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# Rethinking conventional construction: An interview with Broad Group chairman and CEO Zhang Yue

**Traditional construction practices can be costly, inefficient, and detrimental to the environment. In this interview, Zhang Yue reflects on how the industry can change.**

Zhang Yue, chairman and CEO of Broad Group, is not one to shy away from ambitious targets. In 2010, his prefabricated construction company, Broad Sustainable Building, completed a six-story building, Broad Pavilion, at the Shanghai Expo in one day. He continued to challenge this feat by building two more structures at record paces—the 15-story Ark Hotel in less than one week and the 30-story T30 tower and hotel in 15 days. His latest ambition is to build the world's tallest structure. Known as Sky City, the 202-story steel skyscraper is expected to be magnitude-9 earthquake resistant and energy efficient. Ninety percent of the structure is being built at a factory and just 10 percent assembled on site. While the timeline is impressive,

what matters most to the Broad Group is its sustainable design and production process. Zhang sees this high-rise as a step toward redefining urbanization and addressing the energy and pollution problems that have accompanied industrialization in China. In this March 2014 interview with McKinsey's David Xu, a director in the Shanghai office, Zhang describes his journey to sustainable building and shares his thoughts on the future of construction and infrastructure in China.

**McKinsey:** *What are the biggest challenges facing the infrastructure and construction industry today?*

**Zhang Yue:** In general, the industry is underperforming. In many ways, we live in a very intelligent time. Yet there is still no precedent for a creative, low-emission, and practical approach to construction. From city planning to infrastructure development and building construction, from resource consumption to energy use, the industry is lagging the time in which we live. I think this is largely due to mind-sets and that humans must change. The construction industry is inherently long term. A small error in construction can cause significant harm to humans and the environment. The consequences of construction errors can reverberate for decades, centuries, and even a millennium. Yet the industry does not always think long term. We tend to think in terms of a project—one building or infrastructure asset—and its timeline.

**McKinsey:** *How can the industry change its thinking?*

**Zhang Yue:** We need to ask ourselves more strategic and long-term questions: What is the objective of this building or asset? How does it relate to the rest of the neighborhood and the city? How will it affect people's quality of life? How much energy does it use? What problems could it create?

In China, urbanization is happening rapidly. If it continues at this pace without careful consideration of the long-term consequences to the environment, it can cause severe problems. We must take a long-term approach to city planning, construction, and infrastructure and address resource and energy consumption. People living in big cities, with excessive pollution and energy consumption, can hardly enjoy a high quality of life. Urbanization should not

happen at the expense of land and the environment. Stakeholders in China can pursue a long-term path to land- and energy-efficient urbanization.

**McKinsey:** *Technology is evolving rapidly and disrupting other industries. To what extent is this happening in the infrastructure industry?*

**Zhang Yue:** Unfortunately, the construction and infrastructure industry is the exception. It is antiquated and out-of-date. Most work is still performed manually and on site, which is costly and time consuming. For example, today a skyscraper can take five years or more to complete. When the Empire State Building was constructed, it only took about 13 months.

**McKinsey:** *Why do you think technological innovation has failed to permeate the industry?*

**Zhang Yue:** There are two reasons. One, rapid urbanization in China is driving significant investments in infrastructure development. At the same time, innovative financing and investment products are also pouring money into the industry. When demand is strong and the market is good, people do not have much enthusiasm for new technology. They are not motivated to innovate because the profits are there.

Two, excessive regulation of the industry and its supply chain can hinder innovation. In China, there are so many regulations that they do not encourage innovative technology or even thinking. For instance, in construction design, regulations can be so detailed that they specify which types of materials to use and what standard of thickness the materials should be. So, in China the industry falls back on what we call "standard." Because regulations emphasize standard, builders pursue it at the expense of creativity, efficiency, safety,

and ultimately responsibility. As long as a builder does not violate standard, he or she does not bear responsibility for any issues.

**McKinsey:** *What do you envision as an alternative?*

**Zhang Yue:** I think Western countries offer an alternate model. Regulations exist and the guidelines are stringent, to be sure. A building or infrastructure asset must pass inspections and meet safety standards. While engineers bear responsibility for their work, they are free to explore different products and approaches. This model encourages innovation and accountability.



**McKinsey:** *Sky City is not the Broad Group's first sustainable project. When did you start thinking about sustainable building?*

**Zhang Yue:** We began to explore sustainable building after the Sichuan earthquake in 2008. I was attracted to the idea of challenging conventional thinking about construction. Our construction process places special importance on air quality, energy conservation, and sustainable materials. By using 20-centimeter insulation layers, quadruple-paned windows, power-generating elevators, light-emitting-diode lights, and Broad's cooling-heating-power and air-filtration technology, Sky City will be five times more energy efficient than a conventional building. In China, most builders use concrete because it is standard and they are familiar with it. Sky City will be made mostly of steel, all of which can be reused, if the building is ever decommissioned.

**McKinsey:** *How does the use of an energy-efficient product or material challenge conventional thinking?*

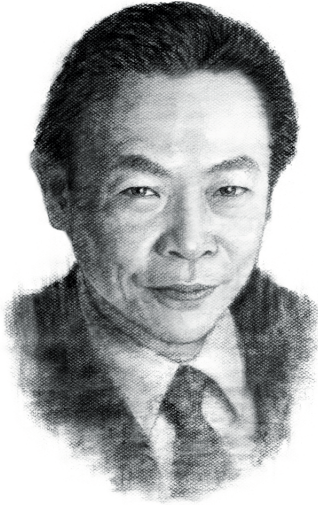
**Zhang Yue:** One product can have tremendous effects. Consider thermal insulation. It does not require fancy technology, simply a willingness to do. A small, up-front investment in insulation significantly reduces the overall cost of a building by lowering heating and cooling expenses. Why then are so few builders in China using thermal insulation? In a word, it is about mind-sets. Thermal insulation is outside of their conventional process and thinking.

**McKinsey:** *How does your construction process differ?*

**Zhang Yue:** If conventional construction is a man building cars in his garage, our approach is



## Zhang Yue



### Vital statistics

Born in 1960, in Changsha, China

Married, with 1 son

### Education

Earned a degree in fine arts from Chenzhou College

### Career highlights

#### Broad Group

(1988–present)  
Chairman and CEO

### Fast facts

Holds patents for a number of inventions, including a nonpressurized boiler (1989), a nonelectric air conditioner (1992), and a combined cooling, heating, and power system (1999)

Received the Champions of the Earth award from the United Nations in 2011 for his contributions to building energy efficiency and sustainable production

Worked as a teacher and librarian in Chenzhou early in his professional life

to build cars on the assembly line. Ninety percent of the work for our prefabricated, sustainable buildings is done in the factory. Only the remaining 10 percent is done on site. Plumbing, electric, heating and cooling vents, plus the flooring and ceiling, are fitted into a module of 60 square meters. The walls, doors, and windows are stacked on top of the module, which is then transported to the construction site as a whole.

**McKinsey:** *What are the benefits of this process?*

**Zhang Yue:** Our production process is not only fast, but it maximizes efficiency and minimizes waste—less than 1 percent construction waste, compared with the 30 percent generated by conventional methods. Because the majority of work is done in advance, our approach also speeds on-site construction. And because our main site is the factory, our transport and logistics

costs are lower. We have greater capacity in the factory to store additional materials and supplies, whereas at a conventional construction site, materials like cement and steel are often delivered daily because the site cannot accommodate extra supplies. All in all, our construction process maximizes efficiency—in resources, labor, logistics and transport.

**McKinsey:** *As a new entrant, you are showcasing a vastly different business model. What is the likelihood that this model can be replicated?*

**Zhang Yue:** We hope to be a model in countries like China, where the urban population is growing, existing infrastructure is incomplete, and the demand for infrastructure development is significant. But the precondition is that we finish the job and do it well. I must build the best product with the highest efficiency, of the

## We are constructing the tallest building to promote the concept that urbanization need not sacrifice land or energy efficiency.

highest quality, at the lowest possible cost. For other builders to follow suit, the production process must be efficient and cost effective, without sacrificing quality. If a building is expensive to develop, the market will be limited. If labor costs are too high, or the construction speed is too slow, the market will evaporate. If quality is hard to control or technicians are required to learn many new and advanced technologies, the barriers to entry will be too great. Return on investment must also be realized fairly quickly, in two to four years; otherwise, investors will lose patience.

**McKinsey:** *When complete, Sky City will measure 202 stories high, with 6 more stories below ground level. It could become the tallest building in the world. What does that mean to you?*

**Zhang Yue:** We are constructing the tallest building to promote the concept that urbanization need not sacrifice land or energy efficiency. This is the real significance of Sky City. When a building is taller, it naturally uses less land. Also, Sky City is a mixed-use development and will include residential housing; commercial space for business, shopping, and entertainment; a school; a hospital; and two square kilometers

of green space covered by 100,000 trees. Residents will have access to everything they need in this self-contained development. Think of how lovely our cities could be if we all traveled to work and school and ran errands on foot. Such a lifestyle lessens energy consumption and the number of roads, cars, and traffic jams in our city. According to our calculations, Sky City could help reduce the number of cars in Changsha by 2,000 and carbon emissions by 120,000 tons. These figures mean more than the title of world's tallest building. We are determined that Sky City will have an impact on the people and city of Changsha, on China, and ultimately on the world.

We hope this project leads three important revolutions: one is a revolution of the construction process; two is a revolution of resource efficiency; and three is a revolution of the construction-industry business model and oversight. If we do not take action and showcase a different model that challenges conventional construction, the industry will not change. There will be huge obstacles, many of which are beyond my imagination. But my resolve is strong. And I look forward to the day when we can reflect on those obstacles over coffee on the 202nd floor. ○