
EXPLORING QUALITY MANAGEMENT PRACTICES IN CONSTRUCTION PROJECTS: A COMPREHENSIVE LITERATURE REVIEW

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ABSTRACT

This extensive review delves into the critical realm of quality management in construction projects. It spans a wide array of topics, from theoretical and methodological approaches to empirical studies, providing a global perspective on the challenges, technologies, and strategies involved. The paper begins by emphasizing the need for robust quality management in enterprises, highlighting statistical evaluations of construction products and the importance of reproducibility indices. It then explores the transformative impact of BIM technology, AR, and VR in error detection and fault prediction, specifically in Chinese construction enterprises. A focus on small and medium-sized enterprises (SMEs) in construction follows, revealing key practices for effective quality management. The study expands globally, addressing factors affecting quality in Nigeria and proposing solutions, emphasizing the role of sanctions and compliance with building codes. The research then narrows down to specific organizations, detailing the development of a Quality Management System for construction services procurement. Insights into Total Quality Management (TQM) practices in various countries, the importance of engineering surveys, and a comprehensive analysis of poor-quality management in Iraqi projects are presented. The paper explores the synergy of marketing and project management in fostering sustainable development, drawing lessons from EnergyTech's experiences in Russia. Geographical diversity continues with a study on quality factors in Afghanistan's construction projects and success factors in Malaysia's Industrialized Building System (IBS) projects. Several studies fill existing gaps, including the evaluation of construction engineering testing laboratories in China, the application of service quality dimensions in construction consultancy, and the development of a quality information management system for modular construction.

KEY WORDS: Quality Management, Quality Improvement, BIM Technologies, TQM (Total Quality Management)

1. INTRODUCTION

Quality management plays a pivotal role in the success and sustainability of construction projects, ensuring that structures meet the highest standards of safety, functionality, and durability. As the construction industry continues to evolve, addressing the complexities of modern projects requires a nuanced understanding of theoretical frameworks, methodological approaches, and empirical findings related to quality management. This comprehensive review aims to provide a thorough exploration of advancements in quality management within the construction sector. The research spans a diverse range of topics, including the integration of cutting-edge technologies like Building Information Modelling (BIM), Augmented Reality (AR), and Virtual Reality (VR). It delves into the specific challenges faced by Small and Medium-sized Enterprises (SMEs) in the industry and assesses the factors influencing quality management in different global contexts, from China and Nigeria to Afghanistan and Malaysia. The paper navigates through various studies that scrutinize the effectiveness of existing quality management systems, proposing novel frameworks and methodologies to address deficiencies. Geographical diversity is a focal point, with case studies from different countries offering insights into region-specific challenges and solutions. From the intricacies of construction engineering testing laboratories in China to the nuances of Modular Construction and Agile Project Management, the review provides a panoramic view of the multifaceted landscape of quality management in construction. In the following sections, we delve into the key findings and methodologies of each study, offering a nuanced understanding of the global trends, challenges, and opportunities in the realm of construction project quality management. This exploration aims to not only consolidate existing knowledge but also provide practical implications for industry practitioners, researchers, and policymakers seeking to enhance the quality and sustainability of construction projects worldwide.

2. LITERATURE STUDY

A J Likita e al (2018) provides an in-depth overview of the implementation of Total Quality Management (TQM) in the construction sector. It evaluates five previous research studies to understand the effectiveness of TQM practices in various countries, including Saudi Arabia, India, the US, and South Africa. The findings indicate that TQM has been successfully practiced in the construction sector in these countries, leading to improved project outcomes, client satisfaction, and competitiveness. The paper also discusses the application of Artificial Neural Network (ANN) to

enhance the implementation of TQM in the construction sector, demonstrating its potential as a practical tool for problem-solving in construction engineering. The study emphasizes the importance of training, good communication, and customer satisfaction as key parameters for successful quality management practices in the construction sector. Furthermore, the paper highlights the need for increased awareness and adoption of TQM in the construction industry, particularly in India, where there is significant competition from global counterparts. It identifies the lack of understanding of the impact of TQM among construction industry stakeholders and emphasizes the importance of regular training programs to improve knowledge and management skills. The paper concludes that when quality management practices, quality culture, and competitiveness are fully implemented, there will be better control of processes in the construction sector, leading to improved project performance and overall industry growth.

Daopeng Wang et al (2018) discuss previous research related to their study. They cite several studies on topics such as green building implementation life-cycle cost analysis building information modelling (BIM) for existing buildings and data mining for occupational injuries in the construction industry. The authors also discuss previous research on the use of machine learning algorithms for quality management in construction projects, including the use of artificial neural networks and support vector machines. They note that while these methods have shown promise, they have limitations in dealing with unstructured data. Overall, the literature review provides a useful background for the study and highlights the need for more advanced methods for managing and analysing construction project data.

Dr Ha Nam Khanh Giao et al (2018) discusses the imperative for consultancy companies in the construction industry to enhance their service quality in order to bolster customer loyalty, future business prospects, and word-of-mouth reputation. It emphasizes the significance of service quality as a pivotal component of consultancy services and highlights the need for improvement in this area. The dimensions used to measure the quality of construction project management services are explored, drawing from studies by various scholars such as Parasuraman et al. (1985), Murugavarotheyan et al. (2000), Hoxley (2004), and Ong (2007), with adjustments to suit the current construction environment. The article also references the SERVQUAL model by Parasuraman, Zeithaml, and Berry (1985) and the framework of service quality evaluation proposed by Murugavarotheyan et al. (2000) as relevant models for assessing service quality in this context.

Mohammed Neamah Ahmed et al (2018) provide valuable insights and related works that contribute to the understanding and development of agile quality management frameworks in construction projects presents a comparison between traditional and agile project quality management approaches, highlighting the shift from a focus on delivery objectives to a focus on continuous improvement in agile methodologies. It also outlines the main aspects of traditional and agile project quality management approaches, emphasizing the proactive response to change, sustainable development, and the importance of working projects over documentation provides an overview of the proposed Agile Quality Management Framework in Construction Projects, discussing the shift from traditional project management to Agile Project Management (APM) and the need for more flexible approaches to managing construction projects. The framework aims to trace alignment and discover a connection between Agile and Traditional Project Management (TPM) concepts, as well as identify contact points between Agile frameworks (such as Scrum) and the Project Management framework (PMBOK) processes presents the article "Agile Quality Management Framework in Construction Projects (AQMFPC)" in the International Journal of Engineering & Technology, providing an in-depth exploration of the proposed framework. The article discusses the challenges of managing construction projects, the importance of agile methodologies in addressing uncertainties, and the goal of the framework to assist project managers in adapting a more flexible approach to managing and implementing construction projects. These references collectively contribute to the literature review by providing a comprehensive understanding of the shift from traditional to agile project management, the challenges specific to construction projects, and the proposed framework's objectives and potential impact on project management practices.

N S Azman et al (2018) primarily focuses on the Industrialized Building System (IBS) and its implementation in the construction industry, particularly in Malaysia. It discusses the challenges, benefits, and success factors associated with IBS. The review also highlights the importance of quality management in construction projects using IBS and emphasizes the need for a competent and knowledgeable technical team, as well as the use of high-quality components and materials. The document references various studies and papers that have explored the factors affecting the quality of construction projects, especially those utilizing IBS.

It also discusses the historical background of IBS implementation in Malaysia and the shift from traditional construction methods to more efficient and automated strategies. Additionally, the literature review covers the impact of IBS on construction productivity, the challenges faced in IBS implementation, and the factors influencing the perception of IBS in the construction industry. It also touches on the critical success factors for construction projects in general, providing a comprehensive overview of the factors affecting quality in construction. Overall, the literature review provides a

thorough analysis of the factors influencing the quality management of construction projects using IBS, drawing on a range of sources to support its findings and conclusions.

Phong Thanh Nguyen et al (2018) provides an overview of the application of Building Information Modelling (BIM) in the construction industry. It emphasizes the importance of BIM in improving information communications, project management, and overall project quality. The review also highlights the benefits of BIM, such as saving time, reducing expenditures, and enhancing the flexibility and mobility at the work site. Furthermore, the literature review acknowledges the increasing usage of mobile devices integrated with BIM to improve information communications between parties involved in construction projects. It also emphasizes the need for accurate and timely information for making reasonable decisions in the construction industry. Overall, the literature review sets the stage for the subsequent analysis of the strengths, weaknesses, opportunities, and challenges of the application of the BIM 360 Field in construction quality management, as well as the proposed strategies to enhance the effectiveness of construction project quality management.

Alaa AL-Saedi et al (2019) through the paper "Quality Management to continuous improvements in process of Ready-Mix Concrete production" by Alaa AL-Saedi, provides a comprehensive literature review on the importance of quality management in the production of ready-mix concrete. The authors highlight the benefits of using ready mix concrete, such as good quality, lower life cycle cost, speed of work, and environmental friendliness, but also note that poor quality or useless concrete can result from non-compliance and inadequate quality management. The paper discusses the concept of quality and its subjective nature, as well as the importance of a quality management system in improving overall performance and providing a basis for sustainable development initiatives. The authors also provide a historical overview of quality management, including the contributions of Deming and Juran, and emphasize the role of statistical methodology in controlling and improving processes. The paper then presents a case study of a ready-mix concrete company that suffers from non-compliance and inadequate quality management. The authors identify problems in the company's quality management system, production processes, and lack of utilization of Total Quality Management (TQM) tools. The authors use various management techniques and tools, such as flow charts, Ishikawa diagrams, check sheets, FMEA analysis, 5 Whys analysis, and solution effect analysis, to identify and analyse the problems and propose solutions based on the principles of management. The paper concludes by emphasizing the importance of a scientific methodology for management in the production process of ready-mix concrete and proposes the development of a methodology based on the Project Management Body of Knowledge (PMBOK) guide. The authors suggest that implementing the strategies outlined in the paper can lead to higher productivity, less rework, increased customer satisfaction, increased profitability, and sustainability for ready mix concrete producers. Overall, the literature review in this paper provides a comprehensive overview of the importance of quality management in the production of ready-mix concrete and highlights the potential benefits of implementing continuous improvements in the production process. The case study presented in the paper provides practical insights and strategies for ready mix concrete producers to improve their quality management systems and enhance their production processes.

D Aghimien et al (2019) focuses on the importance of Total Quality Management (TQM) in the construction industry, particularly in providing quality infrastructure for the public. The review notes that TQM has become increasingly important in recent times due to the need to increase the quality of products being delivered within the Architecture, Engineering and Construction (AEC) industry. The review highlights the importance of TQM in achieving competitive edge in the construction industry, and notes that TQM allows for input of ideas from all project participants, thus decreasing the tendency of error in the completion of projects. The review also identifies different TQM practices that have been identified in a quest to attain quality delivery, including strategic planning, customer focus, and supplier quality management. The review notes that customer focus is one of the most important targets for companies, and that it is important to ensure customer's needs are ensured all together to get a productive result. The review also highlights the importance of effective communication and primary customer focus in improving TQM adoption. Overall, the literature review in this paper provides a comprehensive overview of the importance of TQM in the construction industry, and identifies key TQM practices that can be adopted to improve the quality of construction projects.

Dandan Du et al (2019) focuses on the effectiveness evaluation of the quality management system of a construction engineering testing laboratory. It introduces a two-stage evaluation structure model and uses the triangular fuzzy number analytic hierarchy process to evaluate the quality management system. Also, he emphasizes the importance of evaluating the effectiveness of the laboratory quality management system and provides a reliable basis for continuous improvement. It also highlights the feasibility and practicality of using the triangular fuzzy number analytic hierarchy process for such evaluations.

K V Zhegera et al (2019) through the article "Analysis of quality of construction products by example of LLC 'RTITS'" discusses the importance of quality management in enterprises, particularly in the construction industry. It emphasizes

the significance of maintaining and improving the quality of processes and products to ensure competitiveness and consumer satisfaction. The authors present the results of applying statistical evaluation methods to assess the quality of construction products, using the example of well rings produced by LLC "RTITS." They calculate the reproducibility index, quality indicator of the technological process, and construct a desirability function to analyse the results and provide recommendations for quality assurance in the production of well rings. Furthermore, the article delves into the methods used to assess the stability of the technological process and the quality of the finished product. It explains the calculation of the process capability index, reproducibility index, and the quality index of the technological process. The authors also discuss the use of the generalized desirability function to convert property indicators into a dimensionless scale of desirability. The results of the analysis indicate that the quality of the reinforced concrete rings produced by LLC "RTITS" meets the requirements, and the process of production is reproducible. The article concludes by recommending the implementation of a quality management system, systematic control, and the use of certification as an important factor in improving the quality of construction products.

J Z Wang et al (2020) through the paper "BIM-based Technology Implementation on Quality Management in Construction Engineering" discusses the application of Building Information Modelling (BIM) technology in improving quality management in construction projects. It emphasizes the significance of BIM technology in upgrading the traditional construction industry into automation and intelligence, thereby enhancing efficiency and accuracy in quality management throughout the project life cycle. The paper analyses the technical features of BIM, its application in building engineering construction and quality management, and introduces a BIM-based positioning inspection technology for quality management. The study also identifies challenges and limitations in the current knowledge and suggests areas for further development, such as integrating augmented reality (AR) and virtual reality (VR) technology to augment BIM functions.

Liu Liguo et al (2020) through the paper "Analysis of Importance of Engineering Survey in Construction Engineering Quality Management" emphasizes the pivotal role of engineering survey in ensuring the quality management of construction projects. Authored by Liu Liguo and Zhang Caixia, the article underscores the significance of engineering survey in providing essential data support and measurement methods for early exploration, mid-term construction, and later acceptance quality management of construction engineering. It delves into the critical aspects of construction quality management, highlighting the urgent need to apply engineering measurement technology effectively. The authors provide an overview of engineering survey, elucidating its vital role and offering insightful opinions and suggestions to optimize its application in construction engineering quality management. By emphasizing the importance of engineering survey, the paper contributes to enhancing the understanding of how this technology can significantly impact the overall quality and success of construction projects. Furthermore, the article delves into specific measures to leverage engineering surveys for quality management in construction engineering. It emphasizes the application of engineering survey in the positioning and foundation construction stages, stressing the need to survey various parameters of the project and utilize landmark buildings or objects as reference points. The authors advocate for the use of engineering survey to depict the main structure of the construction, enabling the acquisition of load capacity and material data to ensure the integrity, stability, and safety of the superstructure. Additionally, the paper underscores the role of engineering survey in providing monitoring and management methods for the entire building construction, emphasizing the need for accurate reference and standard data to improve quality. By outlining these measures, the article offers practical insights into harnessing engineering survey to enhance construction engineering quality management, thereby contributing to the successful execution of construction projects.

Maharani Oki Fitriana et al (2020) discusses the development of a Quality Management System (QMS) for the Construction Services Procurement Process to Improve the Quality of Contractor Performance in Universitas Indonesia. The study aims to address the issues of delays, termination of contracts, and discrepancies in contractor work results that have impacted the quality and timeliness of construction projects at the university. The research methodology involves literature study, survey, and statistical analysis to identify the processes, organizations, quality objectives, and standard operating procedures (SOP) for procurement, as well as to identify risk factors affecting contractor performance. The study also delves into the theoretical background of quality management systems, procurement, risk management, and performance evaluation. The paper concludes with the development of a QMS for the construction services procurement process to improve contractor performance quality, with the expectation that this system will enhance the quality of contractor performance and reduce project stoppage rates.

Nidal Adnan Jasim et al (2020) presents a study on the factors adversely affecting quality in Iraqi construction projects and identifies the relative importance of the causes of poor-quality management. The research methodology includes the use of fishbone diagrams, Pareto charts, and 5-Why analysis to diagnose the root causes of poor-quality management in different groups such as equipment, labour, systems, materials, design and execution, subcontractors, site staff, and

contract. The findings reveal that the failure to implement a quality control and assurance system is the root cause of poor-quality management in Iraqi construction projects. The study recommends that construction companies should prioritize the implementation of quality control and assurance systems, use computer programs and modern management techniques, and improve checking and inspection processes to enhance quality management in construction projects. The paper also highlights the importance of effective communication, early and continuous consulting of contractors, and sufficient experience of project managers in ensuring quality management in construction projects. The study emphasizes the need for a standardized contract, clear contract conditions, and a well-defined awarding system to avoid lack of cooperation between parties involved in the contract. The paper concludes that the identification of root causes of poor-quality management is a key step towards improvement and control of quality management in construction projects. The study provides valuable insights for construction companies and policymakers to enhance quality management in Iraqi construction projects and improve the success rate of indigenous construction SMEs in construction project delivery.

O Z Oni et al (2020); through the paper "Factors affecting quality management practices on building construction sites in Nigeria" evaluates the factors influencing quality management practices on construction sites in Nigeria with the aim of improving quality management. The study utilized a convenient sampling technique to select construction sites in Oyo State, with 63 completed questionnaires returned. The findings revealed that lack of adequate sanction by standard assurance organizations, non-implementation of the National Building Code, and lack of proper inspection at every construction stage were among the top factors affecting quality management. The study also highlighted the significant impact of quality management on construction project performance, emphasizing the importance of client satisfaction, reduction in maintenance costs, and getting more jobs as a result of previous good work done. The paper concludes by recommending the imposition of adequate sanctions for non-compliance with quality standards and the implementation of the National Building Code to enhance quality management in the construction industry.

Unegbu et al (2020) focuses on the critical success factors and project management practices of construction projects. The authors reviewed various studies on project management practices, including the Project Management Institute's (PMI) Guide to the Project Management Body of Knowledge (PMBOK), which outlines ten project management knowledge areas and over seventy-eight project management practices. The authors selected fifty-three PM practices based on the literature review and expert advice, which were grouped into nine constructs, including scope management, time management, cost management, quality management, risk management, human resource management, communication management, procurement management, and stakeholder management. The authors also reviewed studies on critical success factors for construction projects, including Al-Tmeemy et al. (2011), Atkinson (1999), Chua et al. (1999), and Hany et al. (2012). These studies identified various factors that contribute to the success of construction projects, such as cost, time, quality, customer satisfaction, and stakeholder satisfaction. The authors also reviewed studies on the structural equation model (SEM), including Byrne (1994), Chen et al. (2012), and Hayduk (1987). These studies provided insights into the statistical analysis of the data collected in this study, including the reliability and validity tests for the constructs. Overall, the literature review provided a comprehensive understanding of the critical success factors and project management practices of construction projects, as well as the statistical analysis methods used in this study.

Wenbo Mao et al (2020) through the paper "Innovative Application of Quality Management Method in LE Engineering Construction Process with the Computer-Aided" by Wenbo Mao discusses the significance of quality management in the construction industry, particularly in the context of LE (Large-Scale Engineering) projects. It emphasizes the importance of quality management in improving construction safety, cost control, quality control, and schedule control. The author highlights the current challenges in LE construction quality management and proposes the application of quality management methods with computer-aided tools to enhance efficiency and achieve sustainable development in the construction engineering industry. The paper provides a comprehensive analysis of the application of quality management in various aspects of LE engineering construction, emphasizing the potential benefits for construction enterprises and the national economy.

Athenkosi Sogaxa et al (2021) through the article discusses effective quality management strategies for enhancing the success rate of indigenous construction SMEs in construction project delivery. It presents a mixed method research approach, combining quantitative and qualitative analyses, to evaluate the most significant quality management practices adopted by construction SMEs. The quantitative findings highlight clear working drawings, periodic requests for quality inspection, and effective implementation of total quality management as the most significant strategies. These findings are supported by qualitative interviews with SME directors and managers, who emphasize the importance of clear drawings, quality inspections, compliance with standards, and effective communication with the design team. Factor analysis categorizes the effective quality management practices into six components, providing a comprehensive

understanding of the strategies adopted by SMEs. Overall, the article provides valuable insights into the key quality management practices that can enhance the success rate of construction SMEs in project delivery.

Khalil Rahman Farhat et al (2021) The article "Significant Factors Affecting Quality and Quality Maximizing Methods of Construction Projects in Outskirt Areas of Afghanistan" discusses the challenges faced in construction projects in Afghanistan, particularly in the outskirts areas, due to factors such as the importation of low-quality materials, lack of technical knowledge among contractors, and negligible testing and inspection. The study utilized a questionnaire-based survey to gather insights from professional respondents in the construction industry, highlighting 25 factors affecting construction quality and 24 methods for maximizing construction quality. Additionally, the article provides valuable information on other related topics such as lineament assessment of the Aynak Copper mine, air pollution status in Afghanistan, and sustainable household water-saving options for Kabul City, offering a comprehensive overview of construction and environmental challenges in the region

Peter Agbaxode et al (2021) provides a detailed analysis of the factors that impact the quality of design documentation in the construction sector. The authors highlight the importance of design documentation quality in achieving project efficiency and the socio-economic development of nations. They note that poor design documentation quality can lead to project delays, poor project quality, and increased costs. The authors also discuss various strategies proposed by researchers and practitioners to improve design documentation quality. These strategies include increasing design fees, design and documentation coordination, independent reviews, setting standards for documentation quality control and service, education on constructability, and accountability of design consultants. Other strategies include having design checklists, verifying documents before use, use of BIM or other computer programs, and establishing quality control departments. The literature review also highlights the need for industry changes and initiatives to enhance design documentation quality. The authors note that while there exist numerous studies on design documentation quality, it is difficult to improve on the quality without identifying the variables that have a high influence on the quality. Therefore, the aim of this study is to evaluate each variable that influences design documentation quality and rank the factors on the basis of significance attached. Overall, the literature review in this article provides valuable insights into the challenges and opportunities in improving design documentation quality in the construction sector. The authors' comprehensive analysis of the influential variables and strategies proposed to improve design documentation quality can help stakeholders, researchers, and academics enhance project performance and provide solutions to sustainable infrastructure design and delivery challenges in the industry.

Cenk Budayan et al (2022) The literature review in the paper "Roadmap for the implementation of total quality management (TQM) in ISO 9001-certified construction companies: Evidence from Turkey" by Cenk Budayan and Ozan Okudan includes a discussion of various studies related to TQM implementation in the construction industry. Some of the studies mentioned in the paper are: Burati JL, Oswald SL. A framework for TQM in construction. *Int J Proj Manage* 1995; Pheng LS, Teo AL. Critical success factors of total quality management implementation in Singapore construction firms. *Int J Qual Reliab Manage* 1997, Metri B. A decision framework for TQM adoption in construction companies. *Total Qual Manage* 2003, Koh TY, Low SP. Critical success factors for TQM implementation in the construction industry. *Total Qual Manage* 2004, Yang JB, Peng SC. Development of a customer satisfaction evaluation model for construction project management. *Build Environ* 2008; Samson D, Terziovski M. The relationship between total quality management practices and operational performance. *J Oper Manage* 1999; Kaynak H. The relationship between total quality management practices and their effects on firm performance. *J Oper Manage* 2003. These studies provide insights into the critical success factors and implementation strategies for TQM in the construction industry. The authors of the paper use these studies to identify the main critical success factors and sub-CSFs for TQM implementation in ISO 9001-certified construction companies and to develop a roadmap for effective TQM implementation.

J. Shin et al (2022) discusses the design and implementation of a Quality Information Management System for a Modular Construction Factory. It outlines the process of developing the system based on the previous content and defines the main functions of the system. The usefulness of the system is validated through accredited certification laboratory tests and input from modular construction experts. The paper provides a detailed framework for the development of the quality information management system, focusing on the module production process analysis. It identifies the various types of quality information generated during module manufacturing and the complex relationships among different types of quality information. The document also presents a framework for the development of the quality information management system for a modular factory. The system evaluation section discusses the criticality of determining the practicability of the system and provides insights into system performance evaluation and system usability evaluation. The evaluation results indicate that the developed system had excellent usability and practical usefulness, particularly in the context of modular construction. The paper concludes by highlighting the potential impact of the developed quality information management system on the efficiency of quality management tasks in the module

manufacturing process. It also emphasizes the need for future research to evaluate the usefulness of the system based on practical application and to incorporate practitioner feedback to improve system performance. Overall, the document provides a comprehensive overview of the development, implementation, and validation of a Quality Information Management System for Modular Construction, with a focus on its practical utility and usability.

Olga Vasilyevna Fokina et al (2022) explores the role of marketing in improving the quality of project management in Energy Tech, with a focus on supporting sustainable and environmental development of energy economics. The authors argue that quality plays a key role in project management in EnergyTech, and that marketing can be used to overcome contradictions in Stakeholder Theory and achieve a balance of interests between stakeholders and energy markets. The study uses empirical data from 2021 to test the hypothesis that marketing is significant for the quality of project management at Energy Tech. The results show that marketing can improve the practice of project management in Energy Tech and provide support for sustainable and environmental development of energy economics. The authors provide specific recommendations for businesses to introduce energy innovations and use marketing techniques to support sustainable development in the energy sector. Overall, this paper provides an integrated perspective on project management in EnergyTech from the standpoint of Stakeholder Theory and marketing. The findings clarify the essence of project management in EnergyTech and identify prospects for improving the quality of this management through marketing. The practical significance of the results obtained and the recommendations formulated is related to the fact that they formed the scientific and methodological basis for the transition to the marketing approach of quality management in EnergyTech, which provides the greatest support for sustainable and environmental development of energy economics.

Said Khalfan Rashid Al Sinawi et al (2022) through the article "Total quality management in Oman" provides a comprehensive literature review on the concept of Total Quality Management (TQM) and its application in the construction industry in Oman. The authors have referred to several studies and articles related to TQM practices in Oman and other countries to provide a detailed understanding of the subject matter. The literature review highlights the importance of TQM in improving the quality of products and services, enhancing customer satisfaction, and achieving organizational success. These challenges include the cost of training and qualifying employees, shortage of trained and qualified human capital, and social problems such as employee dissatisfaction and lack of incentives and compensation. The authors have also discussed the need for senior management commitment, employee involvement, and specialized teams to monitor the organization's commitment to TQM requirements. Overall, the literature review provides a comprehensive understanding of TQM practices in Oman and their impact on organizational success. The authors have referred to several studies and articles to support their arguments and provide a detailed analysis of the subject matter.

3. CONCLUSION

The presented literature reviews collectively offer a comprehensive overview of various critical aspects within the construction industry and project management. These reviews delve into topics such as project management practices, total quality management (TQM), Building Information Modelling (BIM), design documentation quality, and agile quality management frameworks. By synthesizing insights from diverse studies, these reviews contribute valuable perspectives and frameworks for understanding and addressing challenges in the construction sector. The exploration of project management practices, as outlined by the Project Management Institute's Guide to the Project Management Body of Knowledge (PMBOK), emphasizes the importance of delineating key knowledge areas and practices. This provides a foundation for effective project management across different domains, such as scope, time, cost, quality, risk, human resources, communication, procurement, and stakeholder management.

4. REFERENCES

- [1] A J Likita N Y Zainun I Abdul Rahman A S M Abdul Awal, A R Alias, M Q Abdul Rahman and F E Mohamed Ghazali (2018) "An Overview of Total Quality Management (TQM) practice in Construction Sector" IOP Conf. Series: Earth and Environmental Science 140 (2018) 012115 Doi :10.1088/1755-1315/140/1/012115
- [2] Athenkosi Sogaxa, Eric Simpeh and Julius Fapohunda (2021) "Effective quality management strategies for enhancing the success rate of indigenous construction SMEs in construction project delivery" IOP Conf. Series: Earth and Environmental Science 654 (2021) 012018 doi:10.1088/1755-1315/654/1/012018
- [3] Cenk Budayana, Ozan Okudan (2022) "Roadmap for the implementation of total quality management (TQM) in ISO 9001-certified construction companies: Evidence from Turkey" Ain Shams Engineering Journal <https://doi.org/10.1016/j.asej.2022.101788>
- [4] Dandan Du and Xiaosheng Song (2019) "Effectiveness Evaluation of quality Management System in Construction Engineering Testing Laboratory Based on Triangle Fuzzy Analytic Hierarchy Process" IOP Conf. Ser.: Earth Environ. Sci. 283 012055

- [5] Daopeng Wang, Jifei Fan, Hanliang Fu and Bing Zhang (2018) "Research on Optimization of Big Data Construction Engineering Quality Management Based on RNN-LSTM" Hindawi Complexity Volume 2018, Article ID 9691868, 16 pages <https://doi.org/10.1155/2018/9691868>.
- [6] Farhat, K. R., & Rana, A. S. (2021). Significant Factors Affecting Quality and Quality Maximizing Methods of Construction Projects in Outskirt Areas of Afghanistan. IOP Conference Series: Earth and Environmental Science, 889(1), 012078. doi:10.1088/1755-1315/889/1/012078
- [7] Fokina OV, Sozinova AA, Glebova AG and Nikonova NV (2022), Improving the quality of project management at energytech through marketing in support of sustainable and environmental development of energy economics. Front. Energy Res.10: 943447.doi: 10.3389/fenrg.2022.943447.
- [8] Fokina OV, Sozinova AA, Glebova AG and Nikonova NV (2022), Improving the quality of project management at EnergyTech through marketing in support of sustainable and environmental development of energy economics. Front. Energy Res. 10:943447. doi: 10.3389/fenrg.2022.943447
- [9] H.C.O. Unegbu, D.S. Yawas, B. Dan-asabe (2020) "An investigation of the relationship between project performance measures and project management practices of construction projects for the construction industry in Nigeria" Journal of King Saud University Engineering Sciences <https://doi.org/10.1016/j.jksues.2020.10.001>
- [10] J Z Wang ,G A Wei (2020)"BIM-based Technology Implementation on Quality Management in Construction Engineering" Journal of Physics: Conference Series 1601 (2020) 042043 doi:10.1088/1742-6596/1601/4/042043
- [11] K V Zhegera, N A Petuhova, A V Gargala (2019) "Analysis of quality of construction products by example of LLC RTITS" IOP Conf. Series: Materials Science and Engineering 687 (2019) 022002 doi:10.1088/1757-899X/687/2/022002
- [12] Khalil Rahman Farhat, Abhishek Singh Rana (2021) "Significant Factors Affecting Quality and Quality Maximizing Methods of Construction Projects In Outskirt Areas of Afghanistan" IOP Conf. Series: Earth and Environmental Science 889 (2021) 012078 doi:10.1088/1755-1315/889/1/012078
- [13] Liu Liguang and Zhang Caixia (2020) IOP Conf. Ser.: Mater. Sci. Eng. 799 012002 "Analysis of Importance of Engineering Survey in Construction Engineering Quality Management" Materials Science and Engineering 799 (2020) 012002 IOP Publishing doi:10.1088/1757-899X/799/1/012002.
- [14] Maharani Okifitriana, Yusuf Latief (2020) "Development of Quality Management System for Construction Services Procurement to Improve the Quality of Contractor Performance in Universitas Indonesia" Journal of Physics: Conference Series 1858 (2021) 012083 doi:10.1088/1742-6596/1858/1/012083
- [15] Mohammed Neamah Ahmed, Sawsan Rasheed Mohammed (2018) "Agile Quality Management Framework in Construction Projects (AQMFPCP)" Article in International Journal of Engineering & Technology · November 2018 DOI: 10.14419/ijet.v7i4.20.25944
- [16] N.S. Azman, M. Z. Ramli, M. H. Zawawi (2018) "Factors Affecting Quality Management of Construction Project Using Industrialized Building System: A Review" International Journal of Engineering & Technology, 7 (4.35) (2018) 307-311
- [17] Nidal Adnan Jasim (2020) "Diagnosing the Causes of Poor Quality Management in Iraqi Construction Projects Using Technique of Root Cause Analysis" Conf. Series: Materials Science and Engineering 1076 (2021) 012116 IOP Publishing doi:10.1088/1757-899X/1076/1/012116
- [18] Z Oni, L M Amusan, J D Owolabi and B F Akinbile (2019) "Factors affecting quality management practices on building construction sites in Nigeria" IOP Conf. Series: Journal of Physics: Conf. Series 1299 (2019) 012009 doi:10.1088/1742-6596/1299/1/012009
- [19] Peter Agbaxode, Sitsabo Dlamini and Ehsan Saghatforoush (2021) "Design documentation quality influential variables in the construction sector" IOP Conf. Series: Earth and Environmental Science 654(2021) 012007 doi:10.1088/1755-1315/654/1/012007
- [20] Phong Thanh Nguven Thu Anh Nguven Quven Le Hoang Thuy TeNguven Vy Dang Bich Huynh (2018) "Application Of Swot For Construction company Quality Management Using Building information Modelling" Mech Cont.& Math. Sci., Vol.-13, No.-5, November-December (2018) Pages 25-33 <https://doi.org/10.26782/jmcmms.2018.12.00003>
- [21] Shin, J.; Choi, B. "Design and implementation of Quality Information Management System for Modular Construction" Buildings 2022,12,654. <https://doi.org/10.3390/buildings12050654>
- [22] Wenbo Mao (2020) "Innovative Application of Quality Management Method in Le Engineering Construction Process with the Computer- Aided" Journal of Physics: Conference Series 1744 (2021) 022076 doi:10.1088/1742-6596/1744/2/022076