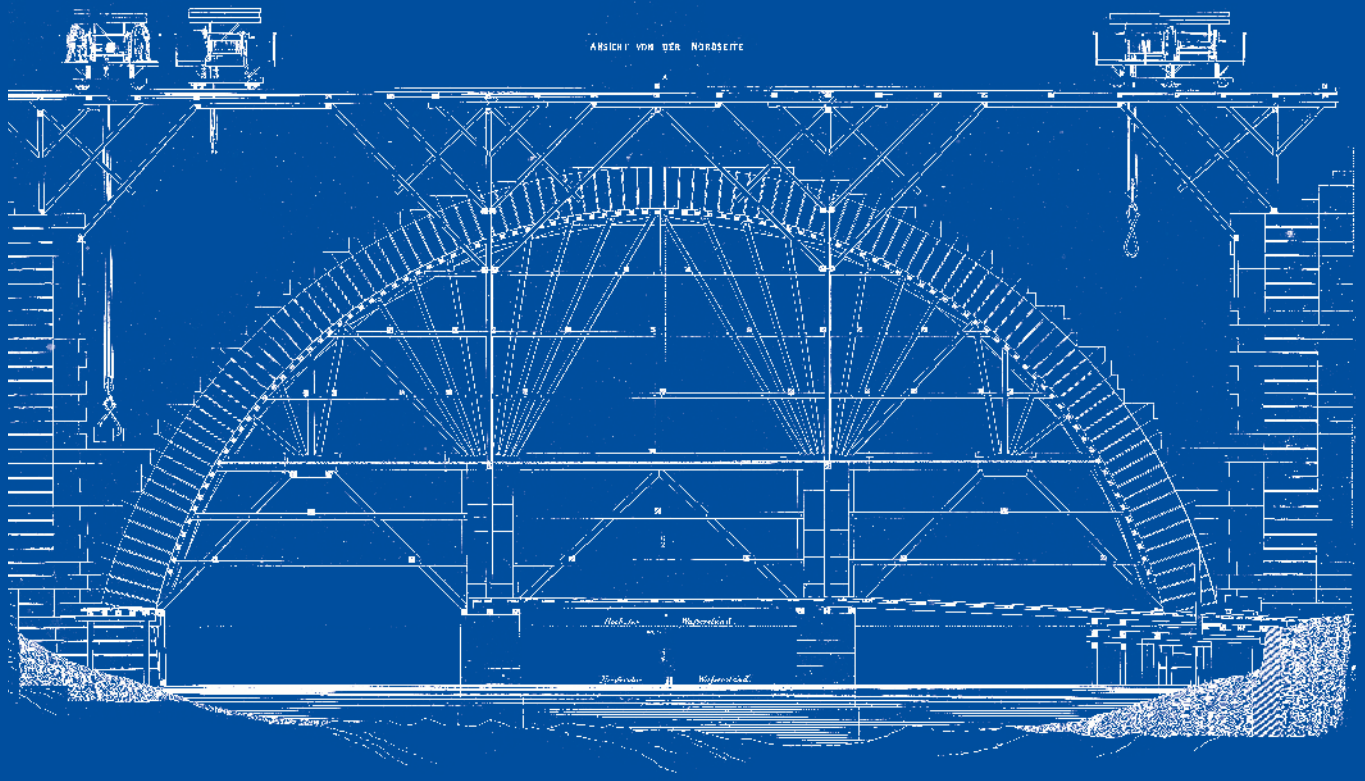
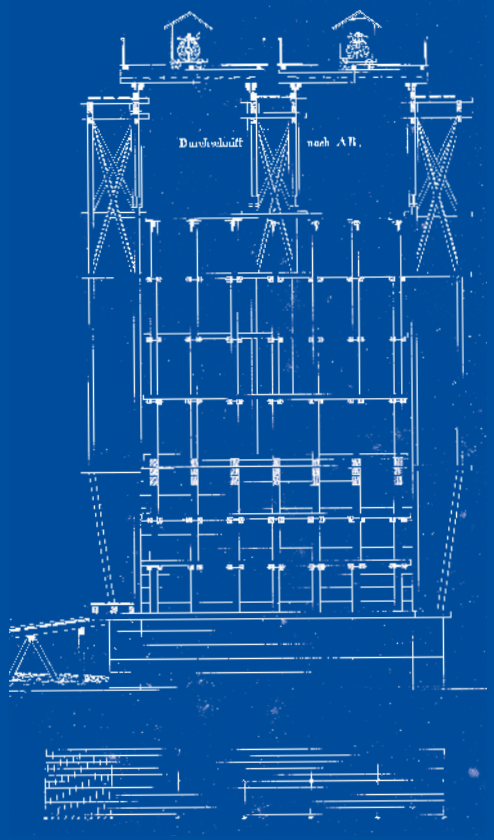
Proceedings of the 8th International Congress on Construction History
Stefan Holzer, Silke Langenberg, Clemens Knobling, Orkun Kasap (Eds.)



Construction Matters



8th International Congress on Construction History – Zurich
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How construction shaped globalization: The nineteenth and twentieth century Eurasian cases

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Abstract: Did construction only play a role as applied science or technical practice following political, economic and institutional powers in the nineteenth and twentieth century globalization, as the enormous body of literature in world history has generated such an image? This paper seeks to advance the field of construction history by re-considering construction as a historical actor in shaping globalization. It is based on an examination of historical and primary sources from engineers and the current scholarship from the construction history and history of science and technology. In this paper, I clarify the neighbor notions of "technology" and "applied science", which have been studied extensively, but also "construction" and "engineering" that are problematic. I then identify two critical gaps that are partly responsible for the said image. One lies between the epistemological understanding of construction and the empirical studies about it. The other derives from the fractures of understanding engineering between engineers and cultural-social historians. I suggest to re-orient construction history to the neglected horizon of human-nature relationship, and develop more interdisciplinary approaches to tackle methodological challenges. In this context the term "Eurasian" gathers two layers of meaning. One refers to the geographical landmass of Asia and Europe. The other implies non-Western approach, including methodological and theoretical efforts that are not limited to the geographical boundaries.

Introduction

The ways how the modern building industry—both knowledge and practice included—developed to its current shapes have been discussed in very different contexts of scholarship. In recent years, world history of the nineteenth and twentieth centuries has had a growing impact on the histories of architecture, science, and technology. Much has been said about circulation of material, agency, idea, and knowledge. While architectural historians are searching for a re-contextualization of architecture from a global perspective, historians of technology have increasingly stressed local context in addressing relationship between local and foreign technology, raising the critical objection that modern technology did not simply diffuse from Europe to other worlds in one-way traffic, and that globalization is not a homogenous process in all aspects of human life. In construction history, there is also growing interest in technological communication and influence across nations, cultures, and geographical territories. These fields of study are shaped—also divided—by their own historiographies. Together they demonstrate tremendous international links between activities of construction and, for instance, trade, military, mining, shipyard, railway, intensive agriculture, immigration, missionary, and popularization of Western methods of production in the last two centuries. The building industry deployed, configured, and reconstituted a broad range of natural and human resources, and engaged complex social-material systems from raw sources to ideas, from skills to sciences, and from equipment to institution.

However, the enormous body of literature has established a general image that construction played a role as applied science or technical practice following political, economic and institutional powers in the nineteenth and twentieth century globalization.

But how did construction shape globalization? In the time period under examination, while science, technology, and industry developed globally, fields of study have also been driven by specialization and disciplinarity in the intellectual sphere. One result is that concepts of science, technology, and engineering, which have been involved deeply in the writings of construction history, are understood not exactly the same between historians of construction and of science and technology. I seek to advance two perspectives regarding the relationship of construction and globalization. One is for developing Construction History as a field and the other is linked to non-Western approaches.

1. A recontextualization across disciplines

According to the history of science and technology, including works by Ronald Kline (1995), Leo Marx (2010), and Eric Schatzberg (2018), "technology" was itself a modern concept constructed in Anglo-American world significantly from ca. 1850. The modern concept of technology, as Francesca Bray and Barbara Hahn (2023, 1) have lately defended with a background in anthropology, agriculture, and global history, "must be understood as the product of a worldwide ferment, polyglot dialogue and heterogenous conceptual traditions, a global assemblage whose local manifestations took shape

concurrently in multiple centers." This synthesis represents a consensus on the complexity of technological globalization in this discipline. Prior research has laid this ground through at least two major and interrelated lines of investigation. One is the relationship between technology, applied science, and science, with a focus on the impact of technology on modern Western sciences. Research in this line often stresses practice and usefulness (Shapin 1984; Waters 2008; Shapin and Schaffer 2011; Hunt 2021; Komel 2023). The other is cultural-societal and industrial condition of science. It has been discussed in a variety of context, with empirical studies on Western sources but also non-Western societies like China, India, and Japan, including connections in between (Bray 2008; Lightman and Zon 2019; Brazelton 2021; Shu 2021; Shu and Coomans 2020; Lightman and Meade 2023).

Historians of science have shed new light on the notion of "applied science": it came from a hybridization of German, French, and British sources built up with growing public-sphere discussion in the second half of the nineteenth century; it is a modern-time historiography rooted in the hierarchy of pure science prioritizing mathematics and physics (Kline 2013; Bud 2012 and 2014; Gooday 2012).

As a result, the previous conceptual boundaries between science and technology have largely been blurred (if not completely removed), no matter what societal context is concerned. It is now a widely shared interest to explore the ways modern practices emerged within a global network of exchange via commerce, engineering, and religion. The (epistemic) cultures of expertise have been analyzed amply via social and material enactments (Knorr-Cetina 1999; Marsden and Smith 2005; Slaton 2020). Research on technology transfer that attends to East Asia has deliberated over local contexts that (re)shaped meanings and forms of foreign—often Western—technologies (Frumer 2018; Kobiljski and Teasley 2022; Tanimoto 2021). Construction-related matters have been studied with a focus on epistemic culture and social construction (Slaton 2001; Clancey 2006 and 2007; Fridlund and La Mela 2019; Bray, Clancey and Mamidipudi 2021)—an approach different from what construction historians usually did.

This scholarship also implies that, in the globalized context, a technological event should not be comprehended simply as a transfer or transformation with pragmatical or esthetic adaptation like some narratives in the literature of construction history show.

How should construction historians then investigate into building activities in a way distinct from the other fields but also engage with the ongoing debates on globalization? The remainder of this paper analyzes two gaps to tackle this methodological challenge.

2. Construction: a critical historiography

The first gap, also a more visible one, lies between the understanding of construction and the empirical studies for construction history. In recent four decades, construction historians have reached a growing agreement regarding epistemological definition of construction. As German scholar Werner Lorenz (2005, 34) has articulated elegantly, "it is the process of construction in its entirety that constitutes construction history. […] construction is the art of making, it is between creativity and routine, between craft and science, between invention, innovation, and tradition." Prior work, including disciplinary reflections by John Summerson (1985), Antoine Picon (2005 and 2010), Santiago Huerta (2009), and Bill Addis and Hermann Schlimme (2016), has led to a growing opinion: construction history should be an open subject of "non-deterministic knowledge process" (Musso 2003, 1516) and "non-hierarchical attitude" (Peters 2003, 1630), rather than within borders of any sort of cognitive structure or epistemological framework; it consists of "culture, technology and society, an inseparable trio" (Carvais et al. 2012, xiii). The relationship between theory and practice—a matter standing at the core of the history of science—have also been recognized by construction historians as intricacies of knowledge and materiality: Construction is much more than a transformation of knowledge into a useful product, and many engineering theories are instead intellectual products of practice. The rationale and ways of processing resources and making tangible/intangible products have often been acknowledged as culture(s) on organizational and intellectual levels (e.g., Davis 2006). Other research, including works by Tom Peters (1996), James Campbell (2003), and Bill Addis (2007), have laid the ground for opening a global perspective of building technology, which is distinct from that of contemporary architectural historians.

Nevertheless, these ends have been achieved through empirical studies mostly of European and Western sources, objects, and cognitive interest.

Second, the construction history has gained its current shape mainly via an internalist approach. Malcolm Dunkeld (1987, 3) once referred it as "direct approach", as compared to the "indirect" one borrowing conceptual framework from other disciplines. Construction historians have consisted most of those who own technical-professional expertise in architecture, engineering, and archaeology, along with others. Driven by curiosity of construction practice and engineering science, they are also concerned by conservation of historic structures and material fabrics. As a result, the explored sources (either written or built) were mostly those produced by skilled personnel working in the building industry, including engineers, architects, builders, craftsmen, and auditors, for example. Works on social perspectives of construction have also focused on relationship between the skilled practitioners. This internalist approach is certainly a strength in the sense that it addresses expert knowledge in the construction sector, and that it can offer insights into this industry that other social-cultural-economical historians often lack. Construction historians have special skills of reading the built evidence, which is also an advantage.

When the modern global network is under consideration, however, there is still a huge area to explore regarding the interaction of different cultures. Historical interplay between construction and other spheres of knowledge, too, is nearly an uncharted territory. Research has yet to be done regarding how construction played roles of communication and exchange for local societies. The internalist approach is probably insufficient for probing into globalized context with the agreed conception of construction that embraces the totality of human experience.

Third, the current shape of construction history shows an inclination of neglecting recent humanity on pressing issues such as environmental sustainability and digital technology. Partly because these themes were not obviously visible in the

primary sources treated by construction historians. Another reason is ascribable to the intrinsic bias of the construction history, in Antoine Picon's (2005, 7) words, "the domain bore the mark of doctrinal and professional concerns". No matter whether or not one agrees that historical writing is a creative process rather than collation of historical information, the long past of construction has shaped not only the built but also natural environment in Asia and Europe at least. Construction has nearly always acted as go-between between technology and environment. It has also utilized digital technology actively. On environmental and digital issues, historians of science and technology have been making discourses since the 1990s (e.g., Cronon 1991; Renn 2022) in a way distinct from construction historians'. There is a high potential for building new dialogues across disciplines.

Above all, the recent historiography of construction is rooted in the writings of engineering history developed after the WWI. The wisdom has come from some prolific engineer authors including Herbert Chatley (1885–1955), Stanley Baines Hamilton (1889–1977), Carl W. Condit (1914–1997), Eugene Shallcross Ferguson (1916–2004), Edoardo Benvenuto (1940–1998), and Henry Petroski (1942–2023), but also the London-based Newcomen Society since 1920, along with others. Strikingly, Italian historian Stefano Musso (2003, 1510) recently defined construction as "a sort of boundary between the world of nature and the artificial world of culture." This appears similar to the 1828 definition of engineering that has been quoted in the British Institute of Civil Engineers until today.

3. Engineering in the primary sources from engineers

The second gap, perhaps surprisingly so, lies in the meanings of engineering as used by civil engineers since 1828 and by social-cultural historians today. From the tremendous amount of European, American, and Chinese sources produced by engineers, it suffices to say that engineering is an enterprise that has continuously enriched North Atlantic knowledge, intertwined with colonialization, scientific discovery, but also the expansion of industrial and economic interest in the period under review. Here the said issue on construction and globalization can be turned into a more fundamental one: what roles did modern engineering play?

3.1. In relation to mechanical science and technology

In the USA of 2019, while addressing "what is engineering", the president of National Academy of Engineering articulated it as "to develop ways to utilize the materials and forces of nature for the benefit of mankind" (Anderson 2019, 4). This definition can be traced back to the 1828 British Royal Charter of the Institute of Civil Engineers (ICE), where the object of engineering was phrased as "for the general advancement of mechanical science, and more particularly for promoting the acquisition of that species of knowledge which constitutes the profession of a civil engineer, being the art of directing the great sources of power in nature for the use and convenience of man." This formulation was favored by the joint effort from engineers Thomas Telford (1757–1834) and Thomas Tredgold (1788–1829). The same spirit was repeatedly stressed in the British Association for the Advancement of Science (BAAS) during the rise of the modern empire of science, including detailed accounts given by civil engineers William Fairbairn (1862), John Hawkshaw (1876), Frederick Bramwell (1889), Jeremiah Head (1894), Douglas Strutt Galton (1895), and the electrical engineer Charles William Siemens (1883), to name a few.

But this essential and continuous understanding of engineering has been diluted in the intellectual sphere during the pursuit of modern Western industrial values and academic specialization in the last two centuries; both engineers and historians have contributed to that. This neglect is also linked to the rise of the said artificial dichotomy between pure and applied sciences from the 1850s.

Primary sources in the English language exhibit a close yet changing relation between meanings of "engineering", "mechanical science", and "technical". In the long nineteenth century, engineers themselves used the terms "engineering" and "technical" much more frequent than "technology". In the first half of the century, a civil engineer was often tightly associated with "mechanical science" which was a fast-growing branch of knowledge at the time. In the 1828 ICE Charter, "mechanical science" included the "species of knowledge which constitutes the profession of a civil engineer". This understanding did not change much when, in 1836, the BAAS started a new section called "Mechanical Science"—rather than engineering—after other six sections, viz. "Mathematical and Physical Science", "Chemistry and Mineralogy", "Geology and Geography", "Zoology and Botany", "Medical Science", and "Statistics" (BAAS 1837). Although mechanical science and civil engineering got institutionalized development separately from the 1820s on, civil and mechanical engineers shared a large number of subjects and professional practice in ship-building, hydraulic construction, railway, iron work, and industrial and urban infrastructure, to name a few; it was not rare that an individual engineer played both roles.

Towards the end of the nineteenth century, meaning of mechanical science gradually narrowed down and became increasingly associated to industrial practice and application. Nevertheless, it was always a consensus that civil and mechanical engineering relied on a variety of knowledge; it was a process integrating advanced sciences (theories included) and practice. In 1893, Jeremiah Head, member of the ICE and President of the BAAS Section of Mechanical Science, clearly pointed out that, "for we civil engineers […] in active practice need far more knowledge than mechanical science can teach us in the ordinary or narrow sense of the term. Our art in its multifarious branches requires, if success is to be attained, the acquisition and application of almost all the other sciences which belong to the fields of research"; Head even envisaged integration between biology and engineering (Head 1894, 860-861).

The use of "technology" slowly increased thanks to the academicization of engineering sciences. Deriving from the older umbrella of Mechanical Science, newer disciplines such as Naval Architecture, Electrical Engineering, and Aeronautical Engineering were established in academic context in different stages down to the 1910s. It is in this process of academicization that engineers started using the term "technology" after 1861, in all likelihood beginning with MIT. The term became more popular after 1915, as one can see from a thorough examination of the BAAS reports. In the meantime, albeit the disciplinary institutionalization

in academia, frequent exchange and interaction happened between these older or newer disciplines and related professional societies on both personal and institutional levels; this involved the Franklin Institute of Philadelphia (1824), the Institution of Mechanical Engineers (1847), the Boston Society of Civil Engineers (1848), the American Society of Civil Engineers (1852), the Institution of Electrical Engineers (1871), and the American Institute of Electrical Engineers (1884), but also their counterparts beyond the Western worlds—there has yet to be more systematical research on this.

Engineering was, nevertheless, a "vague general term", as put by the civil and electronical engineer Alexander Kennedy (1894, 174), and "surely one of the hardest words in the dictionary to define" as by the mechanical engineer Arthur Titley (1920, 66). Into the 1920s and 1930s, "engineering" and "technology" sometimes became synonyms. The "Newcomen Society for the study of the History of Engineering and Technology" was established in 1920 by engineers who had a historical interest. The first presidential address interpreted engineering as "the advancement of craft and science" with pages of elaboration on the relationship between handicrafts and engineering (Titley 1920, 65 and 72–74). Three years later, the second president laid stress on "The Value of Technological History" (Loughnan 1923; Marvin 1924). There was a clear progressivism in the engineers' writings from this period, but also a strong sense of loss and duty about the engineering works and knowledge that became past, old, and forgotten—the latter has also become a foundation stone in the current historiography of construction.

Interestingly, George Sarton (1884–1956), now being considered the founder of the discipline of history of science, sticked "engineering" to arts and crafts but also mechanics and technology in different context (Sarton 1927; Sarton 1931); he also considered technology as a branch of science, just like mathematics, astronomy, geography, and medicine (Sarton 1927, 17). After WWII, engineer authors positioned building and civil engineering as branches of technology increasingly (e.g., Hamilton 1945; Condit 1960). This position has dominated the historicization of engineering and construction till today.

3.2. Garnering new meaning of engineering in China

In China, late imperial Chinese elite's understanding of engineering (*gongcheng* 工程) also referred to nature-human relationship. This is shown clearly in the abundant Chinese records and engineering regulations found in files authorized by the court, in local gazetteers and in technical accounts since the fifteenth century by the latest. In late imperial context, Chinese practiced engineering primarily for maintaining the political empire on either local or central levels, that is, to cope with the unavoidable natural process of material decay and deterioration, disasters like flood and fire, and artificial damage, wear and tear.

This tradition overlapped with the period after the 1860s when a new international network among European, American, and Chinese engineers gradually formed, albeit competition between nations. It was well recognized that "China presents probably the greatest field for engineering enterprise for the future" (ICE 1932). Local and foreign methods of engineering were nearly always hybridized in practice. On paper the aforesaid 1828 British definition was fully quoted by the Shanghai Association of ICE, 1931–1949 (H. Stringer 1931; ICE 1931), whose network extended across diverse regions of China and other locations of Asia, with an approximate number of Corporate Members close to 9000 (ICE 1932). Moreover, European engineers stressed "the general advancement of the science and practice of Engineering" (SSEA 1902), whilst the American and Chinese societies of engineers placed accents on professional standards, international cooperation, and industrial progress as their primary object of practice (ACAE 1920; CES 1925). But none of them singled out innovation or invention as a major aim. The Chinese nature-human relationship evolved in this context.

European engineers in China, on the other hand, garnered a new understanding of engineering distinct from their counterparts in the West. Because their technical experience outside Europe turned out to be also a cultural and philosophical one.

For instance, the Engineering Society of China (ESC)—a Shanghai-based professional body consisting of engineers mainly of European origin—continuously discussed its object in general and the responsibility in China in particular since 1901. In the 1930s, engineers of ESC reached an agreement that engineering was not only about economic, industrial, scientific, and technical advancement but also social, intellectual, and cultural values of the Chinese society. This was elucidated by different presidents of ESC, including civil engineers Prof. John A. Ely (1935a, 1935b, 1937), Dr. Herbert Chatley (1935), and electrical engineer James Haynes Wilson (1939). Ely (1935b, ix) even criticized the then history of science and of engineering and the industrial production, which both "had a similar lack of balance between the claims of the physical and the social values"; he pointed out the need for "Philosopher Engineers" rather than technicians. Ely (1935a) also suggested cooperation between Engineering, Sociology, Economics, and Finance. As he concluded in the ESC annual meeting in October 1935:

"The responsibility rests upon the engineers of the world to set up an organization, all-inclusive and all-powerful, which can use its power to insist that these great forces of nature be utilized and directed to the advance of civilization in every line." (Ely 1937) These values and meanings of engineering surpassed the 1828 definition in a new horizon.

Most interestingly, Wilson (1939, 2) further criticized the then popular usage of "science" that had been "associated only with the laboratory" and had turned away from "other branches of accurate knowledge." He re-defined science as "firstly, a vast collection of facts expressed in exact and unambiguous language […] and, secondly, a collection of rules or laws which express the connection between these facts."

4. Engineering in the present patterns of history

There are three biases that define how engineering activities (construction included) are woven into the current patterns of history. First, in the history of science and technology, the current use of "engineering" clearly and largely conforms with an anachronistic, chiefly North Atlantic perspective. The term "engineering" has mostly been used as a synonym for technology, and engineering history has been predominantly

associated with Western industrial modernity and innovation of technology, notwithstanding the recent advances that have nuanced the innovation-focused discourses and the pursuit of decolonization by addressing technology in the Global South. Still, the stereotypes of standardization, scientification, and efficiency-seeking have dominated the discourses on the production and evolution of engineering knowledge in the modern period under discussion. In writing engineering histories beyond Western worlds, only focusing on these characteristics would unavoidably end in incremental, colonial-imperial histories of European and North American science, expanding to the rest of the world.

Second, the extant literature on engineering history and environmental history exhibits separate agendas: one resides in the context of industrial production while the other starts from ecological concerns. This disciplinary divide has partly resulted from the biased understanding of engineering accumulated in the historical writings after the WWII. Another reason can be located in the insufficient study of the interdependence between the evolution of intellectual spheres and the transformation of physical environment—such as infrastructure, city, and geography. In recent years, the spatial-geographical approach to science (the spatial turn) has laid grounds for addressing connection between space and knowledge making, though this approach has yet to give more attention to globalized context and interrelation.

The third bias lies, maybe surprisingly so, in the globalized approach. The extant literature of global history has dealt primarily with mobility of people and things in the sense of a vastly larger scale in general, and the scholarship around science and engineering has placed emphasis on expansion of professional practice and expert networks in particular.

This kind of pattern of global history has at least two problematic results. First, it directs attention dominantly to actors and institutions that promoted geographical mobility, including the knowledge and practice bound to them. Those who were not sufficiently mobile or international have been left in the shadow of the scholarship on modern globalization. A result is that empirical studies often trace the global connections by water more than by land. In regard to China, for example, hinterland areas of the country have largely been forgotten while the space around treaty ports, which were new urban areas, has monopolized the attention of historians. The second result is that it has added to the impression that the modern Western construction technology is an autonomous achievement, and the mobility of building technology is a one-way traffic from the West to other parts of the world.

5. Notes on non-Western approaches

Non-Western scholarship beyond the field of construction history has cast new light for the field. Here "non-Western" is used to indicate alternatives to the aforesaid mainstream approaches stemming from North Atlantic perspectives. It refers to empirical and theoretical studies anchored in other geographical and cultural conditions such as Asia and Global South, but also including minor and indigenous communities in Western Europe and North America. "Eurasian" is placed under this understanding of non-Western approach, not limited to the geographical sense of Eurasia.

On the circulation of knowledge, recent scholarship has established a more nuanced and balanced trajectory of colonial and post-colonial encounters between the East and West (Lightman, McOuat and Stewart 2013; Diogo and van Laak 2019). For example, the research by the historian of science Fa-Ti Fan (2004) has offered an insight into how British naturalists were changed by their fieldwork and research into China's natural history between c. 1750 and 1911. This work articulates the interplay of political-geographical conditions in China, including the route from the "port" to the "land" areas and the urban environment of Canton. In this way it evaluates them as integral parts in forming the British "informal empire" of scientific information. This scholarship is of special inspiration to us for rediscovering how built environment in one geographical location shaped other spheres of knowledge, activities, and perceptions beyond that geographical condition.

In decolonizing the history of science and technology in Asia, scholars working on China have amply shown that the twentieth-century Chinese science cannot be interpreted only according to Western epistemological patterns. This end has been achieved by way of addressing significant—and obvious—indigenous factors that determined how science developed in that country (Schmalzer 2016; Lei 2014; Nappi 2009). In the history of medicine, for instance, the phenomena of "barefoot doctor" (Fang 2012) and "animal blood therapies" (Chee 2018) are bound to the Chinese countryside from the second half of the twentieth century. What has not been told is that the said medical histories were also conditioned by the state of transportation, engineering infrastructure, and built environment resulting from the pre-1949 period in a globalized and colonial context. And this uncharted approach requires interdisciplinary efforts.

Another research potential lies in overcoming the artificial bifurcation between pre-modern and modern eras in historicization. For instance, the historian of Chinese science Dagmar Schäfer (2018) has offered a longue durée account of the political roles Chinese bridge engineers played within Chinese society in terms of science-state relationship from the pre-modern to the modern age, placing stress on continuity. This effort can certainly resonate with construction historians who studying modern China, as tremendous examples from the field have demonstrated both continuity and change even in technical details. In this regard, the ostensible tension between internalist and externalist positions is also resolvable.

These non-Western approaches remind us to re-question the roles construction activities have effectively played in the modern globalization processes and in the rise of modern Western science. Construction can be a key to explain the complex interplay of nature, culture, and material processes in different scales of social and ecological systems.

Conclusion

With the observations above, I argue that construction is not courses of technical-material action exclusively following political, economic, industrial, and institutional powers in the established modern histories of globalization. Instead, it should be considered as a historical actor in shaping globalization. Construction is both process and practice shuttling back and forth between intellectual spheres and physical environments. It is both incentive and result in the complex interplay. Construction is an enterprise connecting

knowledge and material with its own rationale and epistemic culture. At the core of construction stands the relationship of nature and humanity, including the environment it builds.

The "how" issue, as in the title, points to the gateways, paths, and mechanisms that are less visible in the sources construction historians have used. It can be broken down into more questions in a critical manner. For instance, how did construction intensify or impede exchange of knowledge, (re)configure materialization, and engender new technical or societal problems in a global-local context? Was the modern globalizing process only linked to mobility of ideas, materials, techniques, and knowledge? Did construction reshape local social-cultural-political fabrics, or vice versa? Did it create unexpected consequences outside the building industry? How was local construction—especially in rural-remote areas distant from the modern maritime network—involved in the globalized age? These can help to narrow the gaps and factures analyzed above.

On the issue of globalization, construction historians have the strength and opportunity to write new histories through trans- and inter-disciplinary dialogues. As this pilot study of engineering shows, cultural-social-material context changed the European engineers' view of their own profession. This result indicates a variety of epistemology in engineering (inc. construction) in a globalized context, which has yet to be (re) contextualized in depth and in a way surpassing the biased patterns of history. These facets of modern-time engineering deserves more attention from historians:

- epistemic cultures of engineering
- relationship between engineering and environment
- uncharted (often indirect) connection with engineering in a globalized context
- relationship between engineering and economic, social, and intellectual histories

The following papers in this session show two approaches in addressing globalization. One stresses local adaptation and meaning-making. The analyzed cases include the European reinforced concrete technology used for Catholic churches in varied locations of China and the Japanese timber-masonry joint structure of French origin in the industrial and seismic dynamics of Japan. Both studies exhibit Western missionary engagement in the East in a way distinct from the mission history. The second approach emphasizes interaction between global circulation and local reconstitution. The cases illustrate, respectively, how international communication of advanced concrete technology helped reform the research infrastructure and scientific community of USSR, and how the globalized timber supply created a new social-cultural fabric of the mill workers of different Asian and European origins in British Columbia, Canada.

Acknowledgements

Special thanks go to architectural historian Krista De Jonge and historian of science Bernard Lightman for commenting on an earlier version of my writing about engineering.

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