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Abstract: Generally over-engineering concept is used in manufacturing process or software development. In case of manufacturing, if we providing a family car with maximum speed 250 km/h (which will never run at that speed in its lifetime) then the expenditure done on car for increasing speed over 150 km/h is meaningless. Similarly in software development case, almost more than 95% android users never use all the applications in mobile. Another example of “Microsoft excel” also shows that, the common users exposed to very less features of “Microsoft excel” than it offers. So here always a thought arise “HOW MUCH IS SUFFICIENT??”. This thought leads to concept of over-engineering. If we are providing a too much than what is needed then this will be a wasting of resources available.

A single story building can constructed with 10, 20 or 30 columns (as suggested by Architect/ Design Engineer) depending upon plan. In construction process no one bothers about size and number of columns, beams required. If the simple plan provides an economic solution then there is no need of making it complex. This example shows an over-engineering exists in construction industry also. Hence we see most of the time, even if the area of construction is nearly about same but construction planning, design, process, technique, finishing items and overall cost are not same. Most of the literature referred is silent about Over-Engineering (OE) in construction industry; the effort will be made towards the determination of OE components in construction industry and preparation of suitable model for same.

Introduction

Increasing awareness in construction technology and methodology indicate that issues of sustainability are serious concerns throughout the world. In concrete buildings, conventional on-site construction methods have long been criticized for long construction time, low productivity, poor safety records, and large quantities of waste. The alternative, more innovative approach towards construction practices can offer significant advantages, such as lower project cost, improved quality, less construction site wastage, reduction of energy and water consumption etc. Cost is undoubtedly the most important concern in any business endeavor, not least in the construction industry. Poor cost performance in construction projects has become a major concern for both contractors and clients. In order to control costs, it is important to exercise foresight of the various project-related elements and address the magnitude of their effects. It is agreed that realizing and understanding cost-elements will enrich the cost estimator’s competence, hence, adequately delivering a more sustainable and reliable cost modeling and estimating technique. A clearer understanding of the cost elements is vital to achieve the desired level of accuracy of anticipated labor costs, material costs etc. in total cost estimation. The estimator is able to examine these factors and subsequently estimate, plan for, and mitigate the adverse effects of these factors on the project cost.

Over-engineering is the designing of an element to be more robust or complicated than is necessary for its application, either to ensure sufficient factor of safety, sufficient functionality, or because of design errors. Over-engineering can be desirable when safety or performance on a particular criterion is critical, or when extremely broad functionality is required, but it is generally criticized from the point of view of value engineering as wasteful. Over-engineering generally occurs in high-end element or specialized market criteria, and takes various forms. In one form, elements are overbuilt, and have performance far in excess of needs and hence are more expensive, bulkier, and heavier than necessary. For example building material having excess strength and lifespan, unnecessary over dimensioned building units (bedroom, halls, passages etc.), provision of over architectural aspect in building etc. Alternatively, they may be overcomplicated – the design may be far more complicated than is necessary for its use. Over-complexity reduces usability of the element by the end user, and can decrease productivity of the design team due to the need to build and maintain all the features.
Literature Review

Title - Use of Fuzzy Logic for Predicting Design Cost Overruns on Building Projects
Author – Karla Knight.

The paper describes a model for use in predicting potential cost overruns on engineering design projects. The output of the model is useful in assessing the amount of possible risk on a project and the likelihood of making a profit on the job. Their model is intended for use by engineering consultants, i.e., structural, mechanical, and electrical engineers, in the building design industry. Their research uses fuzzy logic to model the relationships between the characteristics of a project and the potential risk events that may occur, and the associated cost overruns caused by combinations of the project characteristics and risk events. The paper discusses the topic of scope creep and scope definition, which are significant causes of cost overruns on design projects; identifies the project characteristics and risk events used in the model; explains the structure of the model and the use of fuzzy logic; and provides recommendations for future research.

They mentioned that, Risk events are undesirable or fortuitous events that may occur during the design and construction phases of a project, potentially leading to a cost overrun or savings, respectively. Risk should always be taken into account on a project, but due to the competitive nature of the industry not every possible risk event can be accounted for in the project fee. This puts the onus on the consultant and the contractor to deal with, and possibly cover the cost of, both negative and positive risk events. Eight risk events have been selected in consultation with the design firm as being the most common or having the largest impacts on projects. The chosen risk events are
1. Accuracy of site investigation,
2. Design errors or omissions,
3. Design/scope changes by the client, consultants, or architect,
4. Communication among the project team,
5. Over-engineering,
6. Constructability issues
7. Inadequate design team resources, and
8. Adequacy of the general contractor and subcontractors.

As with the project characteristics, each of these risk events is given a rating by the user between 0 and 10. This rating represents the extent to which the risk event is likely to occur and the extent of its impact on the specific project. A rating of 0 indicates the worst case, and a rating of 10 is the best case. A rating of 5 indicates that the risk event is likely to have a neutral effect on project costs.

Title - Over Engineering Enterprise Architecture and Business Competitiveness
Author - Sheerish Jayashetty

According to them, Over-engineering is often ignored by technology as well as business community; which is risk and waste of resources. They said that, while technology is helping business become more competitive and business are now more demanding than ever before. Attaining agility and robustness the tendency among managers is to ignore this interdependency between technology and business and to over-engineer the enterprise. Some of the factors that may contribute to over-engineering are market pressure, style and preferences, over enthusiasm and so on. This may result in a negative impact on business competitiveness.

They define over-engineering as if its deliverables far exceed the business requirements, thereby making it complex, more expensive and difficult to maintain. They said enterprise need to realize that over engineering is a risk and may result in wasted resources. Organizations can avoid over-engineering if due attention is given to periodical assessment, current utilization and allocation of budget.

Title - Project Cost Management
Author - Dr. Peter Smith

This paper examines the global issues and challenges facing the project cost management profession. This relates to professionals in the fields of quantity surveying, cost engineering, project controls and project managers providing cost management services. The paper is based on a literature review of global project cost management issues and research undertaken through professional cost management associations that include the International Cost Engineering Council, the Pacific Association of Quantity Surveyors, the African Association of Quantity Surveyors, the International Project Management Association, the Association for the Advancement of Cost Engineering, the China Engineering Cost Association and the Royal Institution of Chartered Surveyors. The research identifies the need for global recognition of the profession and the development of global professional standards and certification programs. The paper culminates with a series of recommendations and strategies for the profession that includes formal recognition through global organizations.
Title - Issues in Managing Construction Phase of IBS Projects

Author - Izatul laili Jabar

They mentioned that, there are several issues in managing IBS construction projects which lead to delays, poor qualities and cost overrun. Their paper aims to analyze the issues in managing the construction phase of IBS projects that reflects IBS as a non-efficient implementation. The issues can be categorized into pre construction, construction and post construction phase. Majority of the issue is under the construction phase. Categorizing the issue will help to increase the contractor's understanding and help them to be prepared in handling the situation that they may encounter during the construction process.

They also state, during the construction phase, parts of the predicted benefits are quality and productivity of construction, the reduction of unskilled workers and reliance on manual foreign workers, less wastage, less volume of building materials, speedier construction time, increased environmental and construction site cleanliness, reduced risk by improving health and safety, proper coordination and management.

Scope, Methodology, Purpose.

Scope :-

Following are the objectives of the proposed dissertation work.

a) To study concept of over engineering in construction projects.
b) To conduct questionnaire survey for over engineering.
c) To find factors responsible for over engineering.
d) To develop a model to assess over engineering in construction projects.
e) To find possible solution to overcome over engineering in construction projects

Methodology:-

For carrying out the proposed work, following methodology will be adopted for data collecting and analysis.

a) Collection of information through literature review and or preliminary study on site.
b) Collection of data through questionnaires’ devised in the same regards.
c) Finding over engineering in different projects by comparing data collected.
d) Develop a model to assess the over engineering (OE) in a construction project.
e) Validation of the model for selected case study.

Purpose of dissertation

This proposed model will be helpful for construction managers to manage and reduce OE components of construction projects. This will help in reduce the wastage by optimum use of resources.

References


