

Xuemei Bai: Critical questions in achieving “zero-material construction”

The Holcim Foundation roundtable provided a unique and stimulating platform that brought together architects, civil engineers, and urban researchers to discuss zero-material construction. For me, one of the take home messages was the need for research in achieving this goal, addressing the following questions:

1. Preamble: Is it a viable proposition?

First of all, we need to clarify what we mean by zero-material construction, why it is important, and who wants it. The viability of such a concept depends on whether we can contextualize the concept, for example, different meanings and approaches in developed versus developing countries, material demands to meet basic human needs versus avoidable use, unintended consequences and externalities of dematerialization, material intensity versus longevity of the structure etc. How to measure dematerialization, in particular in relation to other factors such as the Human Development Index, is an important question to explore.

2. What are the likely scenarios of, and major trends that affect, material demands?

This is a rather straight forward question, to which we don't have a ready answer. Modelling and scenario building exercises, or the compilation of such, are needed to establish base line and alternative material demand trends in different demographic and socioeconomic contexts, human settlement patterns and the management of them, technical choices and innovation scenarios, and how that might contrast with the constraints of resource availability and distribution.

3. What are the potentials of, and limits to, addressing dematerialization within the construction sector?

What is the state of the art knowledge and practice within the construction sector in terms of material demand, including design, building, managing and demolition phases? Where are the critical gaps that require urgent action? What are the front runner technologies and innovative practices? Can they be up- scaled? How much can be achieved if these innovative practices are proliferated and up-scaled? What kind of evaluation system is needed to prevent premature up-scaling and resulting inadequate technologies and practices? What are the most critical aspects that require urgent innovation, both in terms of technology and practice?

4. What are the broader societal opportunities and barriers to a transition towards dematerialization?

The construction sector is not immune from the influence of broader contexts. Research indicates that drivers of, or barriers to, change often exist beyond the immediate sector. It is critical for us to identify a set of broader societal opportunities and barriers that hamper or enable transition, understand what are the most critical bottlenecks and barriers that hamper this transition and what can be done to overcome these barriers. The innovative practices identified within the sector need to be examined within a broader context and from the viewpoint of how we can transition to these more advanced sustainable practices. In relation to this and to point 3 above, I would like to reiterate the importance of conducting a systemic and comprehensive analysis of the Holcim award recipient projects in order to benefit from current technologies and practices.



Zhaozhou Bridge, in Hebei Province, China, built 1400 years ago (image from Wikimedia Commons).