 4)**. From the social-economic perspective, the building construction could deliver a job to the survivors for them to regenerate their incomes and to regain social status.

Moreover, the building process involved many people. This had encouraged trust and relationship building in the community. Ultimately, the survivors could rebuild their broken community. Meanwhile, creating and building someone's own houses are the basic desire of every human being. Through collaborative construction, the desire could be satisfied. Strategically, collaborative construction could also protect HSIEH and his team from any potential criticism from the survivors for the reconstruction work, because the survivors were fully involved throughout the construction process and would not criticise their own work.

Figure 4: Photo taken on the collaborative construction at Yangliu Village, Abazhou, Sichuan, China, 2009. Source: Atelier-3.

Participatory design and single-line architectural drawing

Participatory design with good communications with survivors is crucial for a successful collaborative construction. For this purpose, single-line architectural drawing was produced by HSIEH and his team to indicate the basic layout of houses and applied steel frame composition **(Figure 5)**. These easily-understood drawings allowed the survivors to learn both about the design and the construction of their future houses quickly. These drawings also facilitated effective communications with the survivors when revising and refining the housing design according to their diverse needs. HSIEH and his team could quickly update their design without spending too much time and efforts on producing overly meticulous working drawings.

These single-line architectural drawings closely represented the retrained approach to design and construction of HSIEH and his team. As mentioned earlier, most survivors in rural areas

of East Asia knew how to build their houses. HSIEH and his team only delivered what the survivors really needed, and minimalized architects' intervention in the reconstruction process. In some cases, these single-line architectural drawings faithfully replicated the vernacular houses the survivors previously owned, and the single-lines on the drawings presented the minimum use of steel elements to reinforce the structure of the re-built house. Following this principle, in some special cases, HSIEH and his team did not provide any drawing; they only provided some special metal joints and elements to survivors to reinforce the structure they would re-built.

Figure 5: Single-line architectural drawings produced by HSIEH and his team for indicating the basic layout of houses and applied steel frame composition for reconstruction work.

Source: Atelier-3.

Simplified joints with nuts and bolts

To allow most of survivors to participate in the reconstruction work, HSIEH and his team designed their steel frame with simplified joints with nuts and bolts **(Figure 6)**. This means their steel frame could be easily assembled onsite without electricity and welding process. This is quite important, because some post-disaster areas would not have water, electricity supply and sufficient number of professional workers at the time of reconstruction. The simplified joints and collaborative construction process, usually only require one day for finishing the assembly of the whole steel structure for a two-floor house with 100 square meters floor area. The simplified joints with nuts and bolts could also benefit future restoration and extension of the houses re-built by the survivors themselves. No doubt, this could also help the survivors to re-locate or dismantle the re-built houses, as well as recycle the steel frame.

Figure 6: Steel frame with simplified joints with nuts and bolts for the reconstruction work at Fu-shan Village, Dawu, Taitung, Taiwan, 2010. Source: Atelier-3.

Open system applied with innovative construction methods

The steel frame applied by HSIEH and his team was as an open system which could be easily combined with local materials for constructing the membrane, roof and floors of the re-built houses **(Figure 7)**. HSIEH and his team encouraged survivors to adopt the traditional way of housing construction and recycle the building materials in the post-disaster zone. The steel frame provided aimed to reinforce the stability of the re-built vernacular houses, rather than

to replace the building tradition they presented. However, in some cases, the local materials are not sufficient, and the survivors did not know how to re-build their houses. HSESH and his team could provide their innovative construction methods to build the floor with thin concrete membrane with metal mesh and to construct the wall with rammed earth and straw bales reinforced by metal mesh **(Figure 8)**. These easily-applied construction methods could not only reduce the costs and time of construction but also rebuild the building tradition by teaching survivors to build their own houses.

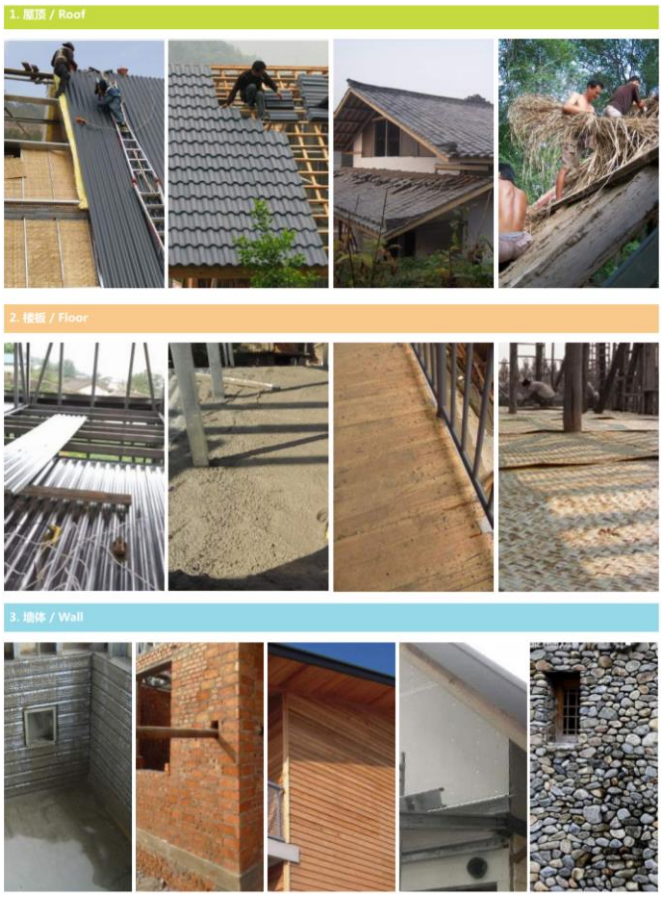

Figure 7: Open system of steel frame for being easily combined with local materials for con-

structing the membrane, roof and floors of re-built houses. Source: Atelier-3.

Figure 8: HEISH and his team provided their innovative construction methods to build the

floor with thin concrete membrane with metal mesh and to construct the wall with rammed

earth and straw bales reinforced by metal mesh. Source: Atelier-3.

Urine-diverting dry toilet

In some cases, when the reconstruction work was completed, the re-built houses could not be connected with municipal services. This means the houses could be without water and electricity supply for a certain period of time, and standard toilet facility would not properly work in this condition. This was why HSIEH and his team applied urine-diverting dry toilet for the re-built-houses **(Figure 9)**. This toilet could not only save the water and energy but also allow people to recycle excrements as fertilizer to increase agricultural productivity. This would enhance their self-sufficient and sustainable living in the rural areas of East Asia.

Figure 9. Urine-diverting dry toilet applied at Mianzhu, Guangyuan, Sichuan, 2008. Source: Atelier-3.

Conclusion: The challenges and possibilities

Clearly, HSIEH and his team reject the elite aesthetics and overwhelming professionalism dominant in today's humanitarian architectural work in their approach to design and construction. Meanwhile, their work represents the applied but restrained professionalism to minimise the intervention of professionals in the reconstruction work. This was due to their belief on "self-reliance" as the key to re-build the survivors' houses and further re-build their community and housing tradition. Meanwhile, HSIEH and his team aim to replace the reinforced concrete structure dominant in the housing industry in East Asia with steel frames. Despite their achievement of more than 3000 houses in post-disaster zones, several challenges remain in their practices.

First, although it is easy to order and mass-produce the steel elements in factory, designing the steel frame to meet the diverse needs of survivors and transporting them to the disaster zones are always challenging. Do we have a better solution to reconcile the relationship between prefabrication and site assembly, as well as between mass production and individual needs?

Second, although steel frame is a much more stable and sustainable structural system than reinforced concrete structure, the production process of steel is not environmental friendly. Do we have more sustainable materials to replace the steel?

Third and finally, infringement on intellectual property has been a threat in the design industry, and in China particularly. HSIEH and his team's idea of applying reinforced steel frame with simplified joints in post-disaster zones has been popularized and plagiarized in East Asia. The market could offer the steel frame at 60 per cent of the price HSIEH and his team proposed, but no one could guarantee the requested strength and stability of applied steel

frame system. How do HSIEH and his team deal with this infringement of intellectual property, and price competition with products of dubious quality?

Author's biography and photograph

CHIU Chen-Yu was born in 1979 in Taipei, Taiwan, an architect, architectural historian and teacher. He received professional training from Chung Yuan Christian University in Taiwan, Columbia University in United States and the University of Melbourne in Australia, and worked in Finland as a post-doctoral researcher at Aalto University. Now, he works as an assistant professor at the Department of Architecture of Bilkent University, Turkey, and the Artistic Director and Marketing Manager of Atelier-3 and for Hsieh Ying-Chun, China.

Hsieh Ying-chun was born 1954 in Taichung County, Taiwan, a Taiwanese architect and contractor. HSIEH has been helping people rebuild their homes since the devastating earthquake in Taiwan 1999, and his reconstruction project for the Thao Tribe gained him international recognition. HSIEH has played a key role in rebuilding communities for Taiwan's tribal communities. In more recent years, HSIEH has continued to help people build their own houses, from the remote villages of China to the sufferers of the South East Asian Tsunami. HSIEH represented Taiwan in the Venice Architecture Biennale 2006 and Venice Biennale of Contemporary Art 2009. The Curry Stone Design Prize 2011 was awarded to HSIEH to champion the designer as a force of social change building more than 3.000 homes with local people in natural disaster zones in East Asia. In 2017, HSIEH and his team are invited to participate in the events of Helsinki Design Week with their 'People's Architecture' pavilion.

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