# Taller India, Healthier India?

Whilst buildings are getting taller, the elevator industry in the country is yet to develop or introduce elevators in the country which match up to the requirements of the buildings. Will they catch up on this trend before it is too late? **TAK Mathews** reports.

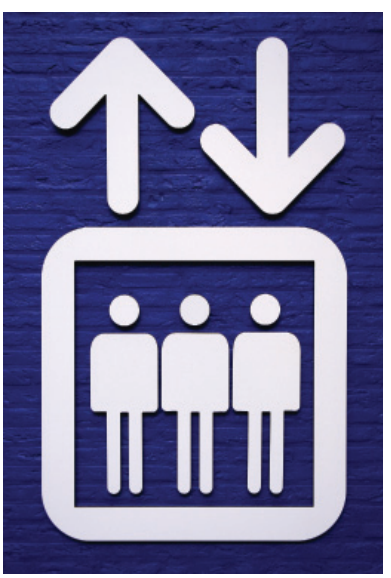
NARIMAN POINT, Mumbai is synonymous with being one of the most expensive real estate in the world. It is also synonymous with serpentine queues of people waiting for the elevators, to the end that many employers add a 15 minute grace period (to account for the average elevator waiting time) to the reporting time for the employees. While Nariman Point might epitomize this phenomenon, in reality, it is not uncommon to see these serpentine queues at numerous prestigious buildings across India, whether in New Delhi, Gurgaon, Hyderabad, Bengaluru or Chennai. In fact, at many of these buildings, it is taken for granted that the first few floors will not get the lift service and walking down would be the only viable egress option.

The fact is that there are very few buildings in India that are well elevatored. In most cases, the vertical transportation configuration is determined by one or varying combinations of the two criteria and two considerations – past experience, supplier's standards, economic considerations and architectural considerations.

Past experience: Past experiences and references are good base for most decisions, including vertical transportation requirements. However, the reference to the experience has to be in totality. In reality, this totality is impossible as no two buildings scenario can be exact – the changes could be occupation pattern, socio–economic time frame, the population character, etc.

Two examples illustrate this –

The Stock Exchange, Mumbai: People who have visited the impressive P J Jeejabhoy building through the 80s and the 90s would remember the serpentine queues to get to the lift. However, the change from ring-based trading to web-based trading saw the number of visitors to the building drop dramatically.



Call Centres: The advent of call centres probably demonstrates the extreme change to building population thumb rules.

While the Stock Exchange scenario is a rarity, present day inter floor and 24x7 commercial operations not only affect elevator traffic analysis thumb rules but also blow away the 240 stops per hour (in some cases even less than 180 stops per hour) design and life span criteria for the elevator components. In fact, the NBC 2005, which establishes guidelines for elevatoring design criteria does not provide for this scenario. The other fallacy with past experiences is that while occupants of the high value Nariman Point building might have adapted and adjusted to the under elevatored building, they are not likely to accept the same at newer and more modern buildings.

The socio–economic impact can also be seen in the residential

segment with major changes in the traditional traffic patterns. In earlier days, most households managed with one full-time domestic help. The new trend is task oriented "multiple" helping hands with multiple trips to the apartments through the day. A study of a 2-bedrooms apartment indicated four domestic helps making six visits. This was in addition to frequent four delivery boys (covering newspapers, magazines, milk and bread), the car cleaner and the driver. Additionally, the apartment also had frequent courier and pizza deliveries.

Once the residential building is upper-end and large, the resident to service staff ratio could be as high as 1 to 5. Even the movement of the occupants have increased with multiple activities through-out the day and not just limited to the morning and the evening rush hours. Children, for instance, are engaged in tuition visits and multiple extra-curricular activities in addition to their school schedules.

With increasing competition, most businesses have been pushed to standardization to achieve cost reductions. The Elevators & Escalators (E&E) suppliers too have not been different and have established their standard product lines. Yet, the problem arises as these standard specifications have been derived from either historical assumptions or international assumptions. Both are out of place in the Indian context.

For instance, the Indian Standards prescribes lift capacity standards as 68Kgs per individual and a space "not to exceed" 0.17 to 0.19 m2 per person. On the other hand, the international norms assumes different individual sizes, that individuals will not crowd into an elevator, that the area per person on a floor plate will be liberal and resulting lower starts per hour.

It becomes even more complex depending on whether these standards were derived from the East or the West, and if from the West, whether they originated in Europe or in the Americas. It also needs to be kept in mind that it is but natural that each supplier would have their bias towards what suits their product offering vis-à-vis what is right for the project. While the E&E market in India is growing, in comparison to world markets like China, the Indian market is small (so are the quality and service demands) and developing a product specifically for India is not a priority for most of the industry majors.

It is understandable that developers would have economical priorities when deciding elevator specifications. An extreme example would be the acceptability of manual door elevators. The downside of this is that many building owners and occupants are stuck with manual door elevators even if they want to change as they would be restricted by smaller hoist way sizes that were considered at the initial stage for manual door elevators.

Considering that longevity is rising, it is common that urban buildings have a number of walking stick or wheel chair dependent senior citizens. More of these individuals with special needs are independent and mobile. Interestingly, when the world and India are moving towards disabled and elderly-friendly environments, the Indian E&E industry has not done enough to push for change in this basic requirement. Admittedly, legislation (normally driven by the elevator majors) has not been too helpful either.

Economic considerations

also force borderline design assumptions leaving no leeway for any change in the building characteristics. There are numerous instances of building owners desperately searching for solutions to add additional hoist ways and elevators, or increase capacities, and speeds. Most of these have ended as exercises in futility.

Unless a show piece of the building, the elevators and escalators tend to find low priority in the planning stages of a building with architectural priorities being of prime focus. The norm is to fit in the solution into the building after accommodating all the other architectural priorities, with little attention to traffic analysis and simulation or the optimum circulation patterns within the building or the required location priority. Even when there has been prior effort to accommodate it as a show piece, the solution ends up with very inefficient handling capacity by virtue of location, shape etc. The result is an under-elevatored building through wrong specifications or straight forward inadequacy, wrong locations or lobbies etc.

In various combinations and proportions, the resultant solution can be very expensive yet very inadequate. Notwithstanding the cautionary footnotes, the wide availability of standardized product brochures and drawings encourage this trend. In fact, there are numerous instances where the solution has been finalized (and sold) just on basis of the standardized product brochure and without reference to project details - some very prominent landmarks stand testimony to this fact.

## No substitute for Vertical Transportation Analysis and a scientific approach

No doubt the criteria and considerations mentioned above have their merits as a "quick" thumb rule for estimating the vertical transportation solution. They, however, cannot be a substitute for a full-fledged vertical transportation analysis for arriving at the appropriate solution. After all, any other reference can just be pointers meant to compare recommendations and not an end in itself.

The reluctance to undertake the required detailed analysis can be traced to the fact that the science of vertical transportation analysis is complex and can take a lifetime to master. In fact, most E&E companies do not even include traffic analysis as part of their induction or training program for their engineers. Not surprising considering that Dr Gina Barney's book on the subject is a 3 pounder consisting of 500 pages, not to mention George Strakosch's bible for the elevator industry, both popular subject references. Engineers (particularly sales engineers) would prefer shifting industries than invest time in understanding this "not so lucrative" subject, let alone master it.

All major E&E companies – and some consultancy firms – have proprietary software for transportation analysis. However as rightfully said by one of India's prominent developers and supported by a very senior

engineer from India's largest construction company, each elevator company ends up with varying recommendations. Understandably, their arguments have to be favouring their standard product offering. On the other hand, software tools are available from independent traffic analysis experts.

While any such tool will give "some" results, it cannot be expected to interpret the analysis or arrive at the final solution. Not to mention that establishing the primary data for the analysis itself is a specialist job requiring extensive experience and understanding – if the data you use for the analysis is garbage, what you get will be garbage. As rightfully stated by one Richard Peters, "A Software will not make the person an expert".

And, not just traffic analysis results: Even if the vertical transportation requirements were established on basis of detailed (and unbiased) traffic analysis calculations, the absence of further collaboration to establish the circulation patterns and optimum locations, configurations, access routes, lobby sizes and layouts, improper zoning, etc., diminish the efficacy of the vertical transportation solution. In short, optimization cannot be achieved without integration of the vertical transportation requirements and logic with the horizontal transportation patterns within the building.

## India is growing taller

While the 45 storey Shreepati Arcade was heralded as the tallest building in 2002, 45 is no longer tall with an estimated 300 to 500 buildings expected to cross this landmark with many of them expected to nudge closer to 100 storeys and even with ambition to go beyond. In contrast to the new tall India, Nariman Point consists of probably what could be referred to as mid-rise buildings. When Shreepati Arcade was under design, the only reference that would have been available was the Belvedere Court and the Kalpataru Heights.

> Economic considerations also force borderline design assumptions leaving no leeway for any change in the building characteristics. There are numerous instances of building owners desperately searching for solutions to add additional hoist ways and elevators, or increase capacities, and speeds. Most of these have ended as exercises in futility.

The design inputs for the Shreepati tower probably were based on inputs from an elevator company. And, shockingly, the hoistway sizes for the main passenger elevators were based on accommodating 8-10 passenger capacity elevators. The tender that was floated by a consultant indicated even a more disturbing lack of appreciation of the elevatoring requirements for a tall building. The tender called for three 8-passenger capacity elevators at 2.5mps, two 8-passenger capacity elevators at 1.75mps and one 1000 kgs service elevator at 1.75mps. The final installed elevator system consisted of three 10 passenger capacity elevators at 4.0mps, two 9-passenger capacity elevators at 2.5mps and one 1000 kgs service elevator at 2.5mps.

While the hoistway sizes were small, slightly larger cars and higher speed was possible as the developers ensured a significantly high level of construction accuracy and had provided for a larger pit. Even with the enhancement of specifications, the quantity of service remains an issue as the capacity of the elevators remained grossly inadequate. After all, a mother and attendant with a pram and shopping bags would occupy more volume than that available in a 10-passenger capacity elevator.

Further, the one service elevator is grossly inadequate to address the number of service staff (probably more than the number of residents), regular deliveries (milk and newspapers) and garbage disposal. As a result, this elevator never can be shutdown for the regular preventive maintenance which, in turn, will impact its reliability as well as life expectancy. With that scenario, it is not uncommon to find the service staff commandeering to the other elevators.

Shreepati Arcade should have been a good reference for subsequent designers and developers of high-rise buildings to adopt corrective measures. Unfortunately, the numerous high-rise buildings now being designed and constructed, controvert the earlier contention that design criteria, based on past

experience, is an approach adopted by designers to establish elevatoring requirements. In fact, the elevator system of many of the new buildings coming up is so bad to the point that in comparison, the infamous elevator systems at the Nariman Point buildings will appear exceptional.

While Shreepati Arcade at least had six elevators, some of the new taller buildings have provision for just three small elevators and with lesser speeds. Considering that the first habitable floor of many of these buildings is 8 floors above the ground, even the Nariman Point solutions will not work. It will be an understatement that these buildings are doomed.


A project manager constructing a horribly under-elevatored hotel building tried to rationalize the apparent nonchalance amongst developers and designers of high rises in India. In his opinion, they approached elevatoring of high-rise buildings in the same manner that they would the smaller buildings that they were accustomed to without recognizing the exponential complexity. He opined that they would be unlikely to learn till they experienced the consequences of an under-elevatored high-rise building, meaning lose heavily on their projects.

Probably true, though the phenomenon is not restricted to Indian designers as the inadequacy in elevatoring is evident even in the buildings designed by foreign designers. In any case, this will be truly a very tall and expensive learning method, not to mention the absolute waste of this nation's resources.

## Conclusion

Vertical transportation analysis and design has to be recognized as a vital science critical to any building. The solution and the planning for the solution have to be established at the drawing board stage itself and not as an after-thought. All supporting players to a project need to appreciate that rarely will they get a second chance to remedy the second most critical prerequisite to a tall building, the first being the structure itself.

On the other hand, we can continue to ignore the criticality and make it the building industry's contribution to making India a healthier country. With inadequate elevatoring, climbing of stairs is the only alternative to reach your flat/office space and the right cure to address the possibility that India will have the largest cardiovascular disease burden in the world and account for one third of all deaths. ▲▼

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***About the author:***

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