THE EFFECTS OF UNSKILLED LABOR ON THE QUALITY OF CONCRETE CONSTRUCTION

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Abstract

The unskilled labor from the Indian sub-continent has played a major role in the development of the construction in the United Arab Emirates (UAE) with more than 350,000 laborers. The development for these laborers exceeds $25 billion in value. Educating and training these laborers will result in billions of dollars of saving in this industry not to mention the result of added quality in construction. Generally, these unskilled laborers get their training on site at the present time. This paper provides an historical overview on the subject with some selected statistics in relation to the impact of the imported labor force on these constructed projects. The data is the generated based on the personal experiences of the author and the proposed comprehensive research, which will potentially provide significant saving in the future construction projects. The need to train the India personnel before they land in UAE has been identified; such training given especially in their home country even before they leave their country, will play an important role due to the increasing complexity of structures being built and also of the growing safety concerns of the workers. The pro-active education and training scheme is being developed on Indian background and will include a model, which may be used in the other neighboring countries with suitable modification to expertise from elsewhere; this will be like an insurance policy for more success compared to that demonstrated earlier, for the future to benefit all participants in these projects in the ever-shrinking global village.

Key Words: Infrastructure, Construction in the UAE, Labor force, Social impact.

1.0 INTRODUCTION

This research is concerned with construction techniques and methods that are currently being utilized in the construction industry in the Gulf Countries (GC). This review is focused on the impact on the construction projects in GC as more facilities developed have become more complex. Considerable support in these projects comes from other countries from Pakistan to Malaysia with main contributions from Indian sub-continent. Thus their work will benefit initially the projects in GC, but finally contributes substantially to the communities in their native lands both socially and economically while assisting the GC projects to achieve the success.

In the United Arab Emirates (UAE), the developments in construction have taken place only recently after their independence compared to either the United States (as developed country) or its neighbors such as India (as developing country, but soon will become a developed country with their
current economic growth). It must be noted that the progress in the UAE has taken place only in the last decade in which Indians have contributed in a major way. The current quality control problems being experienced in the UAE are affecting projects in other countries as well.

Thus, the major goal in this research has been to review the existing construction practices and standards in UAE, India and US with an aim to develop new standards and codes and ultimately developing improved quality of infrastructure. Although emphasis will be on concrete construction in a cooperative manner to benefit all components, aspects of materials/engineering/architecture and construction need to be investigated as well. They will be based on the local construction projects in the UAE, the capacity and potential of the technical and general migrant labor force.

The quality problems in construction are not only technical, but have social impact as well. Such problems could be considered in a social science research in the future as an extension of this project. Such approach will be very useful in this overall objective to improve the infrastructure both in UAE and in India.

2.0 PRESENT STATUS OF CONSTRUCTION IN UAE

The details of various construction projects in UAE under development and their developers are presented to indicate the growth in the construction industry to develop the intended scope of this research.

The UAE has the largest share of the recent construction boom of the Gulf countries. Using their oil revenues judiciously, these countries have used this wealth to become the most desirable place to live and enjoy the best life on earth. Compared to four seasons in many parts of the world, they have only one season i.e., summer with varying levels of heat. They do not have natural snow or winter. It however helped developers to imagine and build the in-door skiing facilities when the temperatures are well above 35°C. This section demonstrates some of these unique projects to show timeliness of this research. Furthermore, the fact that there is no established building code in UAE and no in-depth study of the quality control problems on a large scale, further galvanizes the need for such studies.

The total value of construction projects in the Gulf is over US$2.4 Trillion, which is spearheaded by developments in Saudi Arabia and the UAE, as has been reported by research firm of Proleads in Dubai. Their recent data (November 2007) indicates a total of 2,837 projects in the GC amount to US$2.46 Trillion with developments such as the King Abdullah Economic City (KAEC) in Saudi Arabia, Kuwait's Silk City and Dubailand among the most ambitious ones. When additional developments currently in the early planning or concept stage are also taken into account, these projects will reach a total of 3,519 projects with cost over $2.5 Trillion.

Saudi Arabia, the world's largest oil producer, leads the way with construction projects in the kingdom topping $1.1 Trillion with the UAE in second place with developments cost of over $700 Billion and Kuwait being in third place with projects valued at just under $300 Billion. The largest of these civil developments is KAEC, a $120 billion development by Dubai-based property giant Emaar. The mammoth project will span 168,000 Hectares and comprise of six components: the Sea Port; Industrial Zone; Central Business District; Resort District; Educational Zone; and Residential Communities.

(a) (b)

Figure (a) above shows various construction projects in Dubai are worth $700 billion. These sites are just a few in Dubai. Figure (b) shows the Burg Tower in Dubai under construction, expected to reach the height of 700 meters to become the tallest structure in the world.
There are several developers and contractors, who have contributed to the success of construction industry in the UAE, mainly in Dubai-Abu Dhabi region. They include: Emaar, Nakheel, Aldar to mention the top few. A brief review follows to indicate their strength and relationship with the progress similar to those companies in India with classical names as Gammon (India), L&T to most recently GMR but on a much larger scale at a different pace.

**Emaar Properties PJSC** is one of the world’s largest real estate companies and is rapidly evolving to become a global provider of premier lifestyles. Powered by its Vision 2010 to become one of the most valuable companies in the world, Emaar is charting a new course of growth with a two-pronged strategy of geographical expansion and business segmentation. Emaar has highlighted its remarkable global growth by debuting on the Financial Times Global 500 ranking, which provides an annual snapshot of the world’s largest companies. Emaar has been assigned A1 and A3 ratings with stable outlook by Standard & Poor’s and Moody’s Investor Services, respectively. Replicating its successful business model in Dubai, Emaar is extending its expertise in creating master-planned communities to international markets. Emaar is also developing new competencies in retail, hospitality and leisure, education, healthcare, finance and industry, which have evolved from its integrated approach to customer service and property development.

Emaar is listed on the Dubai Financial Market and is part of the Dow Jones Arabia Titans Index and certified with the ISO9001: 2000 for quality standards. Emaar is the developer of the Burj Dubai, the world’s tallest tower and Dubai Mall, one of the world’s largest shopping and entertainment destinations. In Saudi Arabia, Emaar is developing King Abdullah Economic City at the cost of US$26.6 Billion, the region’s largest private sector-led project. Emaar’s portfolio currently covers the following countries: the UAE, Saudi Arabia, Jordan, Syria, Lebanon, Morocco, Egypt, Turkey, Libya, India, Pakistan, Indonesia, the US, the UK, France and Canada. An award-winning developer, Emaar has strengthened its product sale competencies, market reach and best practices through strategic acquisitions and joint ventures. Emaar acquired John Laing Homes, America’s second largest privately held home builder; Hamptons International, UK’s premier realtor; and formed a joint venture with US-based Turner International to strengthen execution capabilities. Emaar has joined hands with Giorgio Armani and Accor Hotels to strengthen its presence in hospitality, and will launch ten luxury Armani resorts and hotels worldwide and 100 Formula 1 budget hotels in India. The company has contributed to the educational institutions and healthcare centers in South Asia, Middle East and North Africa and its Subcontinent. Emaar acquired Singapore-based leading education provider, Raffles Campus to extend expertise to its educational institutions. Emaar holds 30 per cent equity in Dubai Bank, focused on retail and commercial banking and is the largest shareholder in the UAE’s leading Islamic home financing company, Amlak.

As Dubai's premier development company, **Nakheel** has changed the very texture of the city with landmarks of ingenuity, distinctive residential communities, unique retail offerings and unprecedented investment opportunities. With groundbreaking research and thought leadership, Nakheel's focus is on building icons that embody innovation and progress, creating a legacy of value for generations to come. With more than 1800 employees, Nakheel currently has US$60 billion worth of major projects under development. Nakheel's portfolio includes the iconic and internationally acclaimed waterfront developments The Palm Trilogy, The World and Waterfront. Once complete, Nakheel's developments will add more than 1,000 km of beachfront to the Dubai coastline, and all its projects spread across more than 2 billion sq ft. A holding company that manages and supervises a diversified portfolio of businesses and projects owned by the Government of Dubai, Dubai World™ contributes to the rapid economic growth across the globe through a variety of sectors, including Property Development & Hospitality, Transport & Logistics, Maritime, Financial Services, Multi Commodities and Retail. The company was launched to continue expanding Dubai’s aggressive growth both domestically and abroad. It is a powerful economic engine with a collection of diverse and successful companies including: Dubai Ports World (DP World), P & O, Free Zone World, Dubai Drydocks, Dubai Maritime City, Dubai Multi Commodities Centre, Limitless, Nakheel, Istithmar, Tejari and Technopark, among others. Dubai World™ is also associated with Kerzner, One & Only, Atlantis, Island Global Yachting, Inchcape Shipping Services and additional strategic partners. Nakheel’s partners worldwide include, The Trump Organization (US), Tata Taj Luxury Hotels (India), Kerzner International (Bahamas), Kempinski (Germany), Jumeirah Hotel Operators (UAE) etc. to mention a few. The figure below shows a number of properties that Nakheel has developed to earn their reputation as successful developers and contractors.
ALDAR Properties PJSC is a leading property development company, with strong investment and management capabilities. ALDAR was established primarily to create world-class real estate developments for the nation of Abu Dhabi, whilst providing a stable and profitable investment portfolio for all our investors. They are dedicated to achieving new standards of innovation, excellence and value in urban design and sustainable development. Our priority is the immediate and future benefit of Abu Dhabi and its residents. The company is owned by leading Abu Dhabi institutions, founder shareholders and over 20,000 investors within the UAE with principal corporate shareholders including:

- Mubadala Development Company
- Abu Dhabi Investment Company
- Abu Dhabi National Hotels Company
- National Corporation for Tourism & Hotels
- National Investor

Central to the success of ALDAR are over 200 multi-disciplinary staff providing expertise and knowledge from around the globe. One of their projects are shown in the figure below:

The continued growth of the Northern Emirates’ industrial sector sheds light on the crucial importance of UAE’s industrial free zones for economic development in the region. Free zones act as a catalyst for local and foreign investment by offering incentives such as 100% foreign ownership, one-stop locations for paperwork and procedures, exemption from import duties and taxes, full repatriation of capital and profits, and, in some cases, subsidized water and energy prices. The runaway success of Jebel Ali - the United Arab Emirate’s first free zone, established in 1980 in Dubai - has encouraged the establishment of more free zones, unleashing an industrial revolution in the UAE.

The largest of these is Ajman's Free Zone, inaugurated in 1988, which hosted 2115 companies at the end of 2006 - a 5.75% rise from the previous year - over a total area of almost 1m sq m. But real estate pressure around the Ajman Creek is forcing it to move. A new area has been designated and, according to the authorities, industrial activities will not be allowed to spread out of the new area, in a bid to ensure that industrial and residential areas do not overlap. The Port of Ajman, which has contributed significantly to the free zone's success, is also due for a relocation. The new port will be part of the Al Zora project's master plan. It will adopt a modular design that will allow it to grow and adapt to demand.
Sharjah's efforts in this matter have also been successful. The Hamriyah Free Zone, centered around the eponymous port, is in the process of almost doubling its surface area to 22m sq m. It hosted 1565 companies at the end of 2006. A spin-off of the Sharjah Ports Authority, it caters mainly to medium- and heavy-industry. The Sharjah Airport International Free Zone, with 2738 registered companies at the end of 2006, is a 6.1 sq m area located next to the airport. While it is more focused on trade, import and export activities, it also features facilities for manufacturing, assembling and packaging of goods.

Another emirate that has done well is Ras al-Khaimah where the RAK Free Trade Zone (RAK FTZ) was established in 2000. It has grown very fast and presently accommodates 1430 companies over a surface area of 4,500 Hectares. It has secured some high-profile deals, such as the German crane manufacturer, BTK's establishment of what will be the UAE's first tower-crane factory. The zone has been in the spotlight recently, with international-level visits from groups such as the Alexandria Business Association of Egypt. Also, RAK FTZ's CEO, Oussama El Omari, was recently appointed secretary general of the World Economic Processing Zones Association (WEPZA).

Finally, the Fujairah Free Zone, with 498 companies at the end of 2006, and a surface of 1.4m sq m, might not be the largest free zone in the Northern Emirates. But with a 24.5% increase in registered companies over 2005, it certainly is one of the most dynamic. Established in 1987, it focuses on light manufacturing, warehousing and distribution, and trading enterprises. Many oil-related enterprises have decided to set up shop there to cater to the thriving oil bunkering business in the Port of Fujairah. Authorities believe that industrial activities have only so many added values. Free zones, as a consequence, are increasingly focusing on associated services. In late 2005, for instance, Ajman Free Zone inaugurated a complex of over 300 offices. Similarly, Ras al-Khaimah recently inaugurated the RAK Global Logistics Park, as well as an Inland Container Depot. It will support industrial activities carried out in the RAK FTZ, as well as allow RAK Global Logistics (the joint venture company set up between RAK Ceramics and Global Cargo System to run the park) to tap into the lucrative logistics market system.

Some Northern Emirates are replicating the free zone model in non-industrial sectors. Ras al-Khaimah and Fujairah, for instance, are establishing media production free zones, and Fujairah will soon be host to 28 satellite TV channels, with 12 of them going on air as soon as next month. Ras al-Khaimah has also successfully implemented the RAK Education Zone, which has attracted high-profile education institutions, such as George Mason University, based in Fairfax, Virginia. So even if service-oriented sectors come to overshadow industrial activities, free zones are set to remain crucial assets for the Northern Emirates' economic development.

The staggering volume of development illustrated here and the lack of any significant research in the area clearly signifies the importance of developing and maintaining an optimum quality control system.

### 4.0 ANALYSIS OF THE CONSTRUCTION INDUSTRY PROBLEM

The Global aim in this continuing research is to provide the necessary tools and solutions needed to address the quality control problems identified as a part of the construction work as related to the industry of the GC. When completed, this work will provide the framework for the future with relatively high degree of technological transfer to the Indian workforce in the short to medium term time frame. The results will provide a working document with sufficient details to be adopted as the building standards of the UAE. These building standards will not only address the technical design and construction requirements for the industry, but will also include a structure with relevant support details for the training and certification of key technical construction personnel. Currently, efforts are being made for possible assistance on this topic from reputable concern from Europe with substantial experience in this task. The work is actual practice related and therefore many details are not available at this stage.

### 5.0 METHODOLOGIES AND TECHNIQUES TO IMPROVE CONSTRUCTION

This presentation is the first of the several planned as part of this continuing research. Therefore, only the steps are presented to complete this presentation. They include:

a. Documentation and project review including current available design and construction standards.

b. Survey of failures and successes of recent construction projects to determine the factors influencing the quality control of the projects including training level, materials utilized, design and construction practices, and other relevant contributing factors.
c. Development of a scheme to address the problems from the perspectives of the enhancement of the building and design regulations and of training.
d. Projects are being finalized as a baseline to verify the proposed model.
e. The final stage will be to conduct a comprehensive comparative analysis of the project to include relevant performance indicators such as such as efficiency and quality level etc.

The second part of this work relates to the Development of Building Regulations and proper training of personnel directly affecting the quality of concrete construction. The completed work will reflect in the actual improved quality of construction, better infrastructure and an improved relationship with the workers, all of which will be conclusively illustrated in the comparative analysis scheme.

The building regulations will be developed on an established and recognized building code such as the IBC. The regulations are being developed in consultation with the UAE Society of Engineers and will include an application document to account for all local requirements. This application document with technical input from the engineering society, will be formulated for eventual adoption by the UAE as a building code. The regulation development will include a comprehensive review and re-development of all relevant area specific to the UAE area.

Second area of the research area will focus on the educational and training aspects of the project and referred to as i-Build. This part of the plan is being developed to prepare a construction educational ‘blueprint’ that will become the standard for training India’s labor force for construction in the UAE. The training ‘modules’ will be interchangeable and will convey various building techniques and procedures – in essence providing real time construction training. All materials will be distributed in different local languages to suit the work force.

Using i-Build, the focus will be to create a working tool that delivers the necessary knowledge to apply appropriate building techniques. In essence, the lessons would force the inclusion of basic building fundamentals and instill core definitions of the industry – as established by the UAE building standards Code. This educational concept would allow every worker to translate and incorporate building practices seamlessly into his/her daily duties on the job.

6.0 CONCLUSIONS

As mentioned earlier, this is part of the continuing research for the Doctoral work [6] and is expected to be completed by end of this year. Some of the conclusions are presented although they will be confirmed in the proposed paper [7].
a. The major conclusion is that the economics and the quality of concrete construction in the UAE is highly dependent on the labor work force; this conclusion is applicable to the construction in other countries as well.
b. The earlier the training is provided, the better will be the result in terms of quality of construction and also on-time and quality construction; this approach is pro-active and therefore will be welcome by the industry. To the best of our knowledge, it is not practiced at the present time, which has affected the construction progress in UAE.
c. The training as proposed in this thesis will be conducted predominantly in India and will be concluded with the final research; it will provide a great tool for further commercial development in various parts of Southeast Asian countries.
d. There is also a social aspect of this research, which being conducted separately [8]. This will supplement this work with a substantial impact on the lives of labor force.

7.0 BIBLIOGRAPHY