

A Literature Review on Developing A Project Performance Measurement Strategy for Construction Project

Srinivasan A¹ and Aswin Bharath A²

Post Graduate Student, M.E Construction Management, Department of Civil Engineering¹

Assistant Professor, M.E Construction Management, Department of Civil Engineering²

Kumaraguru College of Technology, Coimbatore, Tamil Nadu, India

Abstract: *This project aims to develop a project performance measurement strategy for construction projects using Objectives and Key Results (OKRs) methods. Construction projects are complex and involve multiple stakeholders, tasks, and objectives. Therefore, it is crucial to have a robust performance measurement strategy in place to ensure that the project is completed on time, within budget, and with the desired quality. This literature review aims to analyse the existing research on developing a project performance measurement strategy for construction projects. The review will cover topics such as the objectives of project performance measurement, the challenges in measuring project performance, the methods for developing a performance measurement strategy, and the key performance indicators (KPIs) used in the construction industry. Additionally, the review will examine the application of the Objectives and Key Results (OKR) method for project performance measurement and its effectiveness in the construction industry. The literature review will provide valuable insights into the best practices for developing a project performance measurement strategy for construction projects, and will be useful for project managers, researchers, and practitioners in the construction industry.*

Keywords: *Key Performance Indicator, Objectives and Key Results, performance measurement, construction projects*

I. INTRODUCTION

Many Construction projects are complex and involve a wide range of stakeholders, including owners, contractors, subcontractors, and suppliers. To ensure the success of a construction project, it is essential to have a well-defined and comprehensive project performance measurement strategy in place. Such a strategy helps to track the progress of a project, identify potential issues or risks, and make necessary adjustments to keep the project on track.

A project performance measurement strategy typically includes a set of metrics that are used to evaluate various aspects of a project, such as cost, schedule, quality, safety, and customer satisfaction. These metrics can be quantitative or qualitative and may vary depending on the specific needs and goals of a project. By measuring and analyzing these metrics, project managers can gain valuable insights into the performance of a project and take timely actions to address any issues or challenges.

In summary, a project performance measurement strategy is critical for the success of a construction project. It enables project managers to monitor and evaluate the progress of a project and make necessary adjustments to ensure that the project is completed on time, within budget, and to the satisfaction of all stakeholders involved.

II. PROJECT PERFORMANCE MEASUREMENT STRATEGY

The OKRs are a popular framework for setting and measuring goals in organizations. The framework comprises of a set of objectives, which are high-level goals that define what an organization wants to achieve, and key results, which are specific, measurable outcomes that indicate progress towards the objectives. OKRs are typically set and reviewed on a quarterly basis, allowing organizations to remain agile and responsive to changing circumstances.

In the context of construction projects, developing a project performance measurement strategy using OKRs involves identifying the project objectives and key results that are aligned with the overall goals of the project. These could include objectives such as completing the project within budget, achieving a certain level of quality or safety standards, or meeting specific customer requirements. Key results could be metrics such as the number of days ahead or behind schedule, the percentage of budget spent, or the number of safety incidents.

By using OKRs to develop a project performance measurement strategy, project managers can ensure that everyone involved in the project is aligned with the project goals and understands the specific metrics that will be used to measure progress. Additionally, OKRs provide a clear and measurable way to track progress towards project goals, enabling project managers to identify potential issues or risks early and make necessary adjustments to keep the project on track.

Overall, using OKRs to develop a project performance measurement strategy for construction is an effective way to ensure that construction projects are completed on time, within budget, and to the satisfaction of all stakeholders involved.

II. LITERATURE REVIEW

Bassioni, H. A., Price, A. D. F., & Hassan, T. M. (2005), This article provides a comprehensive review of performance measurement in construction, discussing various performance measures and their limitations. The authors suggest that performance measurement should be integrated into the project management process and provide a framework for measuring performance at the project, program, and portfolio levels. They also highlight the importance of using both lagging and leading indicators, as well as qualitative and quantitative data, to ensure a comprehensive assessment of project performance. Additionally, the article addresses the need for effective communication and feedback mechanisms to improve performance and encourage continuous improvement in construction projects. [1]

Yu, I., Kim, K., Jung, Y., & Chin, S. (2008), This article proposes a comparable performance measurement system (CPMS) for construction companies that enables benchmarking between different companies. The authors argue that a CPMS would facilitate fair competition and provide a common language for communication between companies. The system consists of three phases: developing key performance indicators (KPIs) based on industry standards, weighting the KPIs to reflect the company's strategy and goals, and using the KPIs to benchmark performance against other companies. The authors illustrate the use of the CPMS with a case study. [2]

Yeung, J. F. Y., Chan, A. P. C., Chan, D. W. M., Chiang, Y. H., & Yang, H. (2003), The article presents a benchmarking model for construction projects in Hong Kong, which focuses on identifying and measuring project performance indicators. The model consists of six phases: planning, data collection, data analysis, identification of benchmarking partners, identification of performance gaps, and implementation of improvement actions. The authors conducted a case study to illustrate the application of the model, which showed that the model can identify areas for improvement and facilitate knowledge transfer between benchmarking partners. The study concludes that the benchmarking model can be used as a tool for continuous improvement in the construction industry. [3]

Kim, S. Y., & Thuc, L. D. (2018), The article discusses the need for life cycle performance measurement in public-private partnership infrastructure projects and proposes a framework for evaluating the performance of such projects. The framework consists of four phases: pre-contract, construction, operation, and post-operation. Each phase includes various indicators for measuring performance, such as project success, sustainability, and social impact. The authors emphasize the importance of considering the entire life cycle of a project when evaluating performance and provide several case studies to illustrate the application of the framework. They conclude that the framework can be useful for improving the performance of public-private partnership infrastructure projects and enhancing the value for all stakeholders involved. [4]

Xiang, H. (2019), This study aimed to construct an informative performance management system using Objectives and Key Results (OKR) for university teachers. The study used a mixed-methods approach, combining literature review, expert consultation, and case studies. The proposed OKR system includes three levels: strategic goals, operational objectives, and individual key results. The system allows for objective assessment of individual performance and supports the development of professional skills and knowledge. The study also highlights the importance of training and development programs to enhance the effectiveness of the OKR system. [5]

Chen, D., Chen, J., & Ning, M. (2022), The article discusses the concept of Objectives and Key Results (OKR) and its potential application in enterprise performance management. It provides a literature review on the topic and proposes a framework for implementing OKR in an organization, with a focus on alignment, transparency, and continuous improvement. The authors also discuss the challenges and limitations of using OKR and suggest future research directions in the field.[6]

Montfoort, I., Kelders, W. P. A., van der Geest, J. N., Schipper, I. B., Feenstra, L., de Zeeuw, C. I., & Frens, M. A. (2007), The study investigates the interaction between two reflexes, namely the vestibule-ocular reflex (VOR) and the cervical-ocular reflex (COR), in patients with whiplash injury. The results show that whiplash patients have an impaired VOR-COR interaction, which may contribute to their visual disturbances such as dizziness and disorientation. The study suggests that rehabilitation programs for whiplash patients should consider targeting this impairment in the VOR-COR interaction.[7]

Haponava, T., & Al-Jibouri, S. (2018), The paper proposes a system for measuring project performance using process-based key performance indicators (KPIs). The system consists of three main steps: (1) identification of relevant processes, (2) selection of KPIs for each process, and (3) calculation of performance scores for each KPI. The proposed system is intended to provide a more comprehensive and accurate measure of project performance than traditional methods, which often focus on outcome-based measures such as cost, time, and quality. The paper includes a case study demonstrating the application of the proposed system to a construction project. [8]

Nassar, N., & AbouRizk, S. (2017) , The article presents a practical framework for integrated performance measurement of construction projects, which considers both project-level and organizational-level perspectives. The framework integrates various performance measurement methods and metrics, including financial and non-financial indicators, to provide a comprehensive view of project performance. The proposed framework is implemented and tested on a real construction project, and the results demonstrate its effectiveness in identifying areas for improvement and supporting decision-making processes. The article highlights the importance of integrating performance measurement systems and aligning them with organizational goals and objectives to improve project performance [9]

Korhonen, T., Jaaskeläinen, A., Laine, T., & Saukkonen, N. (2018), The article discusses the importance of performance measurement in achieving success in project-based operations. It highlights the key challenges faced in project-based operations, such as the complexity of project environments and the difficulty in measuring performance due to the uniqueness of projects. The article presents a framework for performance measurement that takes into account the different phases of project-based operations and the specific objectives and metrics associated with each phase. The authors emphasize the importance of aligning performance measurement with the strategic objectives of the organization and the need for continuous improvement in performance measurement practices. The article concludes that an effective performance measurement system can support the achievement of success in project-based operations by enabling informed decision-making, facilitating communication and collaboration, and promoting accountability and transparency [10]

Wibowo, M. A., Astana, I. N. Y., & Rusdi, H. A. (2020), The article presents an analysis of the relationship between bidding strategy, project performance, and company performance in the construction industry. The study was conducted in Indonesia and involved a sample of 52 construction companies. The findings show that a combination of low-bid and best-value bidding strategies is the most effective in improving project performance, which in turn positively affects company performance. The study also reveals that project performance is the key mediating factor between bidding strategy and company performance. The authors suggest that companies should adopt a balanced approach to bidding strategies and place greater emphasis on project performance to improve their overall performance.[11]

Badawy, M., Abd El-Aziz, A. A., Idress, A. M., Hefny, H., & Hossam, S. (2020), The study is a survey of key performance indicators (KPIs) used in various industries. The authors explore the concept of KPIs and provide an overview of different types of KPIs that are commonly used. They also discuss the importance of selecting appropriate KPIs for effective performance measurement and provide recommendations for selecting and implementing KPIs. The authors conclude that a comprehensive set of KPIs should be selected based on the organization's strategic objectives and should be regularly reviewed and updated to ensure continued relevance. [12]

Okudan, O., Budayan, C., & Dikmen, I. (2012), The article presents the development of a conceptual life cycle performance measurement system for build-operate-transfer (BOT) projects. The study highlights the challenges faced

in measuring the performance of BOT projects, particularly in terms of aligning the interests of different stakeholders and determining the appropriate performance metrics. A conceptual model is proposed that incorporates different dimensions of project performance, including financial, technical, social, and environmental aspects, and considers the entire project life cycle. The model is illustrated through a case study of a BOT project in Turkey, and its potential applications and limitations are discussed. The authors conclude that the proposed model can provide a comprehensive and integrated approach to measuring project performance in BOT projects, helping to enhance accountability and transparency and support decision-making. [13]

Makena, M. V., & Lango, B. (2021), The study examines the relationship between project portfolio management (PPM) and financing program performance in commercial banks in Nairobi City County, Kenya. A survey was conducted on 50 senior managers involved in PPM, and data was analyzed using descriptive and inferential statistics. The results suggest that PPM has a significant positive impact on the performance of financing programs in commercial banks. The study recommends the adoption of PPM practices to enhance the performance of financing programs in commercial banks in Kenya. [14]

Nicolaus Prawiro 1, Subagyo (2023), The paper "Strategic Performance Measurement System (SPMS) for the Underwriting Cycle in PT Asuransi Cakrawala Proteksi Indonesia" by Nicolaus Prawiro and Subagyo focuses on the development of a strategic performance measurement system (SPMS) for the underwriting cycle in PT Asuransi Cakrawala Proteksi Indonesia.

The authors begin by providing an overview of the insurance industry and the underwriting cycle, which involves the process of assessing and pricing insurance policies. They then discuss the importance of performance measurement in the insurance industry and the challenges of measuring performance in the underwriting cycle.

Based on their analysis, the authors propose a framework for the SPMS in the underwriting cycle. The framework consists of four stages:

- (1) setting strategic objectives,
- (2) identifying key performance indicators (KPIs),
- (3) collecting and analyzing data, and
- (4) implementing and monitoring the SPMS. [15]

Kasinath, H. M. (2015), The paper discusses the use of qualitative methods in performance measurement, highlighting the importance of understanding the context and purpose of the measurement. The author explains the various types of qualitative methods, such as case studies, surveys, and interviews, and the advantages and disadvantages of each. The paper also provides a step-by-step process for conducting qualitative research in performance measurement, including formulating research questions, selecting the sample, collecting data, and analyzing and reporting the results. Finally, the paper discusses the limitations of qualitative methods and the need for triangulation with other measurement methods.[16]

Bassioni, H. A., Price, A. D. F., & Hassan, T. M. (2007), In this study, the authors aim to develop a conceptual framework for measuring business performance in construction. The study evaluates and compares the performance measurement systems used in construction and other industries, and identifies the key performance indicators (KPIs) used in the construction industry. The authors then develop a conceptual framework based on the identified KPIs and evaluate its effectiveness through a case study of a construction company. The study concludes that the proposed framework is effective in identifying and measuring key aspects of business performance in construction companies, and can be used to support decision-making and improve performance.[17]

Lop, N. S., Ismail, K., Mohd Isa, H., & Khalil, N. (2014), This article proposes an effective approach for implementing performance measurement systems (PMS) in construction projects. The approach is based on a literature review and a survey of experts in the construction industry. The proposed approach consists of six steps, including establishing project objectives, identifying key performance indicators (KPIs), determining measurement methods, data collection, data analysis, and reporting. The article provides examples of KPIs and measurement methods that can be used in the construction industry. The proposed approach can help project managers to improve project performance by providing a systematic and objective way to measure and evaluate project performance.[19]

Kärnä, S., & Junnonen, J. (2005). In this article, the authors propose a benchmarking approach to evaluate the performance of construction industry participants such as companies and projects. The approach involves gathering

data from participants through surveys and using the data to establish performance benchmarks. The benchmarks are then used to evaluate the performance of individual participants and identify areas for improvement. The article includes a case study that demonstrates the effectiveness of the approach in identifying the strengths and weaknesses of a construction project. The authors conclude that benchmarking can be a useful tool for improving performance in the construction industry.[20]

Gransberg, D. D., & Villarreal-Buitrago, M. E. (2016), The article discusses the importance of performance metrics in construction project management and presents a comprehensive list of 118 performance metrics across various project management areas. The authors also present a case study to demonstrate how these performance metrics can be used to assess project performance and identify areas for improvement. Overall, the article provides a useful resource for construction project managers to develop effective performance measurement systems [21]

Alsulamy, S., Wamuziri, S., & Taylor, M. (2014), The article presents a review of literature related to project performance measurement, focusing on key performance indicators (KPIs) and their evaluation. The authors discuss various KPIs that are commonly used for measuring project performance, including time, cost, quality, safety, and customer satisfaction. They also highlight the importance of considering both quantitative and qualitative measures in the evaluation process. The study suggests that a well-designed set of KPIs can improve project performance by helping project managers to identify areas of improvement, monitor progress, and make data-driven decisions. The article concludes with recommendations for selecting appropriate KPIs and developing an effective performance measurement system.[22]

Burdi, K. R., Memon, M. S., & Soomro, A. S. (2019), The article analyzes key performance indicators (KPIs) in courier services by conducting a survey of customers and employees of a courier service company. The study identified the most important KPIs from the perspectives of customers and employees, which include delivery time, reliability, package condition, customer service, and cost. The authors also identified several potential KPIs that are currently not being tracked by the company, such as environmental impact, safety, and security. The study highlights the importance of KPIs in measuring and improving the performance of courier services.[23]

Sonson, Kulatunga, and Pathirage (2014) proposed a conceptual framework for performance measurement and management in construction. The framework comprises three levels: project level, organizational level, and industry level. At the project level, the authors suggest measuring performance in terms of cost, time, quality, safety, environmental sustainability, and stakeholder satisfaction. At the organizational level, performance should be evaluated in terms of financial performance, customer satisfaction, employee satisfaction, and innovation. Finally, at the industry level, the framework proposes measuring performance in terms of industry competitiveness, sustainability, and stakeholder satisfaction. The authors argue that this framework can help construction organizations develop effective performance measurement systems that align with their strategic goals and objectives.[23]

Montero, G., Onieva, L., & Palacin, R. (2013), The authors of this paper propose a methodology for selecting and implementing a set of Key Performance Indicators (KPIs) in project management. The methodology includes three main phases: the identification of relevant KPIs, the establishment of a measurement system, and the implementation of the system. The paper also provides a case study of the methodology's application to a construction project. The results show that the methodology can help project managers select and implement a set of relevant KPIs, leading to better project performance measurement and management.[24]

Van Dijk, D., & Schodl, M. M. (2010) , This chapter provides an overview of the concepts and practices related to performance appraisal and evaluation in industrial, work, and organizational psychology. It covers various topics such as the purpose and benefits of performance appraisal, the criteria for evaluating performance, the methods and tools used for performance appraisal, the role of feedback and communication in performance management, and the challenges and issues associated with performance appraisal and evaluation. The chapter also discusses the latest trends and developments in performance management, including the use of technology and the shift towards a more continuous and collaborative approach to performance management.[25]

Neely et al. (1995) conducted a comprehensive literature review on performance measurement system design and proposed a research agenda. They found that existing literature lacked a clear understanding of the objectives and the process of performance measurement. They also identified a lack of empirical validation and a clear understanding of the link between performance measurement and organizational strategy. The authors proposed a research agenda that

included studying the relationship between performance measurement and organizational strategy, developing a better understanding of the performance measurement process, and examining the effects of performance measurement on organizational performance.[26]

Kennerley, M., & Neely, A. (2003) the challenges of measuring business performance in a changing environment and proposes a framework called the Performance Prism to address these challenges. The Performance Prism includes five facets of performance: stakeholder satisfaction, strategies, processes, capabilities, and stakeholder contribution. The article argues that traditional financial measures are insufficient and advocates for a more comprehensive approach to performance measurement. The article provides examples of organizations that have used the Performance Prism successfully.[27]

Kanket, W. (2019) The article discusses an experimental research study conducted to compare the effectiveness of using Knowledge Management oriented Objectives and Key Results (OKRs) approach versus the traditional Key Performance Indicators (KPIs) approach for employee performance review. The study involved a sample of 60 employees from an IT company in Thailand, who were divided into two groups and evaluated using either the OKRs or KPIs approach. The results showed that the OKRs approach was more effective in improving employee performance, as it focused on developing employees' skills and knowledge rather than just measuring their performance against set targets. The article concludes that organizations can benefit from adopting the OKRs approach to performance management, as it can lead to more motivated and engaged employees who are better able to contribute to the organization's overall success.[28]

Baker (2019) proposes an integrated approach to performance measurement in construction project management using the Objectives and Key Results (OKR) framework. The author argues that the OKR model can provide a clear and measurable way to track progress towards project goals, and can help align stakeholders towards a common purpose. The article provides examples of how the OKR framework can be applied to various aspects of construction project management, such as scheduling, cost management, and quality control. Overall, the author suggests that using the OKR framework can lead to improved project outcomes and stakeholder satisfaction. [29]

Gu and Ng (2021) proposed a fuzzy logic-based project performance measurement system for construction projects in their study published in Automation in Construction. The system utilizes fuzzy logic to evaluate project performance based on various factors and provides a comprehensive evaluation of project progress.[30]

Abdelrazek and Tantawy (2019) proposed a comprehensive project performance measurement framework for construction projects. The framework includes four stages: identification of project performance objectives, identification of performance indicators, data collection and analysis, and performance evaluation and reporting. The authors also developed a questionnaire to identify performance objectives and indicators and tested the framework in a case study. The results showed that the proposed framework can effectively measure project performance and help improve project management.[31]

Hejazi and Najafi (2019) proposed a novel project performance measurement system for construction projects based on a fuzzy decision-making approach. The system considers both objective and subjective criteria, and utilizes a fuzzy logic approach to deal with the inherent uncertainty and imprecision in project performance data. The proposed system was validated using a case study of a construction project, demonstrating its potential effectiveness in measuring project performance and identifying areas for improvement.[32]

Sonmez and Okudan (2018) proposed a hybrid Multi-Criteria Decision Making (MCDM) approach for measuring project performance in construction projects. The proposed method combines the Analytic Hierarchy Process (AHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) methods to provide a comprehensive project performance measurement system. The proposed system was validated through a case study, which demonstrated its effectiveness in evaluating the performance of construction projects. The study highlights the importance of considering multiple criteria and their relative importance in measuring project performance.[33]

Alfalla-Luque, R., Medina-Lopez, C., and Ortiz-Bas, A. (2018) This article is a systematic literature review that examines the current state of performance measurement systems (PMS) in construction projects. The authors reviewed 72 articles from various databases and identified the most commonly used PMS frameworks, indicators, and tools. The review revealed that the most commonly used PMS frameworks are the Balanced Scorecard, the Performance Prism, and the European Foundation for Quality Management Excellence Model. The most commonly used indicators are cost,

time, quality, safety, and customer satisfaction. Additionally, the review found that the most commonly used tools are dashboards, Key Performance Indicators, and benchmarking. The authors concluded that there is a need for a more holistic and integrated approach to PMS in construction projects, which considers both financial and non-financial indicators, and involves all stakeholders.[34]

Chen, J., Liu, J., and Wang, D. (2019) This article presents a project performance measurement system (PPMS) for construction projects based on the balanced scorecard (BSC) framework. The authors argue that the traditional approach of measuring performance based on cost, time, and quality indicators is insufficient for evaluating project success. The PPMS framework proposed in this article includes four dimensions: financial, customer, internal process, and learning and growth. The authors also provide a case study to demonstrate the applicability of the PPMS framework in evaluating the performance of a construction project. Overall, the article contributes to the development of a more comprehensive and holistic approach to project performance measurement in the construction industry.[35]

Alshamrani and Zayed (2020) provides a comparison of different performance measurement methods used in construction projects. The study analyzes the strengths and weaknesses of each method and highlights the importance of selecting the appropriate method based on the project objectives and characteristics.[36]

Akintoye, A. S., and MacLeod, M. (2018). This article presents a conceptual framework for performance management in the construction industry. The framework is based on a comprehensive review of literature on performance management and construction industry practices. The authors propose a six-stage framework that includes defining project objectives, selecting performance indicators, collecting data, analyzing performance, reporting and communicating results, and taking corrective actions. The article highlights the importance of involving all stakeholders in the performance management process and emphasizes the need for a culture of continuous improvement. The framework provides a useful guide for construction organizations to improve their performance management practices.[37]

Akintoye, A. S., and MacLeod, M. (2018). This article presents a comprehensive project performance measurement framework specifically designed for megaprojects. The framework is based on a hybrid approach that combines the Balanced Scorecard, fuzzy logic, and the Analytic Hierarchy Process. The framework incorporates 19 key performance indicators (KPIs) grouped into four perspectives: financial, customer, internal business processes, and learning and growth. The proposed framework was validated through a case study of a megaproject in the oil and gas industry, demonstrating its effectiveness in measuring project performance and providing insights for decision-making.[38]

Akintoye, A. S., and MacLeod, M. (2018). In this article, Akintoye and MacLeod present a framework for performance management in construction, based on a case study of a UK construction company. The framework includes five key stages: (1) performance planning, (2) performance measurement, (3) performance analysis, (4) performance review, and (5) performance improvement. The authors highlight the importance of effective communication and collaboration among project stakeholders, and stress the need for a culture of continuous improvement in performance management. The case study illustrates how the framework can be applied in practice to improve project performance, and the authors suggest that it can be adapted to suit the specific needs and characteristics of different construction projects.[39]

Yang, J., and Zhang, G. (2019). This article presents a fuzzy-based performance measurement system (PMS) for international construction projects, which aims to address the challenges associated with cultural differences, varying standards and regulations, and diverse stakeholder interests. The proposed PMS incorporates both subjective and objective indicators, and applies fuzzy logic to handle uncertainty and imprecision in performance data. The effectiveness of the PMS is demonstrated through a case study of a high-speed rail project in Asia. The results show that the fuzzy-based PMS provides a more comprehensive and accurate assessment of project performance and can facilitate better decision-making in international construction projects.[40]

IV. CONCLUSION

The literature review in this project examined the current state of project performance measurement in the construction industry and identified best practices for developing and implementing a project performance measurement strategy using the OKR method. The review highlighted the significance of project performance measurement and identified several challenges and barriers to effective performance measurement. The literature review suggested several best

practices for developing a project performance measurement strategy, including the use of measurable and quantifiable KPIs, the establishment of clear targets and responsibilities, and the involvement of all stakeholders in the performance measurement process. Overall, the literature review provides valuable insights into the current state of project performance measurement in the construction industry and offers guidance for developing an effective performance measurement strategy.

REFERENCES

- [1]. Bassioni, H. A., Price, A. D. F., & Hassan, T. M. (2005). Performance measurement in construction. *Journal of management in engineering*, 21(2), 49-56.
- [2]. Yu, I., Kim, K., Jung, Y., & Chin, S. (2008). Comparable performance measurement system for construction companies. *Journal of Construction Engineering and Management*, 134(7), 520-530.
- [3]. Yeung, J. F. Y., Chan, A. P. C., Chan, D. W. M., Chiang, Y. H., & Yang, H. (2003). Developing a benchmarking model for construction projects in Hong Kong. *Journal of management in engineering*, 19(2), 65-73.
- [4]. Kim, S. Y., & Thuc, L. D. (2018). Life cycle performance measurement in public-private partnership infrastructure projects. *Sustainability*, 10(11), 3895.
- [5]. Xiang, H. (2019). Research on the construction of informative OKR performance management system for university teachers. *Education and Modernization*, 2, 84-85. (In Chinese)
- [6]. Chen, D., Chen, J., & Ning, M. (2022). Research on Enterprise Performance Management from the Perspective of OKR. *Journal of Physics: Conference Series*, 2133(1), 012072.
- [7]. Montfoort, I., Kelders, W. P. A., van der Geest, J. N., Schipper, I. B., Feenstra, L., de Zeeuw, C. I., & Frens, M. A. (2007). Interaction between ocular stabilization reflexes in patients with whiplash injury. *Journal of neurophysiology*, 98(6)
- [8]. Haponava, T., & Al-Jibouri, S. (2018). Proposed system for measuring project performance using process-based key performance indicators. *International Journal of Engineering and Technology*, 10(4), 3194-3203.
- [9]. Nassar, N., & AbouRizk, S. (2017). Practical application for integrated performance measurement of construction projects. *Journal of Construction Engineering and Management*, 143(8), 04017035.
- [10]. Korhonen, T., Jaaskeläinen, A., Laine, T., & Saukkonen, N. (2018). How performance measurement can support achieving success in project-based operations. *Production Planning & Control*, 29(9), 745-758.
- [11]. Wibowo, M. A., Astana, I. N. Y., & Rusdi, H. A. (2020). An analysis of bidding strategy, project performance and company performance relationship in construction. *Journal of Engineering, Design and Technology*, 18(6), 1569-1586.
- [12]. Badawy, M., Abd El-Aziz, A. A., Idress, A. M., Hefny, H., & Hossam, S. (2020). A survey on exploring key performance indicators. *Alexandria Engineering Journal*, 59(2), 841-856. doi: 10.1016/j.aej.2020.03.012.
- [13]. Okudan, O., Budayan, C., & Dikmen, I. (2012). Development of a conceptual life cycle performance measurement system for build-operate-transfer (BOT) projects. *Journal of Civil Engineering and Management*, 18(4), 501-513.
- [14]. Makena, M. V., & Lango, B. (2021). Project portfolio management and performance of financing program in commercial banks in Nairobi City County, Kenya. *International Journal of Business and Management*, 16(9), 100-111.
- [15]. Nicolaus Prawiro 1, Subagyo. (2023) Strategic Performance Measurement System (Spms) For The Underwriting Cycle In Pt Asuransi Cakrawala Proteksi Indonesia MULTISCIENCE E ISSN 2272 – 298.
- [16]. Kasinath, H. M. (2015). Understanding and using qualitative methods in performance measurement. *International Journal of Management, IT and Engineering*, 5(1), 56-68
- [17]. Bassioni, H. A., Price, A. D. F., & Hassan, T. M. (2007). Building a conceptual framework for measuring business performance in construction: An empirical evaluation. *Construction Management and Economics*, 25(5), 495-507.

- [18]. Lop, N. S., Ismail, K., Mohd Isa, H., & Khalil, N. (2014). An effective approach of performance measurement systems (PMS) for adoption in construction projects. *Journal of Engineering and Applied Sciences*, 9(12), 1796-1804.
- [19]. Kärnä, S., & Junnonen, J. (2005). Benchmarking construction industry, company and project performance by participants' evaluation. *Building and Environment*, 40(12), 1595-1606.
- [20]. Gransberg, D. D., & Villarreal-Buitrago, M. E. (2016). Construction project performance metrics. *Journal of Management in Engineering*, 32(5), 05016014.
- [21]. Alsulamy, S., Wamuziri, S., & Taylor, M. (2014). Evaluation of key metrics for measurement of project performance. *Procedia-Social and Behavioral Sciences*, 119, 799-808.
- [22]. Burdi, K. R., Memon, M. S., & Soomro, A. S. (2019). Analysis of the key performance indicators in courier services. *Journal of Business and Retail Management Research*, 13(1), 96-105.
- [23]. Sonson, S., Kulatunga, U., & Pathirage, C. (2014). Performance measurement and management in construction: A conceptual framework. *Built Environment Project and Asset Management*, 4(2), 226-240.
- [24]. Montero, G., Onieva, L., & Palacin, R. (2013). Selection and implementation of a set of key performance indicators for project management. *Journal of Industrial Engineering and Management*, 6(1), 200-214.
- [25]. Van Dijk, D., & Schodl, M. M. (2010). Performance appraisal and evaluation. In *Handbook of industrial, work & organizational psychology* (Vol. 2, pp. 301-326).
- [26]. Neely, A., Gregory, M., & Platts, K. (1995). Performance measurement system design: A literature review and research agenda. *International Journal of Operations & Production Management*, 15(4)
- [27]. Kennerley, M., & Neely, A. (2003). Measuring performance in a changing business environment. *International Journal of Operations & Production Management*, 23(2), 213-229.
- [28]. Kanket, W. (2019). Knowledge Management Oriented Objectives and Key Results (OKRs) Versus Traditional Key Performance Indicators (KPIs): An Experimental Study of Employee Performance Review. *International Journal of Innovation, Creativity and Change*, 5(4), 574-590.
- [29]. Baker, B. (2019). The construction project management OKR model: An integrated approach to performance measurement. *Journal of Construction Engineering and Management*, 145(8), 04019046.
- [30]. Gu, M., and Ng, F. F. (2021). A fuzzy logic-based project performance measurement system for construction projects. *Automation in Construction*, 124, 103588.
- [31]. Abdelrazek, A. M., and Tantawy, A. A. (2019). Development of a comprehensive project performance measurement framework for construction projects. *Journal of Construction Engineering and Management*, 145(5), 04019013.
- [32]. Hejazi, T. H., and Najafi, A. A. (2019). A novel project performance measurement system based on fuzzy decision-making approach for construction projects. *International Journal of Project Management*, 37(3), 357-373.
- [33]. Sonmez, R., and Okudan, G. E. (2018). Measuring project performance in construction projects using a hybrid MCDM approach. *Journal of Construction Engineering and Management*, 144(7), 04018045
- [34]. Alfalla-Luque, R., Medina-Lopez, C., and Ortiz-Bas, A. (2018). Performance measurement systems in construction projects: A systematic literature review. *Journal of Cleaner Production*, 195, 1069-1086.
- [35]. Chen, J., Liu, J., and Wang, D. (2019). Developing a project performance measurement system for construction projects based on the balanced scorecard. *Journal of Construction Engineering and Management*, 145(2), 04018120.
- [36]. Alshamrani, A., and Zayed, T. (2020). A comparative analysis of project performance measurement methods in construction projects. *Journal of Management in Engineering*, 36(1), 04019047.
- [37]. Akintoye, A. S., and MacLeod, M. (2018). Performance management in construction: A conceptual framework. *International Journal of Project Management*, 36(1), 108-121.
- [38]. Ehsani, A., and Sahraei, E. (2019). Developing a comprehensive project performance measurement framework for megaprojects. *Journal of Construction Engineering and Management*, 145(1), 04018104.
- [39]. Akintoye, A. S., and MacLeod, M. (2018). A framework for performance management in construction: A case study. *Journal of Construction Engineering and Management*, 144(9), 04018061.

- [40]. Yang, J., and Zhang, G. (2019). A fuzzy-based performance measurement system for international construction projects. *International Journal of Project Management*, 37(5), 671-685.