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RESHAPING THE SKYLINE

CW examines the technologies and trends to build tall, given that tall buildings are the future forward solution to limited land.

Over the past two decades, India's major cities have undergone a remarkable transformation, resulting in a dramatic reshaping of the country's skyline. While cities possess unique urban identities, they are becoming increasingly similar in appearance world over. A modern glass and steel tower in Singapore would not seem out of place amid the tall buildings of Mumbai's Bandra Kurla Complex, highlighting the globalised architectural trends that transcend geographical boundaries.

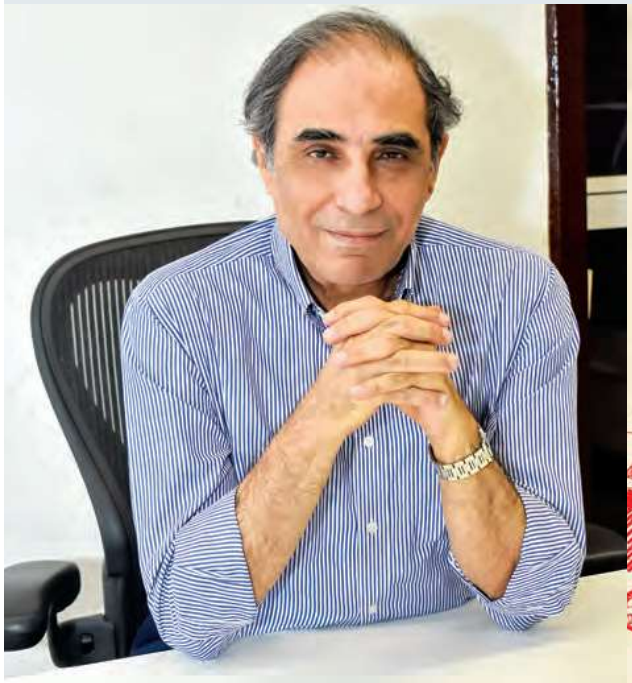
For instance, in recent years, Mumbai's skyline has undergone a dramatic transformation. The city boasts the highest concentration of tall buildings in India, with over 12,000 structures and more than 200 skyscrapers. It ranks seventh globally in terms of tall buildings density and holds the record for the highest number of planned tall buildings in developmental stages.

Tall buildings provide an optimal solution to the challenge of limited land and property availability, as they allow for vertical accommodation, maximising the efficient use of space.

As **Architect Hafeez Contractor says**, "High-rise is our survival kit for the future. If we do not start building high-rises in India to provide housing to the population, we will be in big trouble." *(See exclusive interview on page 46-47.)*

Build Tall to Survive

Dubbed by *The New York Times* as 'The Man Who Draws India', **Padma Bhushan Architect Hafeez Contractor** discusses the future of tall buildings in India in an exclusive chat with **CW**.



A glimpse of the 'future of the cities' concept sketched out by Architect Hafeez Contractor.

The current scenario

India constitutes 17.8 per cent of the world's population but has only 2.5 per cent of the land area. For healthy survival, there is need for a sizeable percentage of land for agriculture and forests. If the forests are not there, the wildlife is not there; if the bees and the birds are not there, human survival will no longer be there. Alarmingly, we have just about 8-10 per cent forest cover left in India.

The difficulty

Across the world, the urban area only occupies 2-4 per cent of the land. However, in India, we occupy around 10-11 per cent. In the good old days, people were content to have their own G+1 house; in today's world, that concept can no longer flourish. On the other hand, most cities like Ahmedabad, Pune, Nagpur, Bhopal, etc, have increased in size over the past 20-25 years. And when these cities increased, they cobbled the farmland, which in turn cobbled the forest land. The rich forest we had is virtually disappearing. We are literally sitting on a time bomb.

The big mistake

A big mistake we are making is that while increasing the boundaries of cities, we are not giving additional FSI for newer areas as compared to existing cities. The new areas are still getting less FSI than cities, which I believe is a big mistake.

Mumbai initially was just a piece of hinterland, with a huge amount of farmland surrounding it. But now, the hinterland has grown multi-fold and, sadly, the farmland is getting lesser day by day. The same story has been witnessed in cities like Pune, Delhi and Ahmedabad. The growth of these cities has consumed a majority of the farmlands surrounding them. If we are eating up the farmland around us and the farmland is eating up the forests, it is a dangerous scenario for human

"The next level of tall buildings will not just be about designing sustainable buildings, but designing net zero buildings."

- Vivek Bhole, Chairman & Managing Director, Vivek Bhole Architects

"Tall buildings require heavy mechanisation, and there is a shortage of skilled manpower to work at height in our country."

- Shyam Seth, Former COO, L&T Realty

New trends in design and engineering

- **Biophilic design:** Biophilic design is the practice of connecting nature within the built environment. Features such as vertical gardens, rooftop gardens and green walls and substantial use of natural materials are used to create naturally aesthetic spaces.
- **Energy-efficient technologies:** Smart controls for lighting and HVAC systems, advanced building automation systems, energy monitoring, management systems and integration of renewable energy sources
- **Vertical transportation:** Double-decker elevators, high-speed elevators, sky elevators and more.
- **Sustainable practice:** Emergency power systems, robust structural systems, redundancy in critical building systems and integration of structure with resilient urban infrastructure to withstand natural calamities and minimise climatic effects.
- **Digitisation:** BIM, virtual reality (VR) and augmented reality (AR) for enhanced visualisation, coordination and collaboration among various stakeholders. Additionally, sensor-based systems enable intelligent monitoring and control of building operations for improved energy-efficiency and occupant comfort.

Vertical safety

Despite the increasing number of fire accidents in tall buildings, Mumbai is still looking for answers to fire safety and evacuation measures. The manpower and equipment required to manage such rescue operations have become a challenge for the fire brigade. The main challenge to rescue people from tall buildings is carrying heavy equipment – only the first 50 m of a ladder can be reached with ease. The usual 90 m ladder can give access to the 30th floor but as they go higher, the wind velocity makes it challenging.

"Regulations now require the design and installation of temporary fire-fighting systems in tall buildings during the construction phase itself and this needs to be budgeted, planned and installed to ensure the safety of the property and manpower engaged," points out Hate.

"Only the joint efforts of citizens and the fire department can make the city fire-free," avers **Sanjay Manjrekar, Chief Fire Officer, Mumbai Fire Brigade**. "Tall buildings specifically need to have evacuation solutions in place. Accordingly, the 'fire evacuation lift' concept was implemented in 2018. This will help self-evacuation of occupants as well as fire-fighters in case of emergencies. An adequate evacuation solution and proper training can save millions of lives."

To this, **Dr Vikram Mehta, Managing Director, SPARTAN Fire Evacuation Lift**, adds, "The fire evacuation lift is considered the new PPE (public protection equipment) that reaches on time to evacuate on time, and thus saves lives and assets. These lifts are designed with well-advanced technologies like IoT. They help fire-fighters ascend tall buildings with heavy equipment to reach fire-affected floors faster and safer and ensure rapid evacuation of people of all ages and abilities."

Supporting this notion, **Dr Deepak Monga, Fire Safety & Evacuation Expert**, says, "Although we have a 90 m ladder, fire-fighters can't use this to reach 40th, 50th, or higher floors because of the wind velocity and limited space. If we use a staircase, then people die owing to inhaling excessive carbon monoxide. The other available options, like fire chutes, are not practical for all ages or fire-fighters as they can't use them to reach higher floors. Therefore, we need to understand the need for a proper evacuation solution. Infra developers need to add the fire evacuation lift in their plan to save people's lives and assets."

The sustainability imperative

"Over the years, there has been a transition in the use of material in tall buildings from traditional reinforced concrete materials to steel and glass, and sustainable

Top 10 tallest buildings listing in India as of May 2023

Project	Height	No. of floors	Location	Status
Lokhandwala Minerva	299.9 m	77	Mumbai	Under construction (2023)
Indiabulls Sky Suites	291 m	75	Mumbai	Under construction (2023)
Arav	282.2 m	83	Mumbai	Structurally topped out (2026)
Indiabulls Sky Forest	281 m	80	Mumbai	Under construction (2023)
World One	280.2 m	76	Mumbai	Completed 2020
World View	277.6 m	73	Mumbai	Completed 2020
Sesen	270 m	67	Mumbai	Under construction (2023)
Lodha Park Allura	266.3 m	81	Mumbai	Completed 2021
Lodha Park Parkside	266.3 m	81	Mumbai	Completed 2021
Trump Tower Mumbai	266.3 m	79	Mumbai	Completed 2021

(Source: CTBUH)

materials such as wood," shares Bhole. "During the initial design stage, we can take care of many factors. To provide energy-saving features, we can use technology to reduce consumption. We can have synchronised vertical transportation systems to reduce the movement of elevators or calibrate the movement of users to reduce energy consumption. We can also use systems like break-pressure tanks and use less energy into pumping water by using more gravity. In high-rise buildings, we put it in service floors and do looping at intermediate levels, resulting in reduction of the pumping load. Incorporating a sustainable design philosophy encourages decisions at each phase of the design process to reduce negative impacts on the environment and occupant health, without compromising on the bottom line."

A sustainable tall building is one that's open, flexible and energy-efficient throughout its design, construction and consumption. As Gangadia says, "Sustainable design should be a norm in any architect's work. I would rather say every building should be sustainable. It should not be a conscious effort but a default outcome."

"We have a limited amount of land and with time and population growth, going taller is a given requirement."

- Bhrugu Gangadia, Associate Director, INI Design Studio

"Designing tall structures gives us the opportunity to push the usual boundaries of construction norms to offer something unique and visually stunning."

- Pooja Nikhar, Senior Associate, Morphogenesis

In Hate's view, "With climate change now being a stark reality, developers have become sensitive to the requirements of sustainable development. While buildings certified by IGBC, USGBC LEED, IWBI WELL, are becoming the norm, the movement towards net-zero and carbon neutrality is gaining momentum."

"Sustainable design is vital in reducing the environmental impact of tall buildings," agrees Bhatia. "Architects, engineers and designers must embrace new technologies and concepts to prioritise energy-efficiency, resource conservation and environmental stewardship. Green building materials and practices, incorporating green spaces and natural features, improving indoor air quality, and promoting occupant health are critical aspects that can significantly reduce environmental effects."

Anil Hira, Director - Middle East, BuruHappold Engineering feels that, "As a collaborative industry, we need to ask questions like will our buildings last the design life in terms of relevancy, quality, and sustainability. This is a huge challenge when the most effective solution for the construction industry is to 'not build', and explore alternative