

CHAPTER 2: OVERVIEW OF CONSTRUCTION INDUSTRY

2.1 Introduction

Construction is the basic fundamental tool of civilization which paved the way for our present modern living. The progress of construction industry paves the way for the parallel progress of hundreds of related industries and the economic improvement becomes multifold. Construction industry's origin dates back to 12,000 BC, when rings of stone, are believed to have been used as shelter. The various technological, engineering turnarounds in the industry have led to the present unprecedented growth that, there is competition amongst project developers for the tallest towers of the world.

2.1.1 Residential construction

All building construction projects include some elements in common - design, financial, and legal considerations. The construction engineers with experience in the field make detailed plans and maintain careful oversight during the project to ensure a positive outcome. Residential construction practices, technologies, and resources must conform to local building authority regulations and codes of practice. Materials readily available in the area generally dictate the construction materials used (e.g. brick versus stone, versus timber). Cost of construction on a square meter (or per square foot) basis for houses can vary dramatically based on site conditions, local regulations, economies of scale (custom designed homes with special specifications are always more expensive to build) and the availability of skilled trades-men. University Construction Management departments and many construction research bodies are on the cutting edge of the newest methods of construction intended to improve efficiency, quality, performance and reduce construction durations. Various efficiency measurement systems and procedures have come into effect in recent years as many newer and faster methods have emerged out within construction technology.

2.1.2 Heavy/civil construction

Heavy/Civil construction is the process of adding infrastructure like bridges, roads etc. to our built environment. Owners of these projects are usually government agencies, either at the national or local level. As in building construction, heavy/civil construction has design,

financials, and legal considerations, these projects are not usually undertaken for-profit, but to serve the public interest. However, heavy/civil construction projects are also undertaken by large private corporations, including, among others, golf courses, harbours, power companies, railroads, and mines, who undertake the construction of access roads, dams, railroads, general site grading, and massive earthwork projects. The client of the project generally formulates an engineering and management team who stipulate an overall plan to ensure that the goals of the project are met.

2.1.3 Industrial construction

Industrial construction, though a relatively small part of the entire construction industry, is very important. Owners of these projects are usually large, for-profit, industrial corporations. These corporations can be found in such industries as medicine, petroleum, chemical, power generation, manufacturing, etc. Processes in these industries require highly specialized expertise in planning, design, and construction. As in building and heavy/highway construction, this type of construction requires a team of individuals to ensure a successful project

2.2 Construction through time

Food, shelter and cloth were considered as minimum requirements for a common man. The important necessity of the human being, “shelter”, was fulfilled by means of construction of buildings namely, “house”, which was the fundamental/basics in construction. The construction Industry has advanced its journey since 12th century BC starting from the stone ages to the modern skyscrapers. There has been no limitation to this growth and with the advent of engineering and technological advancement a consistent growth has appeared in the construction industry sector also, which has led to its present status.

New engineering innovations for the basic construction techniques, construction execution methods and systems, building materials, measurements and control techniques, plant and machinery, automation methods, safety advancements in construction, work study/time study procedures and exercises have contributed to this industry tremendously enabling it to reach its present level of growth. Today, there is greater emphasis on the environment and in relation to the greener community concepts the newer buildings are constructed.

The construction projects, which were executed for decades, have now been executed in very short durations. The interesting trend in present day's construction is that while the end user occupies a project on the finished floors, on a progressing project, the construction execution happens on the other floors, during the same time.

As times change and world population grows, one thing is certain: the growth in construction Sector will remain unaltered.

2.3 Economic History of the Construction Industry

As the Industrial Revolution emerged in Europe and North America, the situations forced the modern construction industry to replace the traditional methods to newer economies across the world. The rising complex nature of structures and buildings due to many newer residential requirement, paved the way for institutions and many best practices were to be developed to organize the growing number of requirements. The need of industry professionals were felt who will become responsible for building construction including architects, engineers, builders, craftsmen, and laborers for the modern construction industry.

The resulting industry due to above includes independent professionals, small and large firms, suppliers, sub-contractors and labor markets. The growing demand, changed technology, client-contractor issues, competitions, market power, credit and government regulations, all inter related functions of economy was well felt in the modern construction industry.

Present days the traditional approach being the owner hiring the builder who tenders the lowest agreeable bid. Large firms build big projects and small firms build small projects. The outlay for the projects, have been mostly managed with easy bank loans, in most of the countries in the world. The financial institutions while analyzing and appraising the projects thoroughly, fund the project owners and as well the contractors at the same time ensure the project progress through continuous monitoring. The outlays for construction projects are not a limiting factor nowadays.

2.4 Global Construction

The Construction markets in the world are always volatile in nature, while one region reported to be growing progressively and in some places there is a trend of aggressive growth also. While the prevailing economies of the nation's drive their infrastructure and construction developments. Consistently USA had a flat growth rate of 1.7 % while U.K. 1.9 %, Japan 2.3 %, and Hong Kong 0.4 % in the previous years. Since these growth potential have been marginal, countries like USA and Germany are trying to focus on the construction markets like India, Middle East etc. Increasingly, international firms are finding the importance of entering growing markets to keep up their earnings (Varghese M.M., 2000).

International companies are realizing that it is important to be 'domestic' in the markets where they want to grow. With the Indian markets now ripe in the merger and acquisition field, many International companies will evaluate the strategy of setting up 100% owned subsidiary and then moving in for an alliance or acquisition. Bechtel, Fluor and Kvaerner are among the leading contracting firms in Asia, all eyeing the big billion markets in Asia and Middle East.

The Indian construction industry in general has an annual growth rate of about 15% per annum. According to India's 11th five-year plan (2007-12), the core infrastructure sector comprising power, roads, highways, railways, ports, airports, mining and irrigation will require massive investments to the tune of US\$490 billion over the next five years to sustain current 9-10 % GDP growth per annum. Standard & Poor's report on the 20 largest Construction markets puts India at 15th rank with a total construction spending of US\$34.9 Million. Further the growth rate for 1999-2003 had remained at 10.4 % which is the second highest in the world next to Korea. (Varghese M.M., 2000). According to industry research agent RNCOS India, the earth moving segment of the Indian construction machinery market is anticipated to exhibit around 18 % of Compound Annual Growth Rate (CAGR) during FY 2011 - FY 2014 with strong demand emanating from the government backed infrastructure projects.

According to the Third Quarter 2011 Information Handling Services (IHS) Global Insight, the outlook for 2015 global construction spending will be increasing at a compound annual growth rate of 4.7 %, while the outlook beyond 2015 projects for a return to moderately strong growth, in the future years. Most of the 2012 growth leaders will be Panama, with a

growth of nearly 13 % over 2011 spending levels as the Panama Canal expansion is continuing, while Japan and New Zealand, as they need to reconstruct the nation from earthquake damages. China, on the strength of the government's emphasis on development in interior and western regions has strong potential while Saudi Arabia has increased investments in infrastructure and housing, coupled with higher oil prices. All these make these countries maintaining consistency on spending in the construction sector. Statistics Canada says the sector had generated just under \$15 billion in 2010-almost 6 % of the provincial Gross Domestic Product (GDP). According to Royal Bank of Canada (RBC) projections construction in Canada has been forecasted with a GDP growth of 1.7 % in 2011 and 2.1 % in 2012.

In the long term, in addition to the Panama Canal expansion project, construction of various sports facilities and venues in Latin America, the Middle East and Europe will have major impact on the construction outlook. Sports related construction including world events will also add good demand to the overall newer construction projects in countries like U.K., Brazil, Russia, Poland and Qatar.

2.5 Challenges in Construction:

For construction, hundreds of workers must come together to complete the project assignments. Hence proper man management and the necessary infrastructure/facilities and resources have to be provided for the massive workforce. Unplanned construction activities tend to consume more than their estimated time and cost, and hence effective project control methods are also to be in place. The follow-on activities and the related sub activities generally drive the requirement of crew preparedness. The vertical and horizontal movement of materials in the project site is also a frequent issue. The sequence and changes are imposed by the client and the Engineer, and causes lot of work disruption and cost overrun. Subcontractor and supplier management is also vital for the successful execution of construction projects.

2.5.1 Methods of Construction Project Control

- Accurate follow up of the project plan.
- Preparation of detailed work breakdown structure.
- Preparation of cost estimates for all activities in line with the budget.
- Evaluation of project performance depending on cost, time and quality.

- Implementation of control systems to identify schedule variances and take corrective action to achieve project schedule targets.
- Ensuring quality of construction which is single factor that determines and differentiate a good construction from any other construction.
- Facilitating good resource of formwork and scaffolding drive the project in a faster manner.
- Ensuring formworks and scaffoldings are properly designed and constructed so that concrete can be properly placed and thoroughly compacted.
- Meeting the client's requirements and achieving the end results with the best possible cost, schedule, and quality performance.
- Effective cost and schedule management are the cornerstone activities of each project.
- Tools like S-Curve, histograms, project cost monitoring meetings help to control cost and time

2.6 Construction in the United Arab Emirates

The construction industry always aims at improving the quality standards of the people of the world and the environment, by innovations in new materials, new systems, execution techniques, safety, machines etc. The building and construction sector is the third largest sector of the UAE economy after oil and trade. The level of construction spending per capita is high – second only to Japan.

The scope of construction in this part of the world was very much limited in the 20th century until the business growth began with more number of people traveling, to this part from neighbouring countries like India. The Indian traders, making entry into these countries, along with trading, brought with them the art of construction trades also, the source and skill of that trade was abundant in their country due to various historical regimes prevailed over centuries there, leaving multicultural construction techniques which speaks for itself even today to the world. After the discovery of petroleum in these areas, the growth was inevitable in the construction sector, due to increased requirements of necessary infrastructure and also to cope up with the needs of the tradesmen and skilled people who started to make this part of the world as their living places. Most of the labor force in construction is from the Asian market, predominantly from India and Pakistan.

The main driving forces of construction spending have been high oil prices, renewed liquidity and strong investor confidence. The following factors also drive construction spending in the UAE:

- Government spending on infrastructure such as roads, ports, airports and rail to support its commitment to becoming a business and tourism hub for the Gulf region;
- High rates of imported labor (both blue collar and professional) who further add to the demand for residential housing, commercial suites and solid infrastructure;
- The positive outlook of private-sector developers who are constructing a huge counts of high-rise commercial and mixed use buildings, shopping malls, hotels, tourist resorts and low-rise residential complexes to support the rapidly growing population;
- The excellent infra-structure facilities which are always aimed at facilitating the business and as well the public interests
- The high oil price which really contributes in a significant way to the wealth of the UAE;
- The relaxation of foreign investment laws to allow non-UAE nationals to purchase property.

A federal law authorizing freehold ownership is planned in the Emirates and this is expected to further fuel the construction boom throughout the country. The governments of Abu Dhabi, Dubai and Ras-Al-Khaimah have separately issued laws allowing own freehold property in specified investment areas. Major development schemes in Dubai, such as the Burj Khalifa, Dubailand, Palm Islands, The World, Dubai Waterfront, Dubai Festival City, Business Bay, Underwater Hotel etc., are fitting project examples which have kept many construction contractors consistently busy. The government is intending to transform the nation into a popular tourist and business destination and acts to prepare a stable foundation for long-term economic growth. Lot of expansion on the infrastructure projects and waterfront projects has happened in the region including airport expansions and road works.

Despite the very positive outlook for construction in the UAE, there exist areas of difficulty faced by many sub-sectors within the industry. Rapid hikes in the cost of key construction materials, predominantly steel reinforcement bar (rebar) and cement – but also wood products, over the past few years have left many contractors struggling to carry the extra

costs. Materials shortages have been hard-felt by contractors during the peak construction period. In an attempt to confront the situation, an increasing number of contractors are entering into long-term agreements with key suppliers to ensure continuity of supply. Though there is still room for more specialized contractors in the region, the growing number of indigenous companies in the general construction sector is having a significant impact on firms already established in the region. Many of the new players are submitting very aggressive, even loss-making bids for contracts in order to fill the order books. Existing contractors are thus forced to squeeze their margins to unsustainable levels just in order to win contracts.

The construction industry was at boom in the UAE since 2005. Real estate and construction were the drivers of economic growth in the UAE. The value of construction contracts awarded during 2005, 2006 and 2007 were Arab Emirates Dirhams (AED) 58.8 billion (US\$16.0 billion), AED 114.1 billion (US\$31.1 billion) and AED 120.2 billion (US\$32.8 billion) respectively. Construction sector alone contributed to around AED 40 billion to UAE National production in 2007 which was approximately seven % to the overall GDP. The statistics book called Dubai in Figures reported the statistics as a total of 2,222 buildings were completed in 2006 and 2,252 buildings were completed in 2007. The growth was observed as 24.4 % and 21.6 % consecutively by 2010 for the construction and real estate sector. Together these sectors have contributed 23 % of the national economy up to 2010, compared to 16 % in 2006.

The effect of the global financial crisis (GFC) on the UAE has been swift and sharp. In mid-2008, the UAE had 1,289 construction projects underway valued at over US\$1.4 trillion. Over 52 % of these are reported to have been suspended. According to the Middle East News Data and Analysis (MEED), while the drop is significant, the construction and property market in the UAE is still by far the largest in the Gulf at nearly double the size of Saudi Arabia. (MEED Gulf Projects Index, 2009). The building and construction sector is still the third largest sector of the United Arab Emirates (UAE) economy after oil and trade, constituting US\$23 billion or about six % of GDP, even in the current post-financial crisis climate. The economic downturn has meant changes in the UAE's dynamic business environment. As a result of the GFC, the construction industry is witnessing a move away from residential and commercial construction and a move towards infrastructure projects. A report says that real estate projects worth more than \$300 billion (400 projects) have been put

on hold or cancelled in the UAE. The country's construction market has tried to remain active with more than 750 on-going projects and 450 recently completed at the end of year 2009. (Arabian Business, 2009).

However, despite the downturn, Dubai is still home to 28 % of the country's largest projects. Business Monitor International (BMI) forecasts that the contribution of construction to the economy will return to levels of over 10 % of GDP again 2010 and 2011 (BMI, 2009). The three main areas for construction in the UAE are Abu Dhabi, Dubai and Sharjah, with Abu Dhabi currently the epicentre of construction activity.

The UAE construction industry is expected to witness a compound annual growth rate (CAGR) of around 20 % from 2010 to 2013, according to the 'UAE Construction Industry Outlook for 2012' report by industry intelligence provider RNCOS India, as rapid economic development continues to drive construction activities and infrastructure development in the emirate. The future prospects for the sector particularly infrastructure development and airport expansions in the UAE hold much promise to the civil contractors. With less construction work available and heavy competition for projects, construction companies working in the UAE have been forced to reassess their strategies in order to remain competitive.

2.7 Construction Companies in the UAE

The UAE, with its aggressive spending and high import propensity, presents vast opportunities for contracting companies for performing businesses in the building and construction industry. Suppliers of building materials, products and other materials usually require agencies and dealers who can work to ensure their products are pre-qualified with the architects and consultants. Specialized service providers in construction business need to bid for the projects and therefore, a local presence is always recommended. The bulk of building materials are imported through Dubai, Abu Dhabi Ports. Major importers have significant warehousing facilities and well-developed distribution networks. The major importers have branches in at least the three major Emirates – Abu Dhabi, Dubai and Sharjah. The Middle East has a strong manufacturing base and well developed relationships with suppliers in India, China and Europe.

There is good presence of international construction companies. Multiplex, Skanska, Samsung, Bechtel, Turner are some of the international companies. Local companies including Arabtec, Khansaheb, ETA Ascon, Al Habtoor, Dutco, Al Shola, Al Shafar, ABM, Al Jaber are some of the leading names in the construction business in the United Arab Emirates.

In the absence of a formal building code, over the years, the municipality of the emirates accepted the practice of British standards. However, the UAE's emirates have developed their own building codes. In many cases the accepted systems are British standards or equivalent. The main objective of construction organizations in the UAE are mostly time driven. Companies with clear project management directives always aim at controlling the factors of Time (T), Quality (Q), and Money (M). Generally projects consist of three main components including scope, budget and schedule.

The companies face many problems including cost overruns, time extensions and conflicts with all parties concerned. The projects are generally unique with high risk, highly fragmented, highly competitive and with increasing challenges. The construction companies need to utilize the available resources effectively to meet the project requirements and deadlines without sacrificing the quality and safety.