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Technology, Craft Culture and Sustainability: The Case of Pre-modern Chinese Architecture

Mengbi Li
Victoria University

Abstract

Although the term of 'sustainable development' was coined in the late twentieth century, this essay suggests that its concept has long appeared in pre-modern ethics of construction, and propagated through the traditional craft culture. The term 可持续发展 (sustainable development) is an imported word that came into use at the end of the twentieth century. This investigation shows that as early as pre-Qin dynasty (before 221 BCE) the idea of sustainability in architecture has been propagated in diverse forms and formed specific craft culture. The craft culture was not only referred to as conventions followed by craftsmen, but was also argued to be a benchmark of measuring the ruling class's taste and morality. Insightful discussions on technology and architecture have been expanded from the code of craftsmen to the way of governing a nation. Many authors, including literati, thinkers, philosophers, officials, politicians and craftsmen, have contributed to these discussions as well as the formation of this specific craft culture.

This essay traces this large body of historical literature and related praxis, and analyses the thoughts behind them. The representative historical literature includes Yijing, Huainanzi, Benjing xun, Shang shu, Chao Ye Qian Zai, Mozi, and The Tang Code. Based on the investigation and analysis, this essay suggests that technology means more to architecture and sustainability than the mere skills of dealing with structures and fabrication. A deeper understanding of technology and craft culture allows us to know what we should do beyond what we can do.

Introduction

The term of 'sustainable development' was coined in the late twentieth century. The Brundtland Commission proposed the important report, *United Nations World Commission on Environment and development: Our Common Future* in 1987.¹ After the proposal, the term 可持续发展 (sustainable development) was introduced into China and started to appear in modern Chinese as an imported word. Although sustainability is a

new concept which becomes a popular topic in recent decades, this essay suggests that a scholar discussion may have been long existing, especially in the domain of technology and architecture. For example, in pre-modern China, the discussion can be traced to as early as pre-Qin dynasty (before 221 BCE). Based on a large body of historical literature and related practices, this essay suggests that there were similar concerns, discussions and even corresponding policies that have appeared in the history of technology and architecture. This strand of thought can be synthesized into three aspects of discussions.

First is a deep concern for the adverse result of technological development. Scholars and practitioners reminded people that the developed technology may lead to an increasing consumption of materials and resources. These concerns have appeared in an early period around the pre-Qin dynasty and resulted in a propagation for the careful use of materials. Second, around the Han to Tang dynasties, whether advanced technology can really bring a better life was questioned. Ironic allegories were composed and popularly cited in various literature. Finally, these ideas embodied as philosophical evaluation of a series of abstract subjects, for example, the ethics laying in craft culture, the value of a craft works, how to weigh the importance of different industries and a moral pursuit of architecture.

These historical discussions may present certain limitation due to the remote time range, but this does not prevent them from serving as a mirror to highlight the crucial issues that are still worthwhile to be conceived today.

Thrift and aesthetics

Novelty, especially when it was based on individual caprice, was thought extravagant and even immoral in pre-modern Chinese craft culture. Wasting time, money or energy on useless decoration or arbitrary crafts was an immoral behaviour. Focusing on practical value and avoiding being distracted by the pursuit of novelty or technical advancement were regarded as a great virtue for a craftsman. As early as the pre-Qin dynasty, thrift was recognised as a general moral asset. This expectation of good character was not restricted to craftsmen and plebeians, but it was also applied to rulers and indeed the emperor.

Various means were applied to propagate the notion that spending energy and time on creating tempting novelties was wasteful, because they were regarded as frivolous indulgences for residents and craftsmen. This idea was first conceived by intellectuals then propagated among the working classes through legends and folklore. Soon after,

corresponding laws and standards were enacted. As early as the Spring and Autumn period, the influential politician and philosopher Guan Zi was developing this idea. He noted that no matter how skilful a craftsman might be, he should not be addicted to fancy styles, because fancy buildings or craftwork would spoil the population and introduce an extravagant lifestyle. Therefore, a moral craftsman would not produce novel and attractive works that were impractical.² Guan Zi showed particular concerns over the pernicious influence being exerted by attractive novelty. He proposed that people using novel crafts or buildings to captivate the emperor should be punished and even exiled or executed.³

Accordingly, craftsmen preferred to put more effort into the quality of their works and adhering to tradition, than into pursuing originality. *Kaogongdian* 考工典 (Book of diverse crafts) is one of the most comprehensive series of books on Chinese traditional design theories and coding. It clarified the principle that materials should be efficiently used, that craftsmen should be cautious in applying appropriate standards and avoid overindulgence.⁴ Showpieces and impractical works were discouraged. Instead, craftsmen were required to check carefully the order and quality of their work. The code warned craftsmen that they must not waste materials and indulge in individualism.⁵ Since the Spring and Autumn period (770—476 BCE), there had been a decree that craftsmen should carve their names on their works.⁶ This rule was termed *wule gongming* 物勒工名 (works should be with the craftsman's name). In the laws of the Tang dynasty (618—906 CE), it was clearly ruled that carving names of craftsmen on their works was compulsory, to show their contribution. For works of improper or bad quality, the craftsman would be regarded as an offender and punished under law.⁷

Advanced technology, novelty and good life

The relation of a good life to the advanced technology, and to the material novelty was questioned. A series of ironic allegories about the great craftsmen appeared among literature. These stories were varied, but they shared a common motif that material innovation and advanced techniques could be risky and deluded. Craftsmen could immerse themselves in pursuing novelty, but they ran the risk of incurring an unfortunate fate. For example, *Chao Ye Qian Zai* 朝野僉載, a collection of stories of the Sui and Tang dynasties (581—906 CE), tells how a famous craftsman made a magic timber eagle. This creation was very ingenious, because the eagle could take off once it was knocked three times. This craftsman rode the timber eagle to the place where he wanted to go. He used

it as a vehicle to visit his wife, as he worked far from home, and his wife finally fell pregnant.

Inventions may not always bring happiness. The craftsman paid the cost for his novel object—the magic timber eagle. The craftsman's parents lived with his wife at home but did not know of their son's regular visits, so they felt concerned with the pregnancy and asked his wife. In order to clarify, the wife told the father about the craftsman's magic wooden eagle. The curious father found the eagle and sat on it. The father knocked the eagle more than ten times, so the eagle carried the father far away to the territory of another state, Wu. People of Wu took the father landing from the sky for a devil, so they beat the craftsman's father to death.⁸

Another legend was recorded by Wang Chong (27—ca. 100 CE)⁹ in his book, *Luheng* 论衡 (literal meaning: discourses in the balance). It tells how a skilful craftsman made a carriage that could be automatically driven by a puppet. The craftsman sent the carriage to his mother as a present, but unfortunately, the carriage was driven away by the puppet with the mother in it. As the carriage had never returned, his mother was never seen again.¹⁰ In the classical book, *Mo Zi*, a talk between Mo Zi and the famous craftsman, Gongshu Ban, ran along the same lines. Gongshu Ban made a wooden magpie which could fly for three days without landing, and Gongshu Ban was proud of his magic. Mo Zi argued that such works lacked practical value and should not be celebrated. Instead Mo Zi was more willing to praise the carpenter who could use the same amount of timber to make a good quality wheel so that it could be used to transport heavy goods.¹¹

Value judgement

The aforementioned trend of ideas and aesthetic philosophy was reflected as the value judgement of specific subjects. For example, novel technology was not always admired, yet a cautious examination was required. An idiom was used to describe the craft works that are seductive but not of benefit to one's morality. The idiom is *qiji yinqiao* 奇技淫巧 (diabolic tricks and wicked crafts). In *Shangshu: taishi* 尚书·泰誓下 (Book of Documents: Great Speech (part 3)), the emperor of the Shang dynasty (ca. 1600—1050 BCE) was criticised for being a fatuous ruler. The book emphasises how the emperor enjoyed using craft novel works to please beautiful ladies.¹² This behaviour was regarded as symptomatic of an extravagant life. Kong Yingda (574—648 CE) annotated the meaning of each word. *qiji* 奇技 means strange skills or techniques, and *yinqiao* 淫巧 means pursuing difference and novelty.¹³

In the Qing dynasty (1644—1912 CE), this term *qiji yinqiao* was associated with patriotism and was utilised as a political tool. When products from overseas were imported into China, the conservative wing of the government thought that the attractive but exotic commodities from abroad would affect Chinese ideology and ruin the Chinese economy, thus they tagged these goods as objects of *qiji yinqiao*. Guan Tong 管同 (1780–1831 CE) reminded people of the potential harm of these commodities, writing in his *Jinyong yanghuo yi* 禁用洋货议 (A Proposal of Banning Imported Commodities) that in the old times when sagacious emperors were on the throne, there were strict rules upon crafts. Craftsmen who tried to pursue *qiji yinqiao* could be severely punished.¹⁴ Guan Tong cited history, and said that the term was used to incite in people a passion to fight against the novel and attractive goods imported from abroad.

To avoid pursuing material novelty was not only regarded as a virtue for craftsmen, but also was generally applied in all walks of life, even including by the emperor. *Shangshu* suggests that if the emperor was able to value practical objects rather than novel works, the country would save considerable amounts of money so the people could live a better life.¹⁵ If one indulged in material pleasure, such as ordering the construction of luxury buildings, one's ambitions would be frustrated. Similarly, if one deceived people, one's morality would be in jeopardy.¹⁶ Guan Zi 管子 (719–645 BCE) also pointed out that, even though there were enough skilful craftsmen, people still felt there was a lack of accommodation. This was because the rulers did not set a good role model and indulged in funding new and luxury construction projects. Rulers, especially emperors, should avoid indulging in novelties.¹⁷ Sensual pleasures could be alluring, but if rulers managed the treasury of a country in their own self-interest, people would suffer and the country would be in trouble.¹⁸ Mo Zi also stated that expanding territories and gaining more wealth was only one way of improving the economy, he encouraged kings also to be thrifty. Mo Zi praised thrift as a great virtue, saying architecture should guarantee basic needs and morality rather than pursue novelty.¹⁹

Along with the idea of renouncing luxury and impractical novelty in architecture, the profound realisation and moral pursuit conveyed by architecture were highly admired. The material and nonmaterial components of craftwork were distinguished by using different words. The physical and tangible part was called *qi* 器 (tools or objects) and the philosophical and intangible part attached to the objects was called *dao* 道. These two terms come from *Xici* 系辞 commentary of the *Yijing* 易经 (Classic of Changes or Book of

Changes). The definitions appeared in the book and their relationship was explained. *Dao* fits the Western interpretation of 'metaphysics'. *Yijing* defines that *dao* is on a higher plane than the real world. 'Dao is above, an abstract world and ultimate reality'.²⁰ '形而上者谓之道，形而下者谓之器'²¹ (*Qi*, tools or material objects, refers to the concrete things of this world. *Qi* is below). In later books, such as *Er Cheng quanshu* 二程全书 (The Book of Cheng Hao 程颢 and Cheng Yi 程颐) and *Shengshi weiyang* 盛世危言 (Fragile Prosperity), the relationship between *qi* and *dao* was further explained. '道为本，器为末'²² (*Dao* was regarded as the essence, while *qi* was treated as the arms and legs). Similarly, the meanings, philosophy and morality conveyed by architecture were more admired than its physical form.

In pre-modern China, industries were classified according to their consumption of resources. Agriculture was regarded as the essence of the country, while other industries relating to crafts such as architecture were treated as *moye* 末业 (the lowest hierarchy of trade). Within architecture, building public infrastructure, especially defence facilities such as city walls and moats, was prioritised, but residential buildings, especially palaces, were morally regarded as least important. Mo Zi proposed that rulers should pay most attention to agriculture and treat it as the primary industry. He believed that construction projects were major devourers of the national treasury and therefore in need of stringent control.²³ Other influential thinkers and politicians who held the same opinion include Han Feizi 韩非子 and Shang Yang 商鞅. They proposed policies to boost agriculture and restrain other industries such as construction.²⁴ Han Feizi established a solid theoretical foundation for the principle of '重本抑末论' (a theory of boosting the primary industry and restraining the minor ones). Shang Yang applied the idea to the development of the State of Qin.²⁵ This state later gained power and finally unified China, making way for the Qin dynasty (221—206 BCE). After gaining tremendous traction in practice, the idea gradually became a deep-rooted ideology in pre-modern China and was passed on to later dynasties.²⁶

This strand of ideas was also embodied as the rejection of luxury. The idea can be found in various sources, from textbooks to allegories. For example, *Zengguang xianwen* 增广贤文 (Enlarged Writings of Worthies: A Collection of Chinese Proverbs) was an education book for children. In the book, among a list of precepts, it provided the standard for assessing architecture '勿营华屋，勿作营巧'²⁷ (do not build luxury buildings and do not create useless decoration). Similarly, *Huainanzi: benjing xun* 淮南子：本经训 (literal

meaning: fundamental norm in the writings of the masters south of the *Huai*) displays an ideal image of the residential environment. It tells how in olden times respectable, saintly ancestors could, in a delicate but thrifty way, pursue morality and fulfil their basic needs.²⁸ Without luxury ornamentation or decoration, being sheltered in a moral way was very simple. A good house should never be overbuilt. Harmful moisture from the land, rainfall and haze from the sky should be kept out of the room, and all four sides should protect the interior from strong winds. This should be sufficient. There was no need for decoration or any change to the landform for the building. The woodwork and other elements used for construction should neither be elaborately processed nor over decorated. The hall did not need to be large, just sufficient for conducting rituals and holding liturgies. The rooms should be sufficiently quiet and clean for sacrifices to the high gods and for ceremonies devoted to the spirits and deities.²⁹ The book further warns against extravagant accessories, which spoil people and ruin their spirits:

声色五味，远国珍怪，瑰异奇珍，足以变心易志，摇荡精神，感动血气者，不可胜计也。³⁰ Now, sounds, colours, and the five flavours, precious and strange things from distant courtiers, things that are extraordinary, different, and surprising are enough to cause alterations and changes in the heart and will, agitate and unsettle one's essence and spirit, and stir up the blood and the *qi* so that it becomes impossible to keep control of them.³¹

Scholarly discourses are explored by this paper through reviewing Chinese historical literature. These discourses accentuated thrift, morality, value judgement and aesthetics. It is noted that the quest of sustainability does not imply conservative or anti-progressive attitudes. Instead, it takes a more prudent attitude towards upgrade and novelty. Conservatively opposing innovation rejects attempts and suppressing changes, but sustainability requires more cautious and responsible actions and calls for foresighted consciousness. The outset of the later is not from the fear of change, but is motivated by a core value of thrift and critical rethink of aesthetics. It was a moral choice towards architecture instead of a political stance of conservation. Such moral value is not exclusive to pre-modern China. It also has profound contexts in other cultures. For example, Thomas Aquinas' thoughts convey his advocacy of prudent practice.³² This shared value has certain historical foundation that allows it to extend to today's societies. It is compatible with our quest for sustainability and low-carbon living.

Architectural technology is not only about materials, construction process or techniques, but it is also about the humanistic ideas embedded in it. Aesthetic orientations largely influence the direction of technological development. An aesthetic orientation that admires thrift may not directly contribute to the development of energy saving technology, but it would not stimulate excessive construction. A rethink of whether more advanced technology can really bring us a better life is meaningful. There is no lack of such discussion in the history of architecture and probably there would never be a generally agreed answer, but the existing of the question per se is necessary. The critical review that it leads to is important for a more responsible development of technology. Although these historical thoughts together with the arguments that support them may not be accepted for this and that in our modern society, but their potential positive potency should not be hidden on our way of pursuing low carbon living and sustainability.

Endnotes

- ¹ The definition of “sustainable development” is “Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” WCED, U. N., “Our Common Future,” World Commission on Environment and Development Oxford University Press (1987).
- ² “古之良工，不劳其智以为玩好。是故无用之物，守法者不失” from Guan Zi 管子, *Wufu 五辅*, Guan Zi 管子 10 (475–221 BCE).
- ³ “若民有淫行邪性，树为淫词，作为淫巧，以上焰君上而下惑百姓，移国动众，以害民务者，其刑死、流” from *ibid*.
- ⁴ “物致用，必谨其度” from *Konggong Zongbu: Huikao 考工总部·汇考* Vol.4 from He, Qingxian 何庆先, *Zhongguo lidai kaogongdian 中国历代考工典 [Paradigm for craftsmen of past dynasties in China]* (Nanjing: Jiangsu guji chubanshe, 2003).
- ⁵ “毋耗于材” and “毋纵己私” from *ibid*.
- ⁶ “物勒工名，以考其诚” literally means craftsmen should carve their names on their works in order to claim their credit. *Yueling 月令 [Proceedings of government in the different months]*, Li ji 礼记 [The book of rites].
- ⁷ “物勒工名，以考其诚，功有不当，必行其罪” *Tanglv yishu 唐律疏议 [Tang code]*.
- ⁸ “鲁般者，肃州炖煌人，莫详年代，巧侔造化。于凉州造浮图，作木鸢，每击楔三下，乘之以归。无何，其妻有妊，父母诘之，妻具说其故。父后伺得鸢，击楔十余下，遂至吴会。吴人以为妖，遂杀之。般又为木鸢乘之，遂获父尸。怨吴人杀其父，于肃州城南作一木仙人，举手指东南，吴地大旱三年。卜曰：般所为也！赀物具千数谢之。般为断一手，其日吴中大雨。国初，土人尚祈祷其木仙。六国时，公输般亦为木鸢以窥宋城” from Zhang, Wu 张鹭, *Chao ye qian zai 朝野僉载* (Beijing: Zhonghua shuju, 1997 (first written between 618–906 CE)), 153.
- ⁹ Wang Chong was a materialism philosopher in the East Han dynasty.
- ¹⁰ “言巧工为母作木车马，木人御者，机关备具，载母其上，一驱不返，遂失其母” Wang, Chong 王充, *Ruzeng 儒增, Lunheng 论衡 [Discourse Balanced]* 8 (ca. 86 CE). Also see the record of the original text and translation into modern Chinese from Wang, Chong 王充, *Beijing daxue lishixi Lunheng zhuyi xiaozu zhushi 北京大学历史系论衡注释小组注释 [Annotation by the Luheng Annotation Team, Department of History, Peking University]* (Beijing: Zhonghua shuju, 1979), 466.
- ¹¹ “公输子削竹木以为鸢，成而飞之，三日不下。公输子以为至巧”；“子之为鸢也，不若匠之为车辖，须臾刘三寸之木而任五十石之重” from Mo Zi 墨子, *Lu wen 鲁问 [Questions posed about Lu State]*, Mo Zi 墨子 49.
- ¹² “作奇技淫巧，以悦妇人” *Taishi (xia) 泰誓(下) [Great speech (part 3)]*.
- ¹³ “孔颖达 疏：‘奇技谓奇异技能，淫巧谓过度工巧。二者 大同，但技据人身，巧指器物为异耳’ Kong, Yingda 孔颖达, *Kong Yingda Shu 孔颖达疏 [Annotation by Kong Yingda]*.
- ¹⁴ “昔者，圣王之世，服饰有定制，而作奇技淫巧者有诛” from Guan, Tong 管同, *Jinyong yanghuo yi 禁用洋货议 [A proposal to ban imported commodities]* 26 (1780—1831).
- ¹⁵ “不贵异物贱用物了民乃足” from Lvao 旅葵 *[The house of Lv]*.
- ¹⁶ “玩人丧德，玩物丧志” from *ibid*.
- ¹⁷ “今工以巧矣，而民不足于备用者，其悦在玩好” from Guan Zi 管子, *Wufu 五辅*.
- ¹⁸ “淫声谄耳，淫观谄目，耳目之所好谄心，心之所好伤民，民伤而身不危者，未之尝闻也” *ibid*.
- ¹⁹ “其为宫室何以为？冬以圉风寒，基以圉羞雨。凡为宫室加固者，鲜祖不加者去之” quoted from *Jieryong 节俭 [Thrift]* in Mo Zi 墨子, *Mo Zi 墨子*. Also see Schwartz’s interpretation from Schwartz, Benjamin Isadore, *The World of Thought in Ancient China* (Harvard University Press, 2009), 148–149.
- ²⁰ Li, Chenyang and Perkins, Franklin, *Chinese Metaphysics and Its Problems* (Cambridge University Press, 2015), 17.
- ²¹ *Zhouyi: Xici 易经·系辞 [Classic of changes: the great commentary]*.
- ²² Cheng, Hao 程颢 and Cheng, Yi 程颐, *Er Cheng quanshu 二程全书 [The book of Cheng Hao 程颢 and Cheng Yi 程颐]* (960–1127 CE); Zheng, Guanying 郑观应, *Shengshi weiyan 盛世危言 [Fragile prosperity]* (1893).

²³ “子墨子曰：国有七患。七患者何？城郭沟池不可守而治宫室，一患也”；“民力尽于无用...民无食，则不可事。故食不可不务也，地不可不立也，用不可不节也” from Mo Zi 墨子, *Qi huan* 七患 [Seven types of adversity].

²⁴ “仓廩之所以实者，耕农之本务也，而綦组锦绣刻划为末作者富” from Han, Fei 韩非, *Wudu* 五蠹, Han Feizi 韩非子; “夫明王治国之政，使其商工游食之民少而名卑，以寡趣本务而趋末作” from Han, Fei 韩非, *Guishi* 诡使, Han Feizi 韩非子.

²⁵ Nie, Zhihong 聂志红, *Zhongguo jingji sixiang shi xieyao* 中国经济思想史概要 [History of Chinese economic thought] (Zhongguo minzhu fazhi chubanshe, 2012).

²⁶ A range of policies were observed from the Qin dynasty to the Tang dynasty, such as “zhongben yimo 重本抑末 [developing the essential industries and restraining the minor ones]” and “quanke nongsan 劝课农桑 [encouragement and innovation in agriculture]”. From the Song dynasty to the Qing dynasty, industries relevant to crafts were regarded as inferior. See the historical study of the notion of thrift from Wang, Na 王娜, “Relationship between Modern Technology and Luxury Consumption from the Perspective of Philosophy” (PhD Thesis, Dalian University of Technology, 2013).

²⁷ Zeng guang xian wen 增广贤文 [Enlarged writings of worthies: a collection of Chinese proverbs] (1368–1644 CE), 504.

²⁸ Also see the analysis offered by Tuan, Yi-Fu, *Morality and Imagination: Paradoxes of progress* (Univ of Wisconsin Press, 1989).

²⁹ “是故古者明堂之制，下之润湿弗能及，上之雾露弗能入，四方之风弗能袭；土事不文，木工不斫，金器不镂；衣无隔差之削，冠无觚赢之理；堂大足以周旋理文，静洁足以享上帝、礼鬼神，以示民知俭节” from Liu, An 刘安, ed., *Huainanzi* 淮南子; Liu, An 刘安, “Benjing xun 本经训 [Fundamental norm]”. The translation is based on Major, John S. et al., “The Huainanzi: A Guide to the Theory and Practice of Government in Early Han China,” New York: Columbia University (2010).

³⁰ Liu, An 刘安, “Benjing xun 本经训 [Fundamental norm]”.

³¹ Major, John S. et al., “The Huainanzi: A Guide to the Theory and Practice of Government in Early Han China,” 283.

³² Thomas Aquinas, *Summa Theologiae* (2005); Thomas Aquinas, *Treatise on the Virtues* (University of Notre Dame Press, 1992).