ISSN 2349-4506
Impact Factor: 3.799

Global Journal of Engineering Science and Research Management

ASSAULT OF RISKS IN MULTI STOREY BUILDING CONSTRUCTION

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DOI: 10.5281/zenodo.1186511

KEYWORDS: Structural/Quality risks, Contract risks, Contractor risks/Logistics risks, Occupational risks, Capital risks/ Locational risks.

ABSTRACT
The Construction Industry is rapidly reviving after the jolt of demonetisation. The builders have understood the RERA and the benefits of same to both themselves and also to the buyers.

The increased income levels, rise in the movement of people from rural areas to urban areas for employment purposes, easy availability of long term institutional finance, increased rentals in city forcing people to sacrifice their other comforts for purchase of an apartment, growing economic development and Government's initiative on House for All and many other reasons contribute to the excellent construction activities, particularly in the City and the outskirts of same.

INTRODUCTION

Methodology
Visit to the sites, observation and personal discussion. Details as under.

Contours	Details
No. of sites visited	2
No. of floors	4 and 7
Statutory compliance	100%
Facilities	Lift, Covered Car Park, Round the clock security, Uninterrupted power supply, Gym, Children Play Area, ATM, Shopping Mall (second site)
Migrated Labour	Present in the second site
Site Maintenance	Excellent in the second site
Female employees	Scarcely in both

CLASSIFICATION OF RISKS
Depending on the severity of the nature, the risk can be broadly classified into two. Minor and Major.

Minor risks: Minor risks are those such as injury to site people leading to halt of work for some time, Occurrence of marginal delays in delivery of materials etc., It does have impact but only in tolerable limits. Delays/rework arising out of communication gap will also come under this.
In a nutshell, whatever occurred causing minor setbacks in workflow and which are easily corrected can be said as Minor risks.

In construction sites, it is admitted that Minor Risks are always prevalent and are just unavoidable. In fact, the project completion period reckons minor risks into account.

Major Risks
By the very term, the occurrence of such risks causing severe injuries, fatalities and other incidents leading to heavy loss, contractual breach and litigation, sudden disruption in capital flow, natural disaster, structural collapse and other events which will virtually bring a halt in construction for a long period. With proper planning, advance action and strictly adhering to systems and complying procedures, major risks can be definitely brought under control. Occurrence of such risks only reflects the utter carelessness at the site.

All Builders face risks

In fact, all the builders face the risks in construction. More the number of floors, larger the scope of risks. The discussion revealed that more risks are faced by large scale builders who venture into several floors. They are constantly gripped with the fear of risks in one way or the other.

However closely the inter action is maintained with all in the loop, communication gap, inevitably takes place, leading to avoidable delays.

Structural/Quality Risks

This is quite dreadful. Nowadays, almost, all the builders do a minimum of 3 – 4 floors in construction. Since they have economies of operation, they prefer to do like this. They do not mind waiting for six months to even one year for completing the sale of all apartments built by them. Such are the benefits that accrue to the builder in large scale construction.

Structural risks are nightmare even to the established, large scale builders who are in the field for years. Many times, their engineering calculations go haywire leading to disaster. There are instances where the buildings which were anchored on rocks (through pile foundations) suffered collapse of one or two floors, in spite of concrete procedures strictly adhered to.

The Site Engineer (of the second site) privately said that structural risks are always there in multi storey buildings, but they can be greatly overcome by engineering marvel and strict adherence to construction practices.

He further cautioned, through off the record, that higher the structure, risks get compounded from structural to natural (such as velocity of air, cyclone, tremor etc.). This has to be only admitted. (to be avoided in a large measure through construction technologies).

His remarks further include that Multi Storey Buildings near lakes pose a permanent threat as the soil condition beneath the earth undergoes unpredictable changes. It may defy engineering excellence.

The Site Engineer went on to say further that this is the reason many eminent builders prefer to have skyscrapers in the city itself.

Here, it is quite pertinent to note that "a structure is meant to withstand or resist loads with small and definite deformation. There are two types of failures associated with a structure namely material failure and configuration failure. The stability loss under compressive load is called structural instability, commonly known as buckling. A buckling failure is potentially very dangerous and may trigger the collapse of many types of engineering structures".

(Source: first page – Introduction, Book Name: Stability Analysis and Design of Structures. Author: Murari L Gambhir. Copy right @ 2004 – Springer – Verlag Berlin Heidelberg. First Indian Reprint 2005, Second Indian Reprint 2009. Published by: Springer (India) Private Limited, a part of Springer Science + Business Media, Registered Office 906 – 907, Akash Deep Building, Barakhamba Road, New Delhi 110 001, India. ISBN: 978 – 81 – 8128 – 335 – 1) [1]

Price of the building is for the quality of the same. The purchasers, nowadays, are no longer sticking to price consideration but are absolutely particular about quality of construction. They do not mind even paying more for quality aspects.

The trend is now shifting from conservative living to luxurious living. Luxury homes are on the increase in construction as people evince keen interest in this.

The Builders are also very particular in quality aspects. Even small builders who do minimal constructions are quality conscious as customers are quality aware. Large scale builders make no compromise at all on quality facts.

They do not want to have different products, though of same combination, to be used in their projects. They use a particular brand of cement only and similarly they buy bricks and sand from specific sources alone who ensure quality standards.

Uniformity of brand – particularly, sand, brick and cement is the secret of their success.
They have more than one supplier in their list. They do not want to have dependence on a single source which is always risky.

By virtue of their large volumes, they split the business to two to three suppliers of same brands of supply by which they get their inputs exactly as they need and as per their requirements, always.

There are builders who insist that their Supply Chain Contractors must be able to bring in the quality improvements expected by the builder, in the supplies. In other words, they should be able to cope with the quality expectations of the builder.

The Site Engineer further said that the Cement Manufacturer, whose brand only they use in all their construction sites, used to advise the builder about various improved methodologies in concrete mixing and the grades of cement to be used for same. Goes without saying, they supply as they advise.

Quality products are not just buying reputed brands in the market. It is the supply chain from the right source and with the package of continuous improvement.

Quality risks are to be avoided by making purchases only from standard and reputed suppliers. There is no place for price consideration in quality. Quality is always First and Foremost, especially in construction field.

As quality risks will shake the whole construction sooner or later, no builder takes risk in this.
The success of "quality buildings" earned by eminent builders is purely attributable to their Supply Chain Management. Not only they, but their suppliers too are quality conscious and that's why the buildings testify the reputation of the builder.

CONTRACT RISKS

It is observed that all leading builders have only very minimum staff in their permanent payroll. They resort to outsourcing for all their activities. As they have excellent Supply Chain Management with all suppliers, they also enter into Labour Contract with reliable contractors for supply of labour.

The reliability of the contractor is so important that there should not be any let down in either supply of labour or the number of persons as required at the site.

A delay of even two days matters a lot to the builder. The losses are silent and they will only eat away the legitimate profit of the builder.

The contract is made by legal experts and it is read for clarity at both ends – contractor as well as builder. The Contract Agreement is made by the two only after having read and agreed to the various clauses set out in the contract.

Nevertheless, there are issues which will be so peculiar that neither will own the responsibility for that.
The clauses so clearly say that in the event of any loss to the builder by the act of the contractor and similarly the other way, the aggrieved party should be redressed by the offended party. The bone of contention would be who is what?

There are litigations in this. When litigation comes in, the name of both gets sullied.
The best way to avoid contract risk is not to give place for that at all. If any misunderstanding erupts, such an issue should be amicably resolved then and there.

This would be possible only when the builder and the contractor have mutual respect for each other. The policy of give and take strengthens the bond of friendship and contract value and thereby both stand to only gain.

Contractor Risks/Logistics risks

The main concern is this. Multi Storey Building construction is characterised by large scale activities. Men, Materials and Machineries are more in use. The mix and proportion of these give place for risks.

Contractors are normally cautious – but, occasionally, they slip too. Lack of clarity in instructions, particularly to migrated labour, ends up in mess. Repetitive rework is only causing weakness to the structure.

A casual approach to concrete mixing will only throw the construction in jeopardy. This will not be felt immediately but the effect of the same will be reflected in the structural stability later. The reputation of the builder will go off for ever.

A committed builder is expected to show great care and personal attention in concrete laying and curing. The edifice stands safely only on the thoroughly built concrete.

It is to be noted here that "when a concrete slab is supported by steel beams and there is no provision for shear transfer between the two, the result is non composite section. Loads applied to non-composite section obviously cause the slabs to deflect along with beams. For many years, steel beams and reinforced concrete slabs were used together with no consideration made for any composite effect. ….. A great strengthening effect can be obtained by tying the two together to act as a unit in resisting loads. Steel beams and Concrete slabs joined together compositely can often support 33 – 50% or more load than would the steel beams alone in non-composite one. The floor slab in composite construction acts not only as a slab or resisting the live loads but also as an integral part of the beam.

An additional advantage of composite construction is the possibility of having smaller overall floor depths – a fact of particular importance for tall buildings"

(Source: Pages 535 – 538. Book name: Structural Steel Design – Fourth Edition. Author: Jack C. McCormac, published by Pearson Prentice Hall, Pearson Education, Inc. Upper Saddle River, NJ 07458, Copy right @ 2008, Pearson Education Inc. ISBN: 10: 0 – 13 221816 – X and ISBN: 13: 978 – 0 – 13 – 221816 – 0 [2]

It is a peculiarity in construction projects that the engineers and contractors pay huge attention in foundation, concrete, and further activities to proceed further. They normally pay scant attention in plumbing as it is a simple one and they firmly believe that with their expertise in the field, no mistakes could ever take place.

The slip occurs only here. A poorly laid pipes will be a cause for leakage initially and unabated of this ending in seepage ultimately. For a seepage in second floor, the original cause could be in ninth floor. Unless the root problem is arrested, the temporary patch up work only leads to further complications.

This evidently means that from ninth floor, the whole piping structure needs to be thoroughly checked and it is possible that all the floors in between too would have the same problem, coming out any time.

There are occasions when the eminent builders re-routed the whole piping structure at their own cost, in order to save their reputation. The owner is penalised with loss of money, time and name.

The contractor should only be blamed for this.

The builders pay great deal of attention in concrete mixing, marble fixing and also in carpentry. The plumbing normally eludes their attention.

In his own interest, the builder should organise a "Fortnightly Meeting" with all stake holders to assess and address the issues. It is sure that no problem can go unattended for more than two weeks.

Any corrective action at the initial stage is easier and yielding results.
In big sites, machineries are used in large scale. Excavator, Cranes etc., are required every now and then. Since these machines occupy sizeable space which is already cramped with men and materials, the contractors commission these machineries as and when the need arises.

The important issue here is that any delays in this will only hamper the construction activities. The site engineer (who is in the permanent payroll of the builder) said that owing to some communication gap, basically at the contractor's end, the pre-stressed concrete slabs have arrived at the site whereas the cranes did not turn up.

This led to heated arguments and altercation. The contractor said that while he gives support to logistics, logistics does not come under the contractual agreement and it has to be handled by the builder only.

It is a clear case that "support to logistics and logistics support" are distinctively different and contractual responsibilities are to be thoroughly defined and fixed with.

There are also occasions when workmen would be available at the site but waiting for materials to start the work. The materials would arrive in the afternoon or early in the evening qualifying for the **date** of delivery. What actually matters for date is the **physical** delivery at the site.

The work could be started only the next day after receipt and assembly of the materials. Here the issue is what about the wages for the group of workers who were only waiting all day long without doing any work (which could not be done owing to late delivery of the materials).

It is a clear case of "wasteful wage for group of workers for zero productivity". The loss is only to be digested by the Builder, ultimately.

With better planning and co-ordination, this kind of risks are to be avoided at all costs.

Occupational risks
The occupational risks are more and severe in the case of multi storey buildings. In a way, it is directly proportional to the number of storeys of construction. More the floors, more it Mars.

Technically speaking, both the Builder and also the Contractor are jointly responsible for these risks. But the peculiarity is both will try to come out of the issue by shifting the blame on the other.

Aluminium Ladders only to be used at the site. Whereas, majority of ladders are made of wood.
Hazardous materials, inflammable materials should be stored in a separate place with proper fencing. Sign boards of prominent size with caution remark are to be kept catching the attention of the workers. In fact, this was not followed even in the second site, which was known to be strictly adhering to the construction practices.

Use of Excavators and Cranes should always be with security vigilance as the injuries caused by these would be severe and even fatal. Many contractors do not strictly follow this. This is a silent but dangerous threat.

All construction workers must compulsorily wear hard hats as head injuries are dangerous. This was just ignored in the first site and only partially followed in the second site. Both the Contractor and Builder are to be accountable for this.

Fall is a common sight in construction site. Each and every floor must have proper precautionary arrangement so that the fall could cause only sufferable injuries and not end up in fatal.

Electrocution is yet another dreadful risk. In variably, the sites are wet during construction. A slight chance will be grave.

The pity is that the people are busy with their loads and tools in work unmindful of the safety aspects which they are expected to have. Most of the accidents occur due to carelessness. The attitude of workers is to finish the work fast and this "rushed sense" benumbs their "common sense" leading to accidents.

Workers should be reprimanded, for that matter, even punished for not adhering to safety regulations. But, the responsibility squarely rests with both - Contractor and Builder only, for any eventualities.

Capital Risks/Locational Risks

The Builder only should bear the brunt of these risks. The Contract being of whatever nature – Turn Key Project or Labour Contract, the builder is the person pumping in the money as and when needed.

While the Builder is preparing the Budget before physically starting the construction activities and getting fully geared up for financial cash flows, more often than not, he is stuck with cash crunch.

This is more acute in the initial phases. Once the construction has progressed reasonably well, bookings start taking place and the builder is able to mobilise some cash receipts from prospective buyers. This will take care of only just a small portion of actual capital requirements.

Institutional finance to builders is always against securities or bank guarantees. Limitations are there in this regard. All the builders resort to open market financing. Actually, they get money from private money lenders at exorbitant rates. While there is no ceiling for obtaining money from lenders, the interest rate is threatening. It is cumulative interest on Daily Basis. Many Big Builders too are in the jaws of alarming interest from money lenders. The stark reality is that in spite of all this, they are grappling with the situation and proceeding with their construction projects.

There are also occasions where many projects had been abandoned as the accumulated loans have overgrown the very cost of the projects. Many builders had deplorable experience with money lenders, yet, they have to depend on them only as they have the money immediately and whatever also be the amount.

Capital risk in large scale building is simply inevitable. The builders' pricing strategy of their apartments takes into consideration these aspects.

A prudent builder always makes a comparison of Plan Vs Actuals in the capital outlay. Any over expenses situation is carefully monitored and stringent action is taken by him in arresting further burning away of money. Appropriate action is initiated in Supply Chain Management, Most Minimal Inventory, Labour Contract, pruning down the expenses in all the areas.

In spite of all these, cash crunch in construction sector is a very common one and all the builders feel the blow of this. The fact is, larger the construction, harsher the blow is. The builders still survive with it, as part of their business.

Capital Risk is a major thing in construction industry, especially, in high rise building construction.

Locational Risks

Here again, the problem rests with only the Builder. The cost of land is shooting up day by day. Many Manufacturing companies also started showing interest in Realty Sector, as part of their diversification. Bulk purchases are embarked upon. This is one of the reasons for cost push in lands.

Tempted by this, agriculturists who own small pieces of lands are also allured and start selling their paddy fields which subsequently get converted into layouts.

In their anxiety to acquire lands, many realtors simply grab the land at whatever price they chance upon for future sales.

The lands near lakes always pose threat of water. It is not overflowing of lakes which seldom takes place but the condition of soil is always a question. The problem assumes greater proportion if the construction is a high rise one. Even after getting satisfied with the various tests on soil condition, the structural stability poses a permanent threat. This is a private remark of a Structural Engineer.

In this regard it is relevant to note that "the two most important properties of a soil that a foundation engineer must be concerned with are strength and compressibility. Because earthern structures are not designed to sustain tensile loads, the most common mode of soil failure is shear. Hence, the shear strength of the foundation medium constitutes a direct input to the design of concrete structures associated with the ground"
(Source: Pages 14 – 2 to 14 – 5. Book Name: Concrete Construction Engineering Handbook – Second Edition. Editor In Chief Dr. Edward G Nawy, P.E. C.Eng, Distinguished Professor, Rutgers - The State University of New Jersey, Copy right @ 2008, by Taylor & Francis Group, LLC. Published by. CRC Press, Taylor & Francis Group, 6000, Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487 – 2742. ISBN: 13: 978 – 0 – 8493 – 7492 – 0 [3]

The eminent builders who are in the field for years do not evince any great interest in acquiring lands near lakes. Their preference is City or outskirts of city but definitely not near lakes.

Similarly, attempting to construct several storey building in a congested area is also risky as the chances of damage to nearby buildings are more. In addition, process of construction would become cumbersome and the risk factors are also more.

Concrete construction in seashores is not advisable. Old timer builders never venture on this. The salty air, over a period of time, will start rusting the iron and would cause severe damage to the whole structure.

In this regard, it is worth noting that "Deterioration of Concrete exposed to Sea water occurs by the chemical action of dissolved salts in Sea water. The temperature of the Sea water also affects its attack on concrete. Deterioration of concrete by chemical attack is more severe in warm climates whereas the mechanical effects of alternate freezing and thawing of the water in the concrete is a major problem in cold climates".
(Source: Pages 148 – 150. Book name: Cement and Concrete. Author: MSJ Gani, Faculty of Engineering, Monash University, Clayton, Victoria, Australia. Published by: Chapman & Hall, 2 – 6, Boundary Row, London, SE18HN, UK.. Copy right 1997@ MSJ Gani, ISBN: 0 412 79050 5) [4]

The builders of younger generation stoutly refute this. As per them, with the latest inventions in construction science, this problem can be fully solved and the concrete buildings would remain as fit as they are in the city. While due considerations can be given to this, attempting to construct multi storey buildings in the areas of locational risks is not advisable at all.

CONCLUSION

The strength of female employees in construction field is reducing, of late. The reason is that they are able to get comfortable jobs in housekeeping areas in companies.

On the other hand, the migrated labour finds construction industry as their immediate source of employment. The presence of migrated labour in construction field is found to be on the increase in Tamil Nadu.

Safety aspects are not strictly followed by workers at the site. What is the use of piling up the helmets without wearing them?

RECOMMENDATION

It is the duty of the builder, in his own interest, to conduct periodic meetings, say, at least, once in a Fortnight with the Contractor and all Stakeholders. This would enable him know what is actually going on in the site. The information of the Site Engineer is only secondary and the builder should have access to all information, himself. A hidden information or delayed information will prove costly, to the builder.

ISSN 2349-4506
Impact Factor: 3.799
Global Journal of Engineering Science and Research Management

All the inputs should be of same brand and procured from the same source. This would help a lot, particularly in warranty claims.

Never rush through construction, to make up delays.
Always have more than one source. However strong and reliable the source is, dependence on a single source is always risky.

All safety parameters must be installed in the site and it is quite essential that the safety procedures are strictly followed by all, at the site.

Have an eye on logistics as it has direct bearing on labour productivity.