



Urban Planning and Architecture Design for Sustainable Development, UPADSD 14- 16 October 2015

Consumer attitudes towards timber frame houses in China

Qinian Hu^a, Bart Dewancker^{a*}, Tao Zhang^a, Tanaphoom Wongbumru^a

^a Faculty of Environmental Engineering, The University of Kitakyushu, Kitakyushu 808-0135, Japan

Abstract

Timber framed architecture owns thousands of years' history in China. However, with the rapid industrialization and urbanization, timber frame houses have substantially decreased. In order to reduce the concentration of the greenhouse gas CO₂ in the atmosphere and establish a low carbon society, the promotion of green building materials and energy saving buildings has been put in a prominent place by Chinese government. However, both of the number of timber frame houses and the potential of using timber, the green and sustainable architectural materials, are still very low in China. This paper presents findings from a questionnaire, shows the Chinese consumers' attitudes to timber frame houses. The semi-structured questionnaire method was chosen to explore common consumers' attitudes. It is found that prejudice regarding the deficiency of timber houses, in terms of fire resistance, durability and stability, persists in the minds of consumers. The aim of this paper is better understanding the challenges and difficulties that timber frame houses market facing from the view of consumers, thus figure out better ways for the future development.

© 2016 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Peer-review under responsibility of IEREK, International experts for Research Enrichment and Knowledge Exchange

Keywords: timber framed houses; consumer; consumer attitudes;

1. Introduction

Today, buildings are responsible for more than 40 percent of global energy used, and as much as one third of global greenhouse gas emissions, both in developed and developing countries. As global environmental problems come more and more serious, how to decrease the negative effects of architecture has aroused extensive attention. "Green design", "green architectures" become popular all over the world; countries try to explore new ways to meet green, ecological and low carbon equipments. China, as the largest developing country in the world, is experiencing unprecedented development, 1.13 millions of square meters building are under construction and 0.39 million are

* Bart Dewancker. Tel.: +81-93-695-3245; fax: +81-93-695-3345.
E-mail address: tracynian@163.com

complete in 2013(Nation bureau of statistics of China).It means there are huge potential for China to improve their architectural industry, thus to alleviate environmental problems. Timber as a building material is seen to have low impacts from the perspective of low water pollution, low green house gas (GHG) emissions, low air pollution and low solid waste compared with concrete and steelwith positive implications for living conditions(Liu, Y., Zhang, J.X., Zhou, B.G., Huang, Z.Z., 2005). What is more, the widely utilization of timber as construction material is considered especially beneficial, due to its long term conservation effects. The Chinese government has already realized about this, and promulgated the National Plan for Responding to Climate Change (2014-2020),and issued the China-U.S. Joint Announcement on Climate Change, stating that China aims to achieve the peaking of carbon dioxide emissions around 2030 and to increase the share of non-fossil fuels in primary energy consumption to around 20% by 2030(U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation, 2014).

2. Literature review

Timber framed architecture owns thousands of years' history in China. However, with the rapid industrialization and urbanization, timber frame houses have substantially deceased. Timber is widely used as beams, poles, columns in Chinese ancient architectures, such as temples, towers and residence. Moreover, the ancient timber joint technology is very advanced, there are still some ancient architectures can show it, such as the wooden tower in Yingxian county, Shanxi Province (built in 1056) and the Palace Museum located in Beijing (built in 1420). But what we called timber frame architectures are different from those ancient ones, which a modern method of construction (MMC) – using standardized, prefabricated timber wall panels and floors commonly in use in many developed countries – which bears no relation to its Tudor 'post and beam' namesake. Nor does it bear much relation to the form of softwood framing common in the 19th and first half of the 20th centuries.

In the first two "Five year's development plans" after the establishment of People's Republic of China, timber was widely used as construction materials and took about 46%. Since the Reform and Opening Up policy in 1976, China entered a rapid developing process, and concrete and steel gradually became the main building materials. Especially, the "National Forest Protection Program" took into action in 1989, and timber was controlled to be used in construction industry. Timber frame houses were gradually took place by concrete and steel buildings. Nowadays, timber frame houses just take small proportion in the whole market. In 2006, there were only a total of 2000 wooden houses in Beijing and Shanghai. Out of the 10 million sets of residential flats that are built in China each year, and only about 500 timber frame houses, which are mainly built by imported wood and construction technology(Wang, G.R., 2009).It is predicted that there will be around140 billion m² houses completed during 2003 to 2020, which means 32 m² for each person and 2.2 billion m² houses are needed each year.

Both the Agenda 21 and the UN 10 Year Frame work of Programs on Sustainable Consumption and Production highlight the necessity for substantially changing consumption and production patterns in order to ensure present needs are met, without compromising the ability of future generations and other world regions to meet their own needs, as defined in the Brundtland report(World Commission on Environment and Development, 1987).China, as the largest developing country in the world, is facing serious resources shortage, only for cement in 2012, Chinese consumption is more 1600 kg/per person /year compare with 300kg of U.S.A, 410kg of Russia, and 8 times higher than the world average consumption(Nation bureau of statistics of China). Globally, concrete accounts for two-thirds of total energy use in the production of non-metallic minerals and its production contributes globally to at least 5-7% of CO₂ emission(Taylor, M., Tam, C., Gielen, D., 2006). Along with this the serious environmental problems, in China, one-eighth of CO₂ emissions are generated by the cement industry(Hao, L.X., Zhao, F.Q., Zhao, P.X., 2011), thus how to improve timber frame houses in China has already aroused much attention from domestic architecture field and also other international companies and organizations. In 2001, Canada forestry delegation visited China for the first time and communicated related materials and technology of timber houses. At the same year, American Forestry and Paper Associate and Canada Timber Export Bureau hold seminar in China. In 2002, The Nordic Timber Association starts their market promotion in China, and helped China to enact Structure Design Specification Manual. Since 2004, Standard for Methods Testing of Timber Structures; Code for Design of Timber Structure; National Building Standard Design Drawing for Wood Buildings are completed one by one. However, the market proportion of timber frame houses in China is still very low. There must be lots of reasons considering economic, social, psychological and anthropological fields, such as 1.Lack of public awareness about wooden

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات