

Construction Industry – Stifling much needed Innovation

How innovation is stifled in the construction industry and why there may be no choice but to adopt innovative techniques for survival and progress

Inertia in Construction Industry

Penicillin was discovered and its characteristics were published in 1929 but took 10 years before it was used as a drug to treat fatal illnesses. Pre-mix concrete took decades in

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India to be adopted as a standard construction material, as masons and contractors suspected its qualities and were unwilling to risk building structures with it. In India buildings, homes, commercial and other infrastructure, are still built mostly in the traditional way, i.e. with brick and mortar, giving livelihood to a large number of semi-skilled and skilled masons and laborers who just shift raw material at the site. However, with the pace at which infrastructure is being built, massive migration of people to satellite towns and suburbs around all major cities, and an apparent shortage of millions of urban low cost homes - more efficient and faster construction technologies are needed. Sadly, affordable housing projects by government or private entities tend to just

move the site farther away from the city where land is cheaper, squeeze more towers into a small area, reduce the carpet area, circumvent regulations and generally are blind to innovations in process, materials or products.

Are we not aware of new Technologies?

However techniques and technologies do exist and are being used extensively, mainly in the developed west and far-east countries to produce buildings faster and at high quality. Construction industry in many developed countries is well organized and most of the processes resemble an assembly line of a product with various structural components delivered to the site in finished or almost finished form. This is seen as a trend now for certain components that are used in buildings, such as wires, pipes, doors, windows, tiles, fittings and furnishings etc. There are many innovations in all these 'products' with companies investing in research and developing new products and solutions (even patenting and licensing them) or copying products developed elsewhere. But when it comes to building the main structure itself the methods adopted are still very conventional and builders shy away even from copying technologies proven elsewhere. The soil is dug and filled with a foundation wall (or pile foundation if it is a high rise – this is a definite change in most urban centers where buildings need to be constructed tall as land cost is high, but this is a different and complex topic and needs a separate space). A foundation is not required in

some non-seismic zones with solid rock bed *but tradition requires a foundation always*. Using reinforced concrete for walls and ceilings and beams where they are not needed such as in low-rise buildings, unnecessary high use of steel etc. are common practices in the industry. Once the foundation is in place, bricks are laid on top of each other, plastered and made into walls, walls are cut to lay internal pipes and cables for water and electricity and plastered again, tiles are pasted, paint is applied, carpentry work is done over that, fittings are screwed in place and paint is applied again. This traditional process is generally messy, highly labor intensive, imprecise with a lot of rework, inconsistent in quality, unpredictable and one of the root causes of project delays. On large construction projects where many tasks are sub-contracted it becomes a nightmare to manage all activities and finish the product on time.

What is the Product Reliability and Robustness?

When we go out and buy a product from a shop it comes with a warranty of sorts, but when people put their life savings into constructing a home the builder doesn't give any sort of warranty for his product. With governments offering populist freebies and job guarantee payouts, *the single biggest plague for the construction industry is shortage of skilled workers*. Even migrant workers are trending to return to their native states to make use of the various welfare schemes, and the previous generation construction workers tend to get their children educated for white or blue collar jobs. Besides, the boom in the services sector has opened up many new job opportunities that are less arduous than working at a construction site.

The building is after all a product like any other. While car companies and computer manufacturers are able to improve the quality of their products at the same price point, or able to reduce the price of their products year over year, *nobody ever talks of a builder reducing cost year over year, and rarely hear about builders adopting new technologies and materials*. On the contrary the price of booking a flat keeps going up the later you book even before construction starts and all input costs seem to keep going up while the construction progresses. The longer it takes the less margin the builder makes, which is one reason why builders and promoters offload the flat bookings in phases at higher and higher price points during the construction phase to cover for the inflation in costs. The later buyers absorb the inflation which is a price for less uncertainty, while the early buyers take higher risk but at a lower price point to enable the project to kick off and gave it momentum increasing its marketability. But we are digressing here. In spite of all these complexities can the builders reduce cost, improve quality year over year? Maybe yes if new technologies and new construction processes are adopted, of course other factors like political and regulatory, input costs, inflation etc. may affect the benefits, but all the more reason why a change is required.

New Construction Techniques

New construction techniques are trying to bring the building construction process to a semblance of order and like an assembly line. Technologies to make pre-fabricated concrete slabs, reinforced concrete blocks, are now available to make parts of the building in factories, with consistent high quality and have these parts assembled at the site into a finished building. However, such factories are few and

there are some hurdles to cross before they are adopted in large scale across India. There is still a perception that pre-fab blocks are ugly, masons resist change and buyers are unsettled about investing their life savings into new technology.

One of the reasons newer, though less advanced elements such as concrete blocks instead of bricks, are used in certain fast growing urban areas is that most of these flats are bought for investments by those who have surplus cash and don't plan to live there themselves. However that does not mean these are any less than brick and mortar constructions, it is mentioned to just make the point that one type of resistance to change is removed.

There are of course other sustainable, environmental friendly technologies available such as reinforced mud-bricks, rammed earth, etc. but they are more suited to small buildings and in rural or small towns. Here we are only looking at large scale fast construction at urban and semi-urban areas.

Using pre-fabricated concrete elements in building construction needs radical change in many areas, first of all is the attitude of the construction companies to design as they construct. Complete pre-fab elements such as columns, entire floor, walls etc. are now possible to build with all required pipes, cables, door and window frames built into them, and just assembled at the site. It is possible with these new technologies to construct entire toilets and bathrooms complete with internal pipes, cables, tiles and fittings, at the factory and lifted into place at the site. There are of course some implementation challenges such as transporting large elements by road to the site, need for large cranes to lift and assemble the elements into a building, for example. Different skills at the site as well, but there are

ways to overcome these. On the positive side, the need for large scale labor during construction, large storage space for inventory, debris and mess, unpredictable causes such as weather, political events, holidays, inconsistent quality due to variable inputs and skills, are largely eliminated. There may be no reduction in cost or even an increase in cost initially due to longer planning and design phase, transport and other costs; however this extra cost is subsumed in the savings that come from finishing the project faster, and at higher and consistent quality predictably on time.

Radical Shift is needed

The biggest challenge to this approach is the need for a radical shift in the way projects are implemented. Using and assembling pre-fab structures at the site needs detailed planning and very meticulous design, winning buyer's confidence, overcoming resistance from builders, promoters and construction companies that may see no incentive to change *when their margins are so high. This is where the real challenge lies.* The workers and their children who may dislike getting into the construction work at the site may now be more open to doing the same sort of tasks in a factory and of course in better working conditions.



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