The dynamics of innovation and integration in construction

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Building a Nation

Dubai Past

Dubai Present

Differences across the UAE

- Dubai a traditional trading city, developed excellence in logistics and supply chain management, in addition to tourism.
- Abu Dhabi major oil and gas producer, investing in manufacturing (oil and gas obviously), renewable energy (MASDAR), Aluminium, Aerospace,...etc.
- Sharjah is the third largest economy with concentration of SME (about 85% of the UAE’s)
Positive Environment for Innovation

- A survey of innovation confidence (2007) measured the willingness of people and nations to accommodate innovation.
- UAE ranked 1 out of 20 with a score of 76 compared to 44 Finland, 68 Brazil, 60 China, 58 US, and 55 UK.

Understanding the Client
The most dominating clients in construction are public organizations and “semi public” organizations.

Understand the affect of the demographics of the country on the public client priorities

Key to success of business is in the ability to understand the clients’ priorities, mind sets, concerns and aspirations.

Risk Averse Clients

Clients would support innovation but the consultants and contractors are expected to take the risk of innovation

Case Study: Public Private Partnership Project

The client did not want to take risk for

- Fluctuation of prices
- Losing jobs for locals
- The private consortium failed
Case Study

- German Consultant working for 5 years in UAE
- Completed major projects successfully but all were for German clients!
- Failed to build a strong relationship with the local client.
- Failed to win the confidence of local clients

Structure of the Construction Industry and its impact on Integration and Innovation
Construction Industry Structure

- Dominated by foreigners many through Joint Ventures, 51% local– 49% Foreign
- Profit sharing not necessarily aligned with percentage ownership which gives more freedom for foreign partner to operate
- Examples: Belhasa–SIX, Al–Futtaim Carillion, ASGC

Construction Procurement

- Dominated by traditional Design–bid–Build.
- Consultants work with the client to develop designs
- Competitive bidding is dominant, lowest price is king
- Tried Partnering with mixed results
- The MENA region is interested in PPP in a big way
Sustainability

- In 2006 the UAE committed itself to address the massive environmental footprint it has
- Construction boom made big contribution to this footprint.
  - Foreign designs were copied,
  - Envelops that fit the climate of cities such as that of London and
  - Designers were a bit tardy with orientation

How Did We Innovate?

Case Studies
Case Study 1:

**Project Type:** Sustainable Residential Masterplan  
**Client:** Dubai Properties  
**Design leader:** X-Architects  
**Sub Consultants:** Buro Happold, SMAQ, Reflexion, Johannes Grothaus  
**Location:** Dubailand, Dubai

Factual Data  
Xeritown

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**The Setting**

- Client Brief: Mixed used development, 59 hectares, housing 7000 people.
- **The Client told us “this is the land. Show us what you can do”** (Senior Architect).
- X Architects, a local firm, founded 2003, its strategy is based on research and collaboration
- Invest in R&D and strong links with universities
The Thinking

- Client is seen as a collaborator, rather than customer, taking part in “idea evaluation”
- No iconic design but to “let the built environment emerge from the context”.
- The designer need to show their ability in creating a micro-climate that is comfortable for people and energy efficient in the harsh weather of Dubai
- X Architects leading role ensured the **centre of gravity was strongly and firmly in Dubai**

Case Study 2

**Client:** RTA  
**Architect:** Aedas  
**Architect of record:** Rafael Viñoly Architects  
**Associate architect:** Carla Bechelli Architects  
**Interior designer:** KCA International  
**Engineer(s):** Atkins  
**General contractor:** Dubai Rail Link (DURL) Consortium  
**CAD system, project management, etc:** AutoCAD, Aconex

Factual Data  
Dubai Metro
The setting

- An iconic representation of an aspect from the heritage of Dubai.
- Aedas, formed in 2002 (HK+UK), global firm
- It is a more “mature” organisation
- Station Architects were in Singapore, UK teams designed the depots & provided the modelling support
- Centre of gravity was not in Dubai

The Challenge of Multiculturism to Innovation and Integration
Lack of a Dominant Local Culture

- The industry is almost all foreigners
- An integration challenge far more complex than just language differences.
- Innovation faces challenge as to which standard to follow, e.g. sustainability (LEED, BREEAM, etc)
- BIM is likely to face the same problem.

Here Comes BIM
Embracing BIM

- Many companies are embracing BIM in the GCC region and UAE
- The driver for such move is two fold
  - Consultants and contractors embracing BIM as the norm at their own home country.
  - Major clients, especially public, are demanding the use of BIM to realise the expected benefits.
- Major challenge is the lack of readiness of industry at SME levels.

Case Study: BIM in Infrastructure

- An infrastructure mega project with simple Architectural design, complicated systems and complicated operational requirements.
- BIM is critical to project success in enabling fast tracking through early detection of clashes in the complicated design
- Creating confidence to start construction of early packages and allow early completion.
What were the Challenges?

- Convincing and enabling the different subcontractors and consultants to work on the same platform
- Availability of the hardware needed to navigate easily through the project
- Lack of experience meant some clashes in the design went undetected because designers misread them
  - More traditional/manual checking was done

Benefits Realised

- Very helpful in design review
- Most of the design clashes were detected
- Valuable lessons were learned by staff giving them the confidence to use BIM in the future.
- Now the client has made the use of BIM mandatory for all mega projects
CASE STUDY: (NBK PROJECT)
CASE STUDY: INTRODUCTION

This case study discusses how the owner/PM initiated the BIM effort on NBK project after design using 2D tools had already started and was at final stages, and how BIM was integrated into the design and construction of the project.
CASE STUDY: PROJECT OVERVIEW

**Project Name:** NBK New Headquarters

**Location:** Kuwait

**Construction Cost:** US$ 400 Million

**Build-Up Area:** 130,000 m²

**Project Delivery:** Multi-Packaging

**LEED:** Gold Certificate.

CASE STUDY: PROJECT OVERVIEW

**Owner:** National Bank of Kuwait

**Project Manager:** Projacs International, Kuwait

**Architect:** Foster + Partners, London

**Engineer:** Buro Happold, London

**BIM Consultant:** BIMES, UAE & Egypt

**Contractor:** Ahmadiyah Contracting & Trading
The architects wished to retain control of the external geometry of the tower’s envelope while the engineers would design the structural system to support the envelope. A hypothetical boundary surface was discussed that separated the domain of engineering responsibility from that of the architects.

The geometry of this interface layer was controlled by the architects and passed to the engineer.
This complex tower’s geometry raised many coordination problems between architecture and structure and other trades and identifying those problems proved to be difficult with the traditional 2D CAD tools. Being responsible for performing design review services, Projacs had to find a solution to this problem.
CASE STUDY: BIM IMPLEMENTATION PROCESS

The BIM consultant initially developed design model, using ARCHICAD and TEKLA software, based on the 2D CAD drawings of the project. The first versions of the BIM model, prepared by the BIM Consultant, were unexpected....
CASE STUDY: BIM IMPLEMENTATION PROCESS

Steel Column

CASE STUDY: BIM IMPLEMENTATION PROCESS

Steel Beam

CLASH DETECTED

Steel Beam

CLASH DETECTED

Steel Column
CASE STUDY: BIM IMPLEMENTATION PROCESS

Realizing the benefits of BIM in clash detection, the project team decided to explore another area of implementation: quantity take off.

Projacs requested the BIM consultant to auto-generate quantities for the structural steel works in order to verify those prepared manually.
BIM IMPLEMENTATION
TENDER PHASE

CASE STUDY: BIM IMPLEMENTATION PROCESS

Tender Stage:
- Also realizing the benefits of BIM in planning sequencing, Projacs requested bidders during tender stage to submit an animated method statement.
CASE STUDY: BIM IMPLEMENTATION PROCESS

One of the main challenges for the project team (especially the contractor who was using BIM for the first time on a large complex project) was transitioning from 2D CAD environment to 3D BIM model system.

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THANK YOU