

# Between Concrete and Earth: Soil-Cement Brick and Its (Failed) Promises

Yu-Han Huang

This essay surveys the soil-cement brick (SCB) technology and its utilization in US-aided workers' housing projects in 1950s Taiwan. Half-concrete half-rammed-earth, SCB was considered an ideal material for constructing modern low-cost housing and was employed in American foreign housing aid programs across Asia. However, SCB's modern nature was not necessarily equally true for every party engaged – be they American advisors, local technicians or the homebuyers themselves. The divergent opinions of these different groups reflect their individual ideas about material and housing modernities. This brief scrutiny of SCB reveals that its political and social roles in a state-driven modernization program are inseparable from its materiality.

**Make Bricks, Own a House**

The term soil-cement brick refers to bricks made of a compressed earth mixture of natural soil and a limited amount of cement. The use of cement as a binder enhances the clay minerals in the natural soil, resulting in a higher coagulation strength of the mixture. Unlike traditional mudbricks, SCBs are produced using ‘human-powered brickmaking machines’, or brickmakers (高壓手工製磚機, in Chinese). The soil-cement mixture is placed in standardized modules and pressurized by the brickmaker, achieving higher compaction density. The moulded compressed mixture is then taken off and dried in the shade. Finished bricks can be utilized for house construction without any further processing, such as firing. The advantages of SCB are evident: theoretically, SCBs can be made of soil from housing excavations and produced on almost any construction site, which minimizes raw material and freight costs. Additionally, the simple technology allows unskilled or DIY workers to make standardized bricks and floor or roof tiles with only a few hours of training. More importantly, for American housing and foreign aid technocrats, the SCB appeared a perfect fit for the “aided self-help housing” program (Harris 1998).

*SCB-making process, stills from film It Can Be Done.*  
Source: ICA 1956.



Since the late 1940s, American housing experts have considered mortgage-driven mass homeownership to be a critical element necessary for capitalism and democracy. Housing aid to allied countries thus became a strand of US Cold War deployment to counter the expansion of the Communist Bloc (Kwak 2015). In order to encourage mass homeownership in ‘underdeveloped’ economies, the aided self-help method redirected government investment towards housing market infrastructures – especially a sustainable housing finance system and construction capabilities – to enhance potential homebuyers’ affordability (Harris 1998). To achieve these goals, American housing technocrats suggested utilizing homebuyers’ “unused leisure time” so they could contribute their labour in house construction and “improve [their] shelter[s] through [their] own efforts.”<sup>1</sup> By doing so, lower-income workers could obtain mortgages more easily and better engage in a mortgage-based housing finance system. The SCB can thus be understood as an infrastructure for aided self-help housing in both material and financial terms: the technology enabled the mass manufacture of standardized building materials in countries that lacked construction industries; meanwhile, considering that brickmaking required a large amount of labour, it allowed more lower-income workers to participate in the program.

<sup>1</sup> “Aided Self-Help Housing Abroad,” National Archive and Records Administration, RG469 UD409 box 118.

Keelung Dockworkers’ Housing (1954) marked the first aided self-help project applying SCB in Taiwan. US Foreign Operations Administration (FOA) officials introduced SCB to the Keelung project, initially using it as a substitute for concrete blocks due to inefficient local cement production. Regarding the Keelung project as a significant success that indicated a solution for the pressing housing crisis across Asia, FOA and the Taiwanese government introduced the aided self-help approach and SCB technology to other low-cost housing projects nationwide. In March 1954, with the guidance of FOA, a joint working group was formed under the Taiwanese Ministry of the Interior (內政部) to supervise the US Aided Salt Workers’ Housing (SWH) projects in Qigu (七股) and Budai (布袋) Saltworks in Taiwan’s southwestern coastal area. However, SCB’s once-overlooked problems of materiality would be exposed in this new program.

### Too Salty to Be Durable

As mentioned above, American advisors believed that SCB technology could provide cheap and standardized materials, enabling the mass manufacture of low-cost modern housing in ‘underdeveloped’ societies. Yet, from the outset, skepticism emerged among salt workers regarding SCB’s promises of reduced costs and good durability. While FOA crews conducted material experiments and concluded that the soil excavated at SWH’s proposed construction sites had an ideal clay–sand ratio for brickmaking, saltwork technicians pointed out that the FOA experiment only analyzed samples from the surface layer and did not reflect the characteristics of the subsoil, which contained more sand and less clay. This uneven soil composition posed challenges in standardizing SCB manufacture as technicians struggled to develop a formula for soil–cement mixtures with an accurate soil–cement–water ratio. Consequently, precise calculation of cement demand and control over the quality of finished bricks proved unexpectedly difficult.<sup>2</sup>

<sup>2</sup> National Archive and Records Administration, RG207 A1 130 box 4.

The salt content in the soil emerged as another significant problem. From the housing project's early stages, homebuyers and local saltwork technicians expressed concerns about the high soil salt content in this coastal area. Fearing that excessive salt in soil-cement mixtures might weaken the finished bricks, homebuyers repeatedly argued for the necessity to increase cement usage in brickmaking. However, grappling with material shortages and budget overrun, project management and engineers sought to regulate cement usage by adjusting the brickmaking formula. Lacking confidence in the SCB, homebuyers in Qigu went on strike at a brickmaking workshop and petitioned the joint working group to replace SCBs with standard red bricks.<sup>3</sup> In Budai, homebuyers also refused to manufacture bricks, citing instances of the surface of some finished SCBs flaking off within weeks. They attributed this problem to excessive salt and sand content in the soil-cement mixture.

<sup>3</sup> 國史館臺灣文獻館, 臺灣鹽業, folder 006-430759.

Consequently, the joint working group was forced to suspend brickmaking at both locations and sought engineering solutions. To convince homebuyers to resume construction, project engineers ultimately agreed to use more cement in the soil-cement mixtures. Additionally, they decided to coat a layer of cement mortar on the finished brick wall surfaces to prevent cracking.<sup>4</sup> The SWH project's first phase was completed in October 1955. SCB would no longer be utilized in subsequent projects, though, due to opposition from local salt workers.

<sup>4</sup> 國史館臺灣文獻館, 臺灣鹽業, folder 006-430927.



**SWH housing at Budai Saltworks.**

Source: 鹽光文教基金會, file no. cca-200119-hp-ph\_a\_238\_030\_001-1

### Not Concrete Enough

If regarding concrete as a modern material is by no means natural (Forty 2012), the modern characteristics of SCB appear even more equivocal. American technocrats depicted SCB as a more economical alternative to industrially produced concrete blocks and a replacement for more traditional materials like red bricks and mudbricks. In other words, the SCB was regarded as a material positioned between concrete and

rammed earth, yet it behaved more like the former. In practical terms, however, the manufacture of SCBs was hardly standardizable, given that natural soil characteristics varied significantly in different locations. Homebuyers acknowledged this unpredictability, and the SBC, along with the houses made from it, failed to “present the possibility of being modern” as well (Larkin 2013: 333).

For SWH homebuyers, it was the cement that provided a major, if not the only, measure to fix SCB’s reliability problems. Yet the increasing use of cement in SCB making and the overall SWH construction highlighted the failure of an aided self-help housing model embedded in low-cost ‘modern’ materials and homebuyers’ own labour contributions. It is not surprising that Taiwanese homebuyers reverted to materials that were more familiar and credible to them. From the second phase of the housing program onward, local homebuyers gained more influence in managing the project, deciding on favoured designs and material purchases. Red bricks remained the primary material in subsequent projects until the early 1960s, when domestic cement production capacity was established in Taiwan.

*Houses from the second phase of the SWH project at Qigu Saltworks.*  
Photo: Yu-Han Huang, 2020.



Scrutiny of SCB prompts a reconsideration of local citizens’ initiatives in state-driven modernization programs. Like concrete, the SCB can be analyzed as an aspect of the US empire’s global expansion in ideological and physical terms (Martinez 2020). If aided self-help housing aimed at reforming the built environment and creating modern

citizens, its promises could be seen, sensed and examined through building materials. The SCB-built houses, although designed to satisfy modern living conditions, were never successful in delivering a “modern world of future positive” to their tenants (Harvey 2017: 90). To some degree, Taiwanese salt workers’ preference for red bricks over SCBs indicates a reversal of the material modernity/non-modernity dichotomy defined by American housing experts and a rebuttal of their promises of housing. In this story, it was the local people deciding which sort of modern they desired.

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**Yu-Han Huang** (he/him/his) is a Ph.D. Candidate in History at the University of Toronto. His ongoing dissertation project focuses on the transitioning urban landscape and housing modernity in Cold War-era Taiwan and South Korea. By focusing on the utilization of concrete and other building materials in housing and public construction projects, Yu-Han attempts to explore how the concretization of the built environment resonated with the region's political, social and cultural transition from the Japanese colonial rule to a postwar order under the influence of the USA.

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