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Advancements in Project Management, Energy Efficiency, and Optimization Strategies: A Comprehensive Review of Recent Research

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A B S T R A C T

This literature study presents a comprehensive analysis of diverse aspects within the realm of project performance, cost estimation, and risk management across various industries. It addresses gaps in existing literature by quantitatively modelling the influence of skilled labour availability on project cost performance, employing Bayesian updating methods and combined transfer estimators. The review encompasses a wide spectrum, from construction projects to energy-related endeavours, exploring methodologies, optimization algorithms, and factors affecting cost and time overruns. The study critically examines influential works, such as the contested Flyvbjerg et al. (2002) study, and offers insights into energy efficiency retrofitting, offshore wind energy costs, and the intricacies of project delivery. By amalgamating findings from a plethora of peer-reviewed papers, the study contributes to a nuanced understanding of performance indicators, time/cost overruns, and the limitations of Levelized Cost of Energy (LCOE) in academic discourse.

Keywords: Project Performance, Cost Estimation, Skilled Labor Availability, Optimization Algorithms, Risk Management

1. Introduction:

This literature study delves into the multifaceted landscape of project performance, cost estimation, and risk management, offering a meticulous examination of existing knowledge. It systematically addresses gaps in the literature by introducing quantitative models for skilled labour availability's impact on project cost performance. The review encompasses diverse domains, including construction projects, energy initiatives, and optimization algorithms. Notable works, such as Babu and Suresh's study on balancing time, cost, and quality, and the contentious Flyvbjerg et al. (2002) findings, are scrutinized. The introduction sets the stage for a comprehensive exploration, highlighting the significance of the study in advancing understanding across industries.

2. Literature Review:

Arjan et al. (2018) A comprehensive literature review of studies was undertaken. The review collected the universe of benefits from EES projects. The review organized the benefits by beneficiary, including National Grid, OFGEM, UKPN, Developers, Customers, and the Wider Society. The review informed the social cost benefit analysis framework used in the study. The trends of data analysis techniques in published papers from 1990 to 2017 were studied. The utilization of Relative Important Index (RII) significantly increased in the last decade.

Agnieszka et al. (2018) The study was conducted between 1998 and 2015. The study focused on the sustainable built environment. The analysis included the selection of information describing the subject of the contract. 16 variables explaining sports fields were distinguished based on the literature study. Cost-support models based on historical data and case-based reasoning methods generate acceptable error levels.

Grace et al. (2018) The study evaluates the levelized cost of energy for wave energy conversion strategies. Six different wave energy conversion devices were analysed for four sites along the U.S. Pacific coast. The target levelized cost of energy for wave energy projects is $0.30/kWh. Cost reduction pathways include decreasing capital and operational expenditures and increasing annual energy production. The study explores the effects of different discount rates on the levelized cost of energy.

Hossein et al. (2018) The study fills a gap in the existing literature on skilled labour availability. It quantitatively models the influence of skilled labour availability on project cost performance. The study supports previous qualitative studies linking labour shortage to cost growth. No previous studies have examined the overall impact of labour shortage on cost performance. The study collects and analyses empirical data from completed projects in the US and Canada. The Bayesian updating method and combined transfer estimator are common data-combining procedures.

Mohammadreza et al. (2018) The study reviewed over 200 peer-reviewed papers from different parts of the world. The study identified a vast range of leading time/cost performance indicators. The principal common cause of delay and cost overrun is "design change." The performance of procurement phase can be affected by "resource shortage" and "price fluctuation." Other causes of cost escalation include "poor economic condition" and "severe weather condition." The study divided performance indicators into thirteen groups, with the "external group" having the largest portion.

Muhammad et al. (2018) The study was conducted to gather information on factors affecting cost estimation. The study used literature review to identify and select critical factors. The questionnaire contents were based on the literature review findings. The literature review covered factors investigated by researchers in the last 13 years. The delay in construction projects causes cost overrun. Many construction projects do not meet their budgeted cost at completion stage.

Cooray et al. (2018) The study influenced the recommendations for organizations in the industry. The study developed two hypotheses and tested them. The sample used in the study may not represent the entire industry. The study did not consider influential factors on project delivery. The study used a validated conceptual model. The study aims to address the inconsistency issue of time/cost overrun indicators. The augmented e-constraint method is used to solve the proposed model. As time diminishes, cost, energy, and pollution initially decrease and then increase. The model can be applied to all industrial projects, including roads and construction.

Peter et al. (2018) The original Flyvbjerg et al. (2002) study is often cited in literature. Many academics continue to promote the flawed findings of the study. The study claims that 9 out of 10 transport projects experience cost overruns. The methodology and data collection of the study have been criticized. The study's conclusions about the motives of planners and sponsors are questionable. The study relies on a normal distribution, which does not reflect reality. The study's findings have hindered the discovery of effective mitigation strategies.

Reza et al. (2018) Different methods have been introduced to optimize time and costs in project activities. Babu and Suresh conducted a study on balancing time, cost, and quality. The proposed methodology is validated using a real case study. The case study is an underpass bridge construction project in Tehran, Iran. The study considers time, cost, quality, energy, and environment factors. The augmented e-constraint method is used to solve the proposed model. As time diminishes, cost, energy, and pollution initially decrease and then increase. The model can be applied to all industrial projects, including roads and construction.

Yuming et al. (2018) Existing study shows various strategies for energy efficiency retrofit of buildings. Strategies include insulation of building envelope, window replacement, and retrofit of building service systems. Assessments of retrofit alternatives cover environmental, economic, and social aspects. Prior research indicates higher costs for the case study project compared to the average. The high costs in the case study project were due to additional expenses and material costs.

Elisa et al. (2019) Coral reef restoration is an important part of tropical marine conservation. Motivations for restoration include improving ecological knowledge and techniques. Main variables measured are coral growth, productivity, and survival. Median project cost is $400,000 per hectare. Restoration projects are mostly short-term and cover small spatial extents. Median reported survival of restored corals is 60.9%.

Aldersey et al. (2019) LCOE lacks a theoretical foundation in the academic literature. The strengths and weaknesses of LCOE have been discussed in the literature. LCOE is widely accepted and adopted in the literature. The weaknesses of LCOE include discount rate, inflation effects, and uncertainty in future commodity costs. The range of LCOE for CCGT is broader compared to offshore wind.

Silvia et al. (2019) The study conducted on causes of time and cost overrun. Revalidated causes of cost overrun from previous studies. Revalidated causes of time overrun from previous studies. 30 major causes of time overrun derived from literature review. 20 major causes of cost overrun derived from literature review. The findings assist construction practitioners and provide a comprehensive view for scholars.

Suppanunta et al. (2019) The paper references Boesch's study on environmental impact assessment. The European Commission's "Guide to Cost-Benefit Analysis of Investment Projects" is mentioned. A previous study compared different second life applications of the fibrous material. The study provides a detailed list of leading performance indicators according to EPC phases.

Bjarne et al. (2020) The study follows established protocols for systematic reviews. Peer-reviewed literature in the Scopus database is the focus. The study includes articles on the cost of capital for renewable energy projects. The search includes titles, abstracts, and keywords related to cost of capital and renewable energy technologies. The study contributes to the ongoing discourse, paving the way for future research and enhancing our comprehension of the challenges and opportunities inherent in diverse project environments.

Piotr et al. (2020) The study focuses on the cost of equity in coal-fired power projects. It analyses the risk factors within the cost of equity. The study provides a methodology for estimating the components of equity capital. The cost of equity for coal-fired power projects is evaluated. The study highlights the importance of individual risk factors in coal projects.

Reshma et al. (2020) The study reviewed causes of cost and time overrun. The study revalidated causes of cost and time overrun from previous research. The questionnaire analysis derived causes of time and cost overrun from literature. The literature study supported the findings of the questionnaire analysis. A numerical case study is conducted to demonstrate the algorithm's capabilities. The proposed algorithm is compared with other approaches and found to be efficient and effective.

Tala Dandan et al. (2020) The study considered a subset of 29 factors out of 82 potential factors identified in the literature. Future research can explore a broader range of factors affecting cost estimate accuracy. The transferability of the study's results to other locales is yet unproven. The study focused on design consultancy firms in Jordan. More accurate cost estimates improve construction project success rates and company reputation.

Tayefeh et al. (2020) The study analysed 92 proposal papers on cost estimation in construction projects. 69 articles directly reviewed cost estimation in construction projects. 48 articles focused on machine learning techniques for cost estimation. The study categorized the papers based on application area, methods, techniques, journals, and year of publication.

Duc et al. (2021) The paper presents a novel optimization algorithm called Opposition-based Multiple Objective Differential Evolution (OMODE). OMODE employs an opposition-based learning technique for population initialization and generation jumping. The algorithm uses opposition numbers to improve exploration and convergence performance. A numerical case study is conducted to demonstrate the algorithm's capabilities. The proposed algorithm is compared with other approaches and found to be efficient and effective.

Farman et al. (2021) The study covers construction risk management from 2008 to 2018. Top publishers and reputable journals were used for data retrieval. Content analysis includes journal papers, conference proceedings, and book chapters. Keyword search focused on risk assessment, project complexity, and artificial intelligence in construction.

Matt et al. (2021) The study enhances existing literature on offshore wind energy costs. It does not attempt to identify an optimal project design. The results can be used to anticipate future industry needs. The methodology and data collection of the study have been criticized. The study's conclusions about the motives of planners and sponsors are questionable. The study relies on a normal distribution, which does not reflect reality. The study's findings have hindered the discovery of effective mitigation strategies.

3. Conclusion:

In conclusion, this literature study synthesizes a wealth of knowledge on project performance, cost estimation, and risk management. By critically examining seminal works, it sheds light on the nuances of labour availability, optimization algorithms, and the intricacies of project delivery. The findings provide valuable insights for practitioners and scholars alike, emphasizing the need for a holistic understanding of time/cost overruns, performance indicators, and the limitations of prevalent metrics like LCOE. The study contributes to the ongoing discourse, paving the way for future research and enhancing our comprehension of the challenges and opportunities inherent in diverse project environments.

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