Project Cost Estimating;
"A comparison of tools and techniques used in construction projects“

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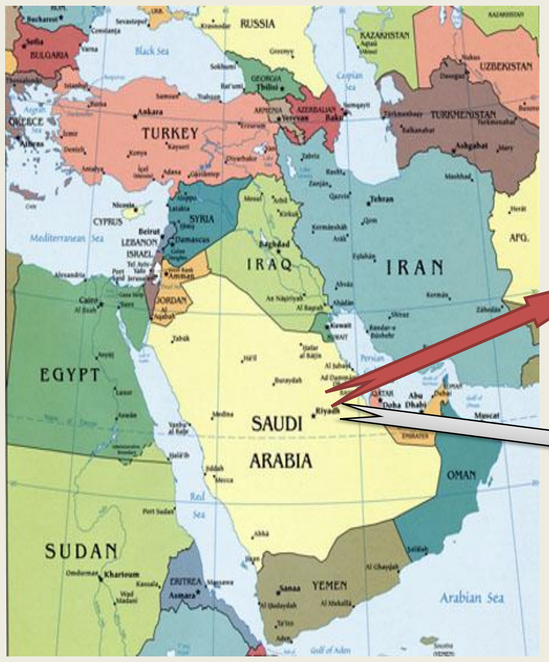
Introduction

Kingdom of Saudi Arabia is considered as the largest market for building and construction in the Middle East with an annual average growth for this sector amounted to 7.5%. Therefore, it is one of the FASTEST growing markets in the world. In recent years, record high oil prices and large oil revenues have made it possible for the construction industry to employ extra liquidity for its development. During the G20 summit in Washington took place on November 14–15, 2008, King Abdullah announced a US$ 430(EUR 333) billion financial stimulus to guarantee finance for development projects for the next five years.



Cost Estimation

Construction cost estimating has been defined as a prediction of cost, quantities, and price of resources required by the scope of a construction project. As a prediction, the cost estimate must address project related risks and uncertainties. Project cost estimates are used primarily as inputs for budgeting, cost and value analysis, decision making, asset and project planning, and for project cost and schedule control processes. They are determined using experience and calculation to forecast the future cost of resources, methods, and process within a scheduled time frame (California Federal Government, 2007; Evans &Peck, 2008, p. 21).

Accurate cost estimate of construction projects is considered to be fundamental process and very important tool with projects management. It is playing an efficient role to realise project's targets as well as its success.

The importance of accurate cost estimates that stand out especially when there is a need to judge the feasibility of the project or not. In addition to avoid unexpected cost and lack of funding that can expose the project to stop. So, according to this estimation change concept of the project, abandon it or follow it up.

There are several existing techniques and tools used by professional project managers that can be used to develop more accurate cost estimates;

Expert judgment:
This uses the knowledge and experience of experts to estimate the cost of the project. This method can use into account unique factors specific to the project.

Analogous estimates:
Use historical data from similar projects as a basis for the cost estimate. This type of estimate is usually used in the early phases of a project and is less accurate than other methods.

Parametric estimates:
Use to assess the historical data of key cost drivers to calculate an estimate for different parameters such as cost and duration. For example, square metres are used in some construction projects.

Bottom-up estimates:
It uses the estimates of individual work packages which are then summarized or "rolled up" to determine an overall cost estimate for the project. This type of estimate is generally more accurate than other methods since it is looking at costs from a more granular perspective.

Three-Point Estimates:
It originated with the Program Evaluation and Review Technique (PERT). It uses three estimates to define an approximate range for an activities cost: Most Likely (Cm), Optimistic (Co), and Pessimistic (Cp). The cost estimate is calculated using a weighted average: Cost Estimate = (Co + 4Cm + Cp)/6

Reserve Analysis:
Used to determine how much contingency reserve, if any, should be allocated to the project. This funding is used to account for cost uncertainty.

Cost of Quality (COQ):
Includes money spent during the project to avoid failures and money spent during and after the project due to failures.

Project Management Estimation Software:
Cost estimating software applications, spreadsheets, simulation applications, and statistical software tools. This type of software is especially useful for reviewing alternative methods of cost estimation. Such as, Primavera Software.

As industries adopt technology in an attempt to increase efficiency, reduce time and cost wastage so proponents of the new software (and architects in particular) felt the need to adopt computer aided designs (CAD) known as multi dimensional computer aided modelling (MD CAD) within their design and construction projects such as, Vico software. Traditional 3D CAD software contains geometric concepts of length, depth and height. More advanced 4D and 5D CAD software have had cost dimension added with 5D CAD having an additional schedule and time schedule added. The 4D and 5D CAD software considers cost estimate as a function of effort, team size and project schedule estimate. They also include matrices of size and industry data when estimating the cost (Feng and Chen, 2010, pp. 347-349).

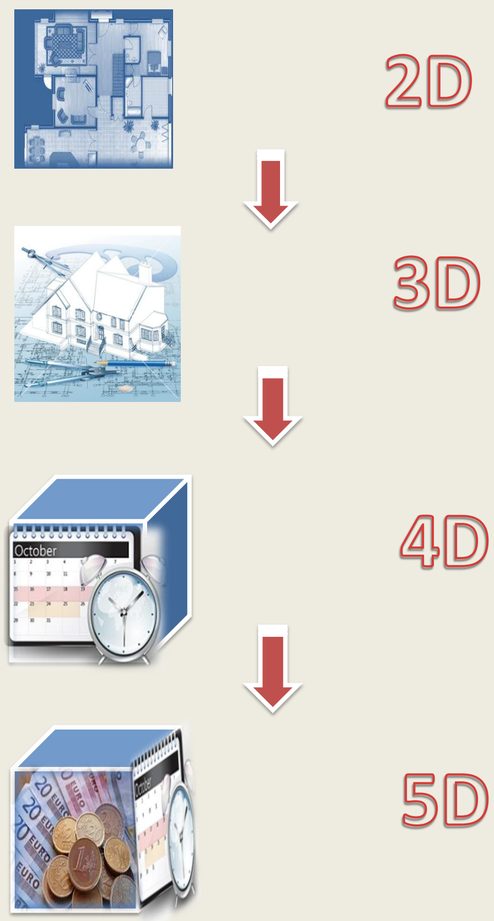


Figure 1 Shows Cost estimation techniques and Methods
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Figure 2: Multi dimensional model design, cost, schedule and production teams allow direct value engineering and analysis of modifies and project position
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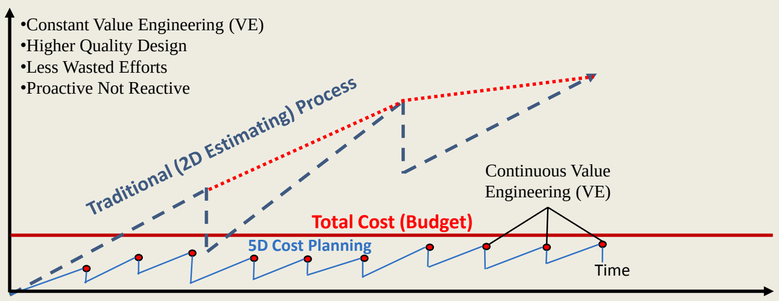


Methodology

Data used in this research study was collected from a range of published peer reviewed literary materials that focused on Saudi government ministries and UK estimation of construction project costs, with the terms of reference for the secondary data searches being the same.

This research assesses methods of obtaining project cost estimates for both public and private sectors of construction building in Saudi Arabia and the United Kingdom.

Comparison of KSA and UK Construction cost index

Figure 4 shows the comparing between KSA & UK temporal fluctuation in building costs between 2000 and 2012. The regression equation coefficient of determination highlights a significant correlation between increasing construction cost and time (R2 =0.83), (R2 =0.98) and signifies that the equation Y cost = (27.962 X time – 55504), (3305.9 X time – 6572461) is a suitable tool for the estimation of future trends. Moreover, the analysis is significant at the 99% confidence level (p =0.00)

Results

MDCAD technology is one of the evolving products that have been deemed to have the potential of facilitating the solution of the above mentioned problems faced by Saudi government ministries in estimating construction project costs. By streamlining project variables into a single register and database, MDCAD has the potential to unify focus of construction project activities, thereby, enabling improvement in the overall process of cost estimation. Active coordination between design team and other parties in the construction process facilitates the cost estimation process. This leads to a significant reduction in costs. Overall, integration of MDCAD technology into the Saudi government construction activities results in increased accuracy and efficiency of construction project cost estimation processes. The 3D geometry is used to gain construction-caliber takeoff quantities which are linked to required resources and methods with cost. Due to the strict integration any change to the design, cost or schedule can be straight away appraised by 5D Software (see figure 5).

Recommendations and Conclusion

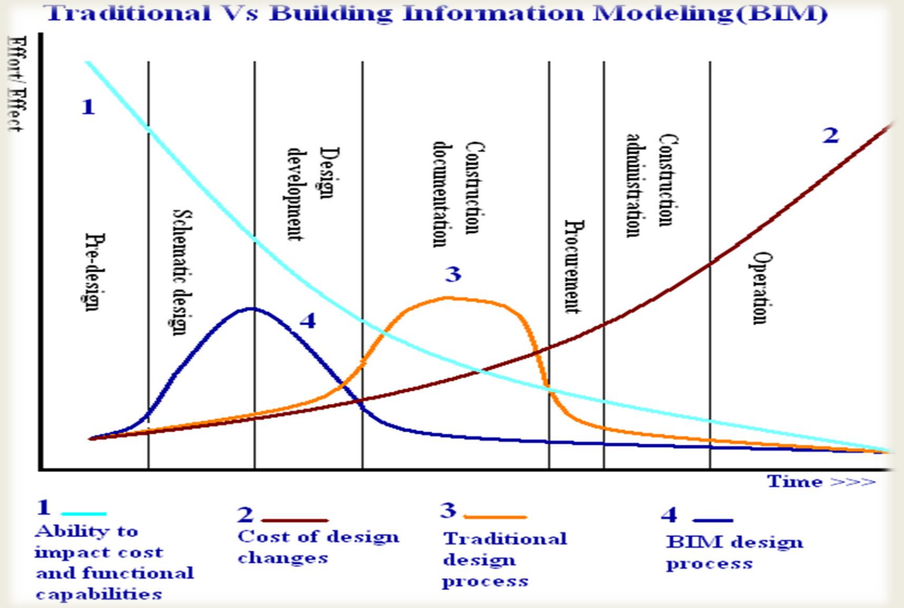
The efficient, timely and accurate construction project cost estimation has proven to be a paramount variable in the Saudi government ministries management of costs of construction projects. Inferences from the research study show that the ministries are increasingly adopting the use of MDCAD to accurately, timely and efficiently estimate construction project costs. The research results can be useful tools to ministries seeking to embrace increased use of technology in their operations and activities, and saving of costs.

There is, therefore, need for the ministries to adopt specialised cost estimation packages to enhance accuracy, increase cost estimation accuracy demands to enhance good planning, and develop relationships between construction project design variables and costs (see figure 6).

Priority adoption of MDCAD by Saudi government ministries will facilitate; improved visualization of the project; improved synchronization of the construction project's documents; improved efficiency within the construction project due to easy recovery of data; connecting and entrenching of vital construction project's information; increased speed of construction project's delivery; reduced construction project's cost; and improved construction project's simulation.

It is, therefore, right to conclude that MDCAD is a more accurate and efficient tool in estimating construction project costs, and that its priority adoption by Saudi government ministries will streamline their activities, and help them save on time and costs.

References



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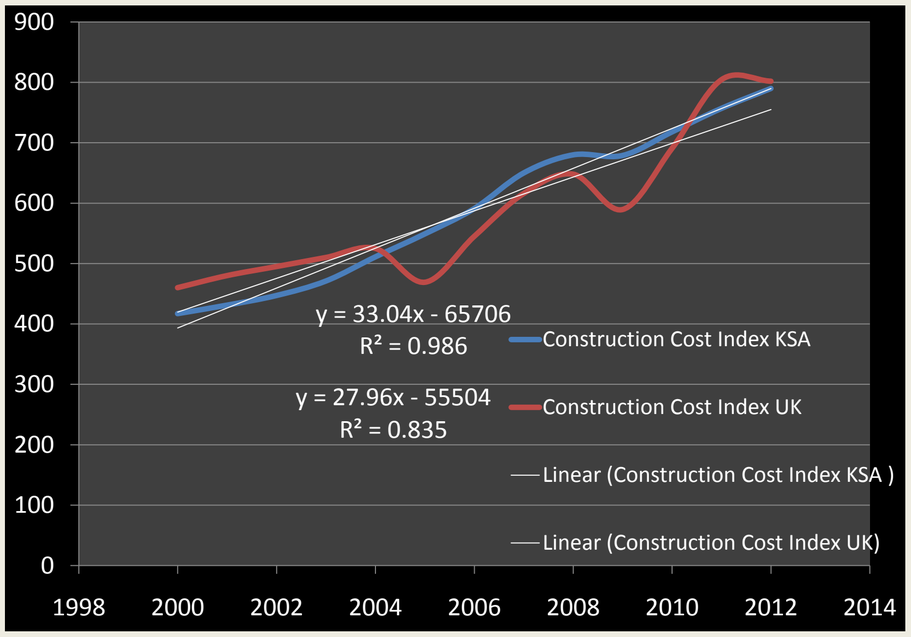

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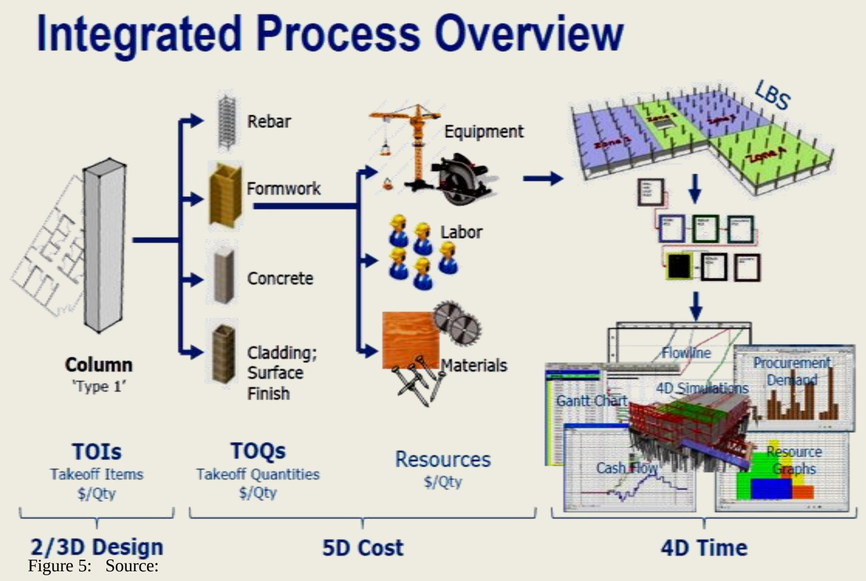

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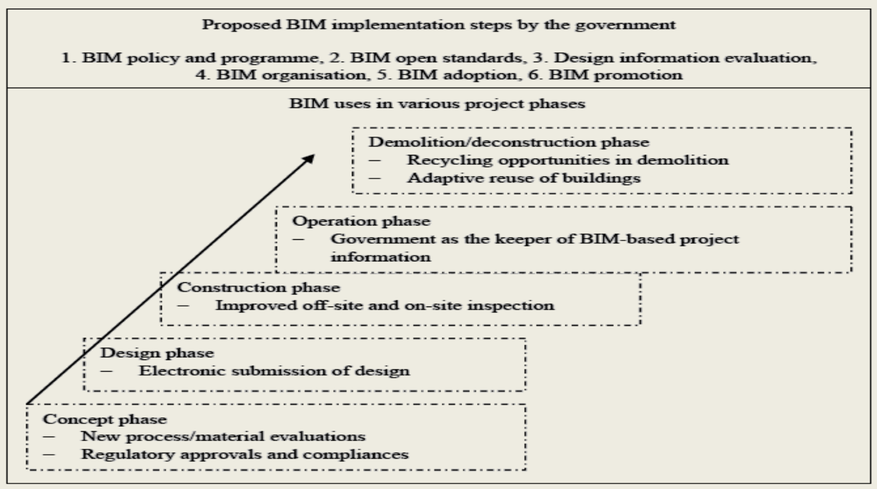

Figure 6 Source: