

Lecture Notes in Mechanical Engineering

James Olabode Bamidele Rotimi
Wajiha Mohsin Shahzad
Monty Sutrisna
Ravindu Kahandawa *Editors*

Advances in Engineering Project, Production, and Technology


Proceedings of the 13th International
Conference on Engineering, Project, and
Production Management, 2023, Volume 2

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Lecture Notes in Mechanical Engineering

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Preface

This book contains a selection of papers from the 13th International Conference on Engineering, Project, and Production Management (EPPM) held in Auckland, New Zealand, from 29 November to 1 December 2023. The conference was organized by the School of Built Environment, Massey University, in collaboration with the EPPM Association. The book comprises of quality-assured theoretical discussions, data analysis, case studies, and industry practices, presented by the global researchers and practitioners. The conference theme was “Creating capacity and capability: re-energising supply chain for sustainable management of projects and productions in engineering”, but this volume focuses on papers related to engineering project, production, and technology. The papers are comprehensive, multidisciplinary, and advanced, and will be of interest to researchers and practitioners from various industries seeking the latest updates on the fields of engineering, project, and production management.

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Theme: Engineering Project

A Conceptual Framework for the Development of a Competency-Based Evaluation Tool for Project Managers Within the Road Infrastructure Industry



Jones Nyame Aboagye, Ernest Kissi, Theophilus Adjei-Kumi,
and Edward Badu

1 Introduction

Road infrastructure projects, such as highways, are the foundation of and a key factor in the expansion of a country's economy by guaranteeing convenient mobility to everyone. For example, India's production capacity and efficiency depend heavily on the country's infrastructure and construction projects [24]. Measuring competencies is important in assessing whether an individual or a team is well-equipped with the requisite knowledge, skills, and attributes to carry out an activity. Delivering infrastructure projects to boost economic growth is something that emerging nations are very interested in doing. Recent infrastructure projects have received significant capital budget allocations, and these initiatives are sponsored mainly by taxpayer funds, thus, they must be successfully provided [16, 66]. When managing road projects, construction sites spread across a significant land area, making their execution a highly demanding endeavour. Effective project management abilities are essential because they affect decisions about contractor selection, procurement, and design [24]. According to Daw [21], the three key factors for project success are designing the right project, implementing the right organization, and choosing a competent project manager. Daw's research proposes that the project manager's competency has the strongest impact on overall project success. The most important success factors in construction project management practices in developing nations are the competence and abilities of the project manager [11, 85]. Projects in the public sector

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involve various diverse stakeholders, and as the public sector becomes more projectized, it becomes more important than ever for project managers to strengthen their skills [48]. The effort and research that have properly customized human resource development strategies are equally crucial to the expanding importance of the project management profession and its rising popularity [52].

Numerous studies on the qualities of project managers have emphasized technical skills while disregarding other crucial managerial abilities [84]. Conversely, project managers' required skills are growing [10]. Project managers should thus possess unique abilities and competencies different from those of other managers. Project management integrates various project-related factors that impact achieving the desired outcome [81]. It should be stressed that a project manager's job requires both soft skills and emotional intelligence in addition to the "hard" expertise and knowledge they have obtained throughout their professional careers [79]. These are essential for an effective project manager's ability to communicate, handle conflicts, and manage relationships. This also holds for knowledge management [81]. The relationship between project manager competencies and a particular project type is receiving much attention since project managers with varied personal qualities may view and approach problems differently [60, 87]. Different project types demand varying approaches to project management as well as different levels of skills [48]. A project manager appropriate for the project's type, context, nature, and complexity is needed to ensure success and better performance. The decision-making process for choosing a project manager in the construction industry is sometimes difficult and uncertain [48].

Consequently, creating relevant criteria considering the project's demands is essential for effective project manager selection [60]. According to some researchers, choosing a project manager should be based on evaluating their performance and expertise [35]. The function of project managers is crucial for attaining project goals. According to [25], their project management skills can contribute to the success of a project. In Pakistan, public sector development projects might perform better when hiring skilled project managers [48]. However, the particular qualities of public sector project managers' competencies have received relatively little attention thus far (Jalocha et al. 2014).

In addition, an empirical study is necessary to create a project management model for public sector projects based on thorough research of best practices worldwide, particularly in developing nations. The infrastructure projects of the public sector are important for their high-level contribution. Managing projects is fast becoming a standard way to execute business strategies for public and private institutions. People are involved in the project from the beginning to the end, and competent execution is at the heart of every successful execution. The project management concept depends on a single entity, the project manager, being accountable for project success [33, 56, 70]. Competencies are the dimensions of behavioural action with measurable and observable characteristics [8] that differentiate superior and average performance [17, 74]. The project manager's competency is relevant, and its assessment is robust and a resourceful tool [19, 40, 69]. Numerous competency studies have mostly concentrated on project managers working in the private sector on vertical projects, leaving

a dearth of research on project managers in public institutions working on horizontal projects like roads [1, 74]. The current research is to develop a tool for evaluating the competencies of project managers in the road sector, necessitating this conceptual framework. This paper highlights the existing frameworks and its weakness, theories, and frameworks considered in developing the conceptual framework.

1.1 Project Management and Project Management Practices in Ghana

The practice of project management in Ghana has evolved over the years, driven by the need to deliver developmental initiatives and address various challenges across sectors efficiently. As far back as the mid-1960s, Ghana embarked on an accelerated infrastructure provision following colonization, which marked the emergence of project management practices in the country. Initially embraced as a tool for developmental initiatives, there was a transition towards vertical programming approaches. However, the prominence of project management resurged in the 1980s due to donor-funded interventions and the influence of stakeholders driving the restructuring of the Ghanaian economy [68]. The public sector and private, not-for-profit organizations became active agents in projectizing the development agenda. Project management practices in Ghana have been applied across diverse sectors, including infrastructure, education, agriculture, and healthcare. Notably, development projects have contributed to the nation's infrastructure growth, such as the refurbishment of schools, water provision, road construction, and rural electrification [61, 64]. The application of project management in Ghana's construction industry gained traction in the late 1980s. Mass Housing Building Production (MHBPs) by the Social Security and National Insurance Trust (SSNIT) exemplified the successful use of project management, resulting in the completion of housing units within five years [4]. While project management practices have entwined in the mass housing sector, mainstream construction faces challenges and inconsistencies. Only recently, project management was included in the schools' curriculum in Ghana and has become a programme now at the undergraduate and master's level. In the past, individuals tasked with project management responsibilities, often skilled in specific fields, acquired their knowledge through practical experiences or collaborating with professionals in project management [67]. The adoption of project management practices in Ghana has led to the inclusion of project management courses in universities and professional institutions. In addition, the Ghana's Chapter of the Project Management Institute (PMI) was established to promote best practices. The emergence of "PMP" courses signifies a growing demand for trained professionals (Ministry of Finance and Economic Planning Report 2006). To ensure project success, a project manager must possess the requisite knowledge of project management, which encompasses planning, organizing, monitoring, and controlling all project aspects, motivating stakeholders to achieve objectives within defined parameters while also applying skills,

tools, and techniques to meet project requirements, this skillful orchestration of diverse competencies aims to guarantee project success, with quality being a pivotal yardstick for assessing project outcomes and project management effectiveness [67].

In drawing on inspiration from other countries, work on the construction project management competencies has been rigorously rehearsed in construction management literature with paramount concentration in the building construction sector. Thus, Fig. 1 shows the different countries and their contribution to the number of publications. The country with the highest contribution was the Islamic Republic of Iran, with four (4) publications. Ghana and the USA followed with three (3) publications each. This was followed by Greece, Brazil, China, and Poland, which recorded two (2) publications each. The UK, Thailand, Indonesia, Portugal, and Indonesia recorded one (1) publication each. The result indicated that geographically, both developed and developing countries had a representation.

From the trend of publications in Fig. 2, there was one publication in 2010. This increased to two in 2011. From 2012 to 2016, there was one publication each, except in 2015, which had no representation. The 2017 and 2019 had three (3) and four (4) publications each. The trend shows consistency from 2020 to 2023, where every year within this period recorded at least two (2) publications, with 2021 and 2023 recording three (3) each. The trend shows that from 2010 to 2023 (i.e. 13, a 13-year span), an average of 1.76 articles was retained for this study.

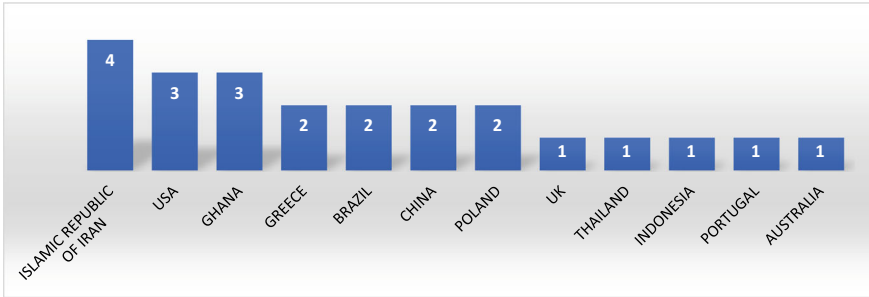


Fig. 1 Country of origin of retained studies

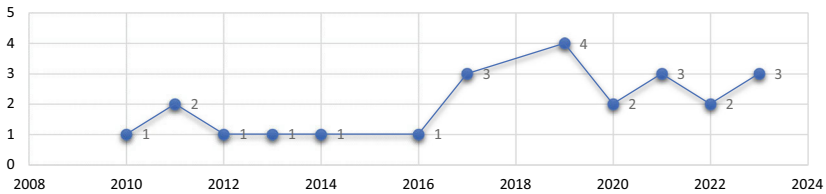


Fig. 2 Trend of annual publications

2 Existing Frameworks

In reviewing the conceptual framework, nine (9) frameworks were examined. These conceptual frameworks help the study establish the basis for developing novel frameworks to support the work. It includes studies conducted by [2, 14, 18, 22, 26, 42, 59, 73, 76]. However, it must be noted that “the process of competency development is a never-ending story” [22].

Ahadzie et al. [2] established the behavioural characteristics that best predict PMs’ performance results and proposed a conceptual module to quantify PMs’ performance. By taking this stance, the model highlights the idea that behavioural capabilities are a function of both the intended project outcome and the PM. Cognitive capacity, job knowledge, task proficiency, and experience were defined as the constructs of task performance behaviours. In contrast, job devotion and interpersonal facilitation were identified as constructs of contextual performance behaviours. On the other hand, [14] contended that to be fully competent, an individual must effectively evaluate against three set parameters, according to the Project Management Institute parameter as it was espoused in 2002. It would be impossible to assess project managers’ competence if they lacked the expected combination of knowledge, performance, and personal ability [14]. The three dimensions of competence, knowledge, performance, and personal are demonstrated differently. For example, knowledge competence can be proved by passing an adequately credentialed examination, performance competence by completing projects, and personal competence by the project manager’s behaviour when completing projects. [59] also offered the Project Managers’ Competency Development Framework (PMCDF) as a roadmap to help develop the competencies required for project managers to flourish in their sector. According to the authors, employing a competency-based evaluation system for project managers can be extremely helpful in encouraging professional excellence and progress in project-oriented businesses. Organizations can identify areas for growth and provide focused training and development opportunities by evaluating project managers based on their competencies. This can help to guarantee that project managers have the essential skills and knowledge to properly manage projects, which can lead to increased project success and overall business success for the firm.

In addition, the International Project Management Association (IPMA) created this framework to establish a set of competencies for project managers at various levels of experience. This approach categorizes project management competencies into three categories [41], namely technical, behavioural, and contextual capabilities. These were amended again in 2021 and are divided into four levels (A–D) that cover project planning, risk management, stakeholder management, and ethical behaviour [42]. In research by Rezende and Blackwell [73], they explored project management competencies from various perspectives, including leadership, emotional intelligence, and general and project management competencies. Rezende and Blackwell [73] illustrate the Project Management Competency Framework (PMCF) based on all competencies over the years. The core competencies of project management are based on the frequency with which researchers found them to be more significant

than other competencies. The authors created eleven main groups to organize the competencies discussed differently based on their affinities. The Project Management Competency Framework (PMCF) is a comprehensive set of skills and abilities that define the profile of a project management professional. Both practitioners and academics can use it to assess individuals working in the project management industry. The PMCF provides a foundation for analysing the relationship between people and processes, competencies and organizational processes, and competencies and individuals, which can help understand the competency level in project management.

The objective of assessment may differ for academics and practitioners. Regarding rating scales for project management competencies, there are two options: the APM's (2) and PMI's (1) competency level scales. The APM's rating scale is more descriptive and easier to use. It includes five levels, and it is essential to incorporate an initial level represented by zero, indicating a lack of competency. By applying the PMCF, individuals can identify competency gaps that must be addressed for better job performance. Conversely, they may discover that they exceed the required threshold, which could qualify them for higher or more complex positions.

Additionally, since different roles and processes demand distinct competencies, the PMCF enables managers to identify individuals with multiple competencies who can be assigned to various roles or processes, giving the organization flexibility in managing its talents. [26] conducted a comparative analysis of three models: the Project Manager Competency Development Framework, the IPMA Competence Baseline, and the APM Competence Framework. In another development, [76] proposed an employee performance appraisal model that focuses on the impact of organizational context, such as company strategy and type of business, on the strategic integration of human resources management. This integration involves performance management and appraisal processes, where performance criteria and standards are applied. The model also considers contextual factors, such as the company's strategic objectives and the specific job or position, in establishing customized performance criteria and standards. The purpose of employee performance appraisal is highlighted as an essential factor influenced by the organizational context. The model suggests that the purpose of the assessment affects the use of specific appraisal instruments and techniques.

Additionally, the model emphasizes the importance of providing post-appraisal feedback and positive reinforcement to promote positive behaviours and improve employee performance. This approach contributes to long-term learning and reinforces behaviours that lead to higher work performance. In Kenya, Chepkemoi [18] developed a model associated with the performance of road construction projects. These include contract management skills, which highlight negotiation skills and contract need assessment skills, procurement management skills; financial management skills; and government regulations. These all lead to achieving project objectives, meeting the project schedule, and working within the cost of projects in terms of the performance of road construction projects.

Lastly, using a ground-theory approach, [22] built an integrative model to show the different steps of organizational competency development. The model illustrates

how competency development is associated with organizational and social-economic context and other HRM practices. In the model, competency development is an integral part of competency management, which consists of several steps. A personal development plan (PDP) is critical to the model because it lays the groundwork for the overall competency development process. To develop the competencies, it is necessary to go through training, on-the-job learning, and career management. The employability of the individuals will increase as a result. It is important to note that as the organizational and socio-economic context continues to change, it is essential to review the frameworks and models in the literature when developing an assessment tool for assessing project management competencies in road infrastructure projects. These frameworks are helpful resources for comprehending the many aspects of project management competencies and how they are evaluated. However, it is also important to recognize that these frameworks have weaknesses and limitations. Thus, the aim is to develop a new one that will suit the current study. Table 1 presents some weaknesses in the frameworks. Awareness of these restrictions makes it possible to create a new framework better suited to assessing project manager competencies in road infrastructure projects.

2.1 Underpinning Theories

The underpinning theories for the frameworks are the competence-based theory, human behavioural approach theory, performance-based theory, and knowledge-based theory.

The competence-based theory concentrates on developing skills, talents, knowledge, and attitudes required by the project manager for every profession [12, 62]. The theory explains the direct influence of personality traits on behaviour, actions, and performance [58]. Competence-based theories provide strategies for establishing the required capabilities, reviewing the current levels and developing a plan to bridge gaps [46]. This study seeks to determine the components of competencies of the project manager in road infrastructure projects, it, therefore, is aligned with situation-based theory, which states that behaviour and performance (project manager are influenced by the setting and context. From the trait-based aspect of the competency-based theory, personal traits can influence performance and behaviour; that is to say, the competencies of professional project managers in the road sector will play a significant role in achieving the expected output. Thus, the study aims to understand the competencies of the trait-based and situational-based competence-based theories supported by competence-based theory.

On the other hand, the human behavioural approach theory is a psychological perspective that focuses on understanding human behaviour by examining the influence of external factors and the role of reinforcement and conditioning [34, 62]. This theory emphasizes the importance of external factors, learning experiences, and the role of reinforcement in shaping human behaviour. It provides insights into how individuals acquire new behaviours, adapt to their environment, and develop

Table 1 Weakness of the framework

References	Aim	Area	Weakness
[2]	The model purports to measure the performance of PMs by establishing the behavioural attributes that best predict the PMs' performance outcomes in mass house-building projects	House building companies	The framework does not provide specific competencies or assessment methods for project managers in road infrastructure projects. It focuses more on behavioural characteristics without delving into the technical and contextual aspects of project management
[14]	To provide a framework for defining, assessing and developing project manager competence based on the premise that competencies directly affect performance	Project managers, in general	The framework highlights the importance of knowledge, performance, and personal ability for assessing project manager competence but lacks specificity regarding the competencies within each parameter. It does not provide a detailed assessment approach or address the contextual aspects of project management
[59]	To explain the competencies of project managers according to the PMCDF model	Project managers in MAPNA locomotive engineering and manufacturing company	While the framework emphasizes the importance of competency-based evaluation for project managers, it does not provide a structured assessment process or specific competencies for road infrastructure projects. It also lacks a clear link between competency assessment and project success
[41, 42]	The ICB4 is the international standard on competence for project, programme, and portfolio managers	Project managers, in general	The frameworks broadly categorize project management competencies but may lack specificity for road infrastructure projects. The focus on technical, behavioural, and contextual capabilities needs to be further tailored to the specific requirements of the road infrastructure sector
[73]	To highlight the project management core competencies (inner bar) according to the number of times researchers found them to be more significant than other competencies	Project managers, in general	While the framework identifies core competencies in project management, it does not provide a comprehensive assessment approach or specific competencies relevant to road infrastructure projects. The grouping of competencies based on researchers' perceptions may lack empirical validation

(continued)

Table 1 (continued)

References	Aim	Area	Weakness
[26]	To investigate the individual competencies of project managers through a methodological approach that combines a systematic literature review and an analysis of employment opportunities	Project managers, in general	The comparative analysis of the models, project manager competency development framework, IPMA competence baseline, and APM competence framework, identifies similarities among these models but does not explicitly address their weaknesses or limitations. It lacks an in-depth evaluation of the applicability and relevance of these models to road infrastructure projects
[76]	To investigate the employee performance appraisal systems and processes based on main organizational contextual dimensions in highlighting the relevance of customization according to a company's specific organizational context	Employee performance appraisal	The model focuses on employee performance appraisal in general and does not explicitly address project manager competencies. It lacks a clear connection between the appraisal process and the assessment of project management competencies in road infrastructure projects
[18]	To establish the influence of project management skills on the performance of road construction with a focus on road construction projects in Machakos Country, Kenya	Road construction	The framework focuses on the performance of road construction projects rather than explicitly addressing project manager competencies. It does not provide a structured approach for assessing and developing the competencies of project managers in road infrastructure projects
[22]	A framework to map out the different steps of competency development in the participating organizations	Flemish organizations	While the model addresses organizational competency development, it does not explicitly focus on project manager competencies or provide a tailored assessment approach for road infrastructure projects. It may lack the specificity required for evaluating project manager competence requirements in this sector

habits and responses to various situations [12]. This theory supports the study in developing the competencies of project managers; that is, individuals' intellects and innate principles can be identified and developed to improve their competencies.

The performance-based theory, however, is an extensive and interdisciplinary theory that aims to explain the connection between individual performance and results in various settings. The concept of goal setting is a crucial viewpoint in performance-based theory. According to this theory, people are more motivated to work hard when they have specific, well-defined objectives to strive for [38, 54]. According to this theory, people are more likely to perform well when they feel autonomy, competence, and relatedness in their activities [77]. Another perspective of the performance-based theory that concentrates on the interaction between individuals, their environment, and their behaviour is social cognitive theory. This theory proposes that people learn through observation and modelling and that their self-efficacy beliefs or belief influences their performance in their capacity to achieve [71]. The study will seek to determine drivers for assessing project managers' competence requirements, which will lead to the development of an assessment tool for checking the performance of project managers in the road sector. The drivers, if determined, will impact the outcome of project managers, as they are more likely to perform well when they are competent in their activities, leading to increased performance.

According to the knowledge-based view theory, knowledge is a significant resource that is challenging to duplicate, transfer, or buy, and it is essential in determining a firm's competitive strategy. In recent studies, project managers are required to identify the knowledge needed for a project and acquire it in order to effectively manage projects and ensure project success [29, 63], demonstrate knowledge-based leadership [53], and development of knowledge-based innovation [55]. The study relates to this theory due to the fact that project managers in the road sector need to understand how to acquire the appropriate expertise to perform well. More importantly, project managers are required to impart knowledge to project team members, therefore, understanding how competencies and performance knowledge can be obtained and transferred will help achieve the project goals.

3 Towards the Conceptual Framework

A conceptual framework provides a philosophical basis for the research and links the study's theoretical aspects and practical constituents. In developing the framework in Fig. 3, the framework starts with organizational context. This highlights the role of organizational culture, organizational structure, resource availability, stakeholder dynamics, and established processes and their related effects on employee performance and performance assessment. The next level of the framework was to assess the roles of the project manager and the challenges and drivers of such functions in the road infrastructure sector. As discussed above, human behavioural and knowledge-based theories will help form the basis for this level. From this level will come the formulation of the competency components. The competence-based theory

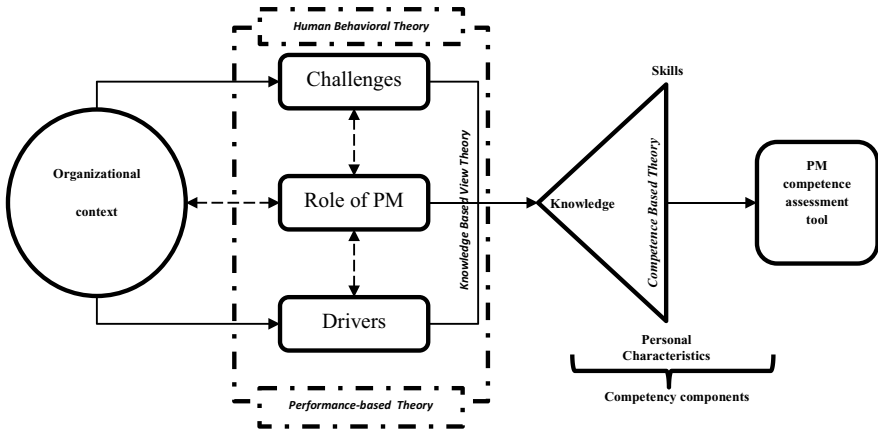


Fig. 3 Conceptual framework, author’s construct

will assess the project manager’s competence components of knowledge, skills, and personal characteristics. A project manager’s assessment tool will be developed based on these components. The details are explained as follows:

3.1 Organizational Context

The organizational context serves as the foundation of the framework. The importance of corporate culture, structure, resource availability, stakeholder dynamics, and established processes in influencing employee performance and performance evaluation is acknowledged. The organizational culture may affect project managers’ perceptions of their tasks and responsibilities, demonstrating the company’s values, norms, and attitudes. The organizational structure can influence the project manager’s capacity to manage road infrastructure projects effectively by establishing reporting lines, decision-making procedures, and resource distribution. The availability of resources, such as funds, tools, and qualified staff, is essential for project managers to do their duties effectively. Stakeholder dynamics highlight the importance of understanding and managing the interests and expectations of various stakeholders involved in road infrastructure projects. Finally, established processes, such as project management methodologies and quality assurance procedures, provide a framework for project managers.

3.2 Roles of the Project Manager

This level of the framework focuses on analysing the job responsibilities of project managers in projects involving road infrastructure. It entails being aware of project managers' specific roles and responsibilities throughout a project. Planning, organizing, coordinating, and directing all project operations is crucial to achieving project goals within the scope, schedule, and budget parameters. They are in charge of managing stakeholders, allocating resources, assessing and reducing risks, communicating, and ensuring the success of the project as a whole. The framework offers insights into the major areas where project managers' competencies are crucial for successful project delivery by examining project managers' responsibilities. Project managers serve as financial custodians, meticulously estimating costs, controlling expenses, and deftly managing resources to ensure the project's financial health [23, 44, 45]. As the brain behind the project team, they nurture the cohesive environment, fostering collaboration, motivation, and synergy among team members, enhancing overall project efficiency [37, 60]. Drawing from a deep well of knowledge, project managers navigate regulatory landscapes, ensuring adherence to standards and regulations while maintaining a strong grasp of road construction methods, materials, and engineering principles to ensure technical precision [89]. According to [50], project managers bridge the gap between stakeholders, prioritizing client needs and building trust through effective communication. They liaise between the project and its stakeholders, ensuring that the project aligns with client needs, building trust, and nurturing strong relationships.

Further, project managers possess an inherent ability to interpret intricate technical details, understanding and conveying engineering specifications to ensure project accuracy [31, 65]. Furthermore, their commitment to environmental responsibility is evident as they integrate sustainable practices, harmonizing road infrastructure with ecological awareness. Project managers are tasked with assuming responsibility for the outcomes of projects, which includes the integration of sustainability measures [57, 75]. Sunindijo [83] and Zhang et al. [91] affirmed that they would be required to carry out various technical and social tasks in the proper procedure to advance the project process.

3.3 Challenges and Drivers

The framework's next level examines project managers' difficulties working on road infrastructure projects and the factors influencing competence standards' determination. These difficulties may result from the unique qualities of road infrastructure projects, including their complexity, length of time, and the engagement of several parties. The framework should consider difficulties in managing technical complexity, coping with risks and uncertainties, collaborating with contractors and subcontractors, and assuring regulatory compliance. Along with improving project

results, guaranteeing quality and efficiency, adhering to industry standards, and satisfying stakeholder and regulatory body needs, project management competence requirements are also driven by these factors. Understanding the challenges and drivers helps shape the assessment tool to address these factors effectively.

3.4 Competency Components

At this level, the framework incorporates the competency-based theory to assess the project manager's competence components. These components typically include knowledge, skills, and personal characteristics. Knowledge encompasses the theoretical understanding and practical know-how required for effective project management in the road infrastructure sector. Skills refer to the specific abilities and expertise project managers must demonstrate, such as leadership, communication, negotiation, risk management, and technical skills relevant to road infrastructure projects. Personal characteristics encompass the individual traits and qualities that contribute to effective project management, such as adaptability, resilience, problem-solving ability, and emotional intelligence. Evaluating these competency components comprehensively assesses a project manager's capabilities.

3.5 Assessment Tool Development

The final level of the framework involves the development of an assessment tool for project manager competencies in road infrastructure projects. Based on the previous levels' findings and incorporating theories like human behavioural theory and knowledge-based theory, the tool evaluates project managers' knowledge, skills, and personal characteristics. The assessment tool should include appropriate evaluation methods, such as interviews, self-assessments, performance reviews, and 360-degree feedback, to gather comprehensive data on a project manager's competencies. It should be reliable, valid, and user-friendly, enabling organizations to assess and identify areas for improvement in project managers' competencies.

4 Theoretical and Practical Implications

The framework contributes to project management theory by emphasizing the centrality of competencies in project success. It underlines that effective project management extends beyond technical skills and encompasses a holistic range of knowledge, skills, and personal characteristics and competencies. Additionally, the competency-based evaluation tool outlined in the framework provides organizations with a systematic approach to recognize, choose, and cultivate project managers

possessing the necessary competencies. This tool can guide recruitment processes, ensuring candidates possess the multifaceted skills and traits essential for successful project leadership.

5 Conclusion and Further Studies

With a surge in project management concepts and applications rising in the road infrastructure sector of Ghana, this paper sought to develop a conceptual framework for assessing project managers' competencies in the road infrastructure sector. Assessment of the competencies of project managers is a never-ending process, which varies geographically in application areas. There have been several studies on developing assessment tools for project managers in vertical construction at the expense of project managers in horizontal construction. Existing project management assessment frameworks were considered and reviewed to identify their weaknesses and limitations, which were considered in the development of this proposed conceptual framework. The conceptual framework was developed by mapping the four theories of human behavioural theory, performance-based theory, knowledge-based theory, and competence-based theory to the study objectives. The organizational concept starts the framework by advancing the issues of corporate culture, structure, responsibility, and funding, among others, followed by the roles of the project, challenges, and drivers that will help shape the assessment tool. The competence components of skills, knowledge, and personal characteristics shall be evaluated to assess the project manager's capabilities. All these earlier stages shall be integrated into developing the project manager's competency assessment tool. Operationalizing, validating, and applying these proposed frameworks to managers and stakeholders in horizontal construction may be the next stage of this research. The proposed conceptual framework's applicability might be limited to the road infrastructure sector, potentially requiring adaptation for other sectors. Different industries might demand unique competencies, potentially requiring adjustments to the framework's parameters. Further, this framework provides a deep insight into the relevance of assessing the competencies of project managers in horizontal construction, helping to shape their selection, training, retention, and career progression. This study will be undertaken in Ghana, emphasizing project managers in state-owned institutions involved in road construction.

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