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REVIEW ARTICLE

A SYSTEMATIC REVIEW OF VALUE ENGINEERING PRACTICES IN CONSTRUCTION PROJECTS IN TANZANIA

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ABSTRACT

Value engineering (VE) has become a vital component of construction management, improving project outcomes in terms of cost, time, quality, safety, environmental performance, stakeholder satisfaction and social value. This study systematically reviews VE practices to assess their applications, benefits, barriers, and future research directions, with emphasis on Tanzania's construction industry. A structured search of Google Scholar and Semantic Scholar retrieved peer-reviewed publications from 2005 to 2025, yielding about 70 sources, of which 32 highly relevant studies were analyzed in depth. The review shows that VE delivers quantitative benefits such as cost and time reduction, alongside qualitative gains including enhanced construction quality and better management through multidisciplinary teamwork. However, its adoption in Tanzania remains limited due to inadequate awareness, cost-driven procurement systems, and a shortage of trained VE professionals. This study further identifies critical success factors (CSFs) across VE phases, including effective project information preparation, cost-based comparison of design alternatives, systematic planning and implementation, and strong stakeholders support. It concludes by recommending the development of localized VE guidelines and increased awareness among clients and top management to enhance decision-making and promote wider VE adoption in Tanzania.

1.0 Introduction

The construction industry in Tanzania remains a critical driver of economic growth and infrastructure development. However, it continues to face persistent challenges such as high construction costs, prolonged project durations, substandard quality, compromised safety, and social as well as environmental concerns (NAOT, 2023). These inefficiencies are largely attributed to ineffective project management practices and the absence of structured decision-making frameworks, including the limited application of VE principles (Ikanuti *et al.*, 2018).

Despite these challenges, the sector provides significant employment opportunities for both skilled and unskilled labor, from project appraisal through to post-construction maintenance (Phoya, 2012). To enhance performance, the Tanzanian government has introduced several reforms. These include the establishment of the National Construction Council, as well as regulatory bodies such as the Contractors Registration Board, the Architects and Quantity Surveyors Registration Board, and the Engineers Registration Board to ensure compliance with laws and standards. The Building Research Unit and the Tanzania Bureau of Standards have also been established to promote the use of local building materials and regulate quality. In the road sector, agencies such as TANROADS and TARURA are mandated to manage trunk, regional, and district roads, supported by the Roads Fund and Roads Fund Board for sustainable financing.

Delays in construction projects, often linked to poor planning and budgetary constraints, can be reduced through consistent application of VE principles (Ghorbani *et al*., 2005). VE offers systematic approaches for eliminating unnecessary expenditures, improving quality, and enhancing decision-making processes (Tom, 2015). Globally, VE has gained prominence as a construction management tool that balances cost, quality, and functionality. Over the past three decades, extensive research has demonstrated its effectiveness in improving project efficiency, fostering innovation, and optimizing value across all construction phases (Bowen *et al.*, 2010; Tohidi, 2011). Beyond cost reduction, VE enhances risk management, functional development, stakeholder satisfaction, and knowledge transfer in multi-project environments (Haskins, 2010; Formentini *et al*., 2011).

In Tanzania, efforts to improve project value have primarily focused on performance measurement systems, cost control mechanisms, and project reviews (Samizi, 2018). However, the integration of VE remains limited, with most initiatives adopting alternative approaches rather than systematically applying VE methodologies (Basondole, 2022). Given the increasing global significance of VE in construction, this paper systematically reviews studies published between 2005 and 2025. The objective is to provide insights into the applications, benefits, barriers, and future research directions of VE, with particular emphasis on the Tanzanian construction industry. In doing so, the paper proposes strategic interventions to strengthen VE adoption in developing economies, where efficiency, cost-effectiveness, and sustainable project delivery remain critical.

1.1 Fundamental Principles of Value Engineering

VE is a structured, function-oriented, and multidisciplinary methodology designed to optimize project or process value by systematically analyzing functions, eliminating unnecessary costs, and enhancing performance without compromising quality, safety, or stakeholder requirements (Danku *et al*., 2020). At its core, VE is built on three interrelated pillars: function, cost, and value (Adhikari, 2013). Its philosophical foundation emphasizes that any solution failing to achieve optimal functional capacity is inadequate. Consequently, VE extends beyond cost reduction to incorporate key principles such as quality assurance, time scheduling, brainstorming of alternative solutions, life-cycle costing, and the application of systematic and organized approaches. These dimensions ensure a holistic framework for improving both the cost-effectiveness and performance of a project, product, or system. The primary objective of a VE study is to enhance project value through a structured process commonly referred to as the job plan. This plan provides a sequential framework for conducting value studies and typically involves three major stages: pre-workshop preparation, the value workshop, and post-workshop documentation and implementation. Within these stages, structured activities guide project teams to identify essential functions, explore alternatives, and recommend solutions that maximize value.

A formal VE study must adhere to a systematic job plan comprising five core phases (Figure 1) (SAVE, 2015). Although variations in terminology exist, the essence of the process remains consistent: ensuring a logical progression from information gathering to idea generation, evaluation, development, and implementation. Assaf *et al*. (2000) emphasize that this structured approach is fundamental to the success of VE studies, as it directs multidisciplinary teams to concentrate on key project functions and stimulate innovative solutions that improve value (SAVE, 2007). To qualify as a valid VE plan, SAVE International (2015) prescribes three essential conditions: (1) the value study team must strictly follow the defined phases of the VE process; (2) the team must be multidisciplinary, comprising professionals and stakeholders selected for their relevant expertise; and (3) the study must be led by a certified value specialist or team leader with advanced training and competence in VE methodology. Compliance with these conditions ensures methodological rigor, credibility, and effective outcomes in the application of VE.

Although VE can be applied at any stage of the construction process, evidence shows that earlier implementation yields greater returns on investment in both time and effort (SAVE, 2015). SAVE (2015) further emphasizes VE's role as a management tool for maximizing the value of public and private projects, particularly when applied during the early stages. While VE can add value at multiple phases, the planning stage is generally the most advantageous, as changes at this point are less costly and have minimal impact on project progress. In practice, however, VE teams often become more actively engaged during the design phase, where they critically review proposed solutions. Hayles *et al.* (2000) illustrate this relationship by showing how the cost of implementing changes escalates as a project advance from initial concept to final completion (Figure 2).

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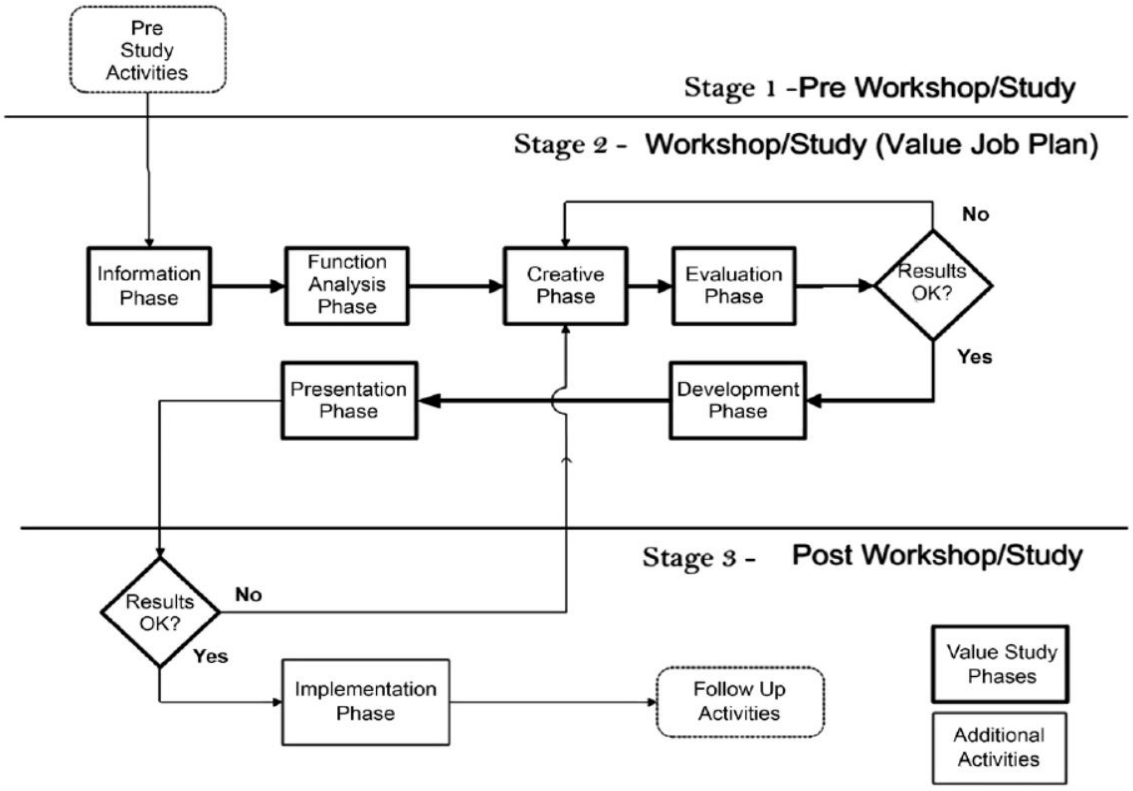

Figure 1: Value engineering job plan development process flow

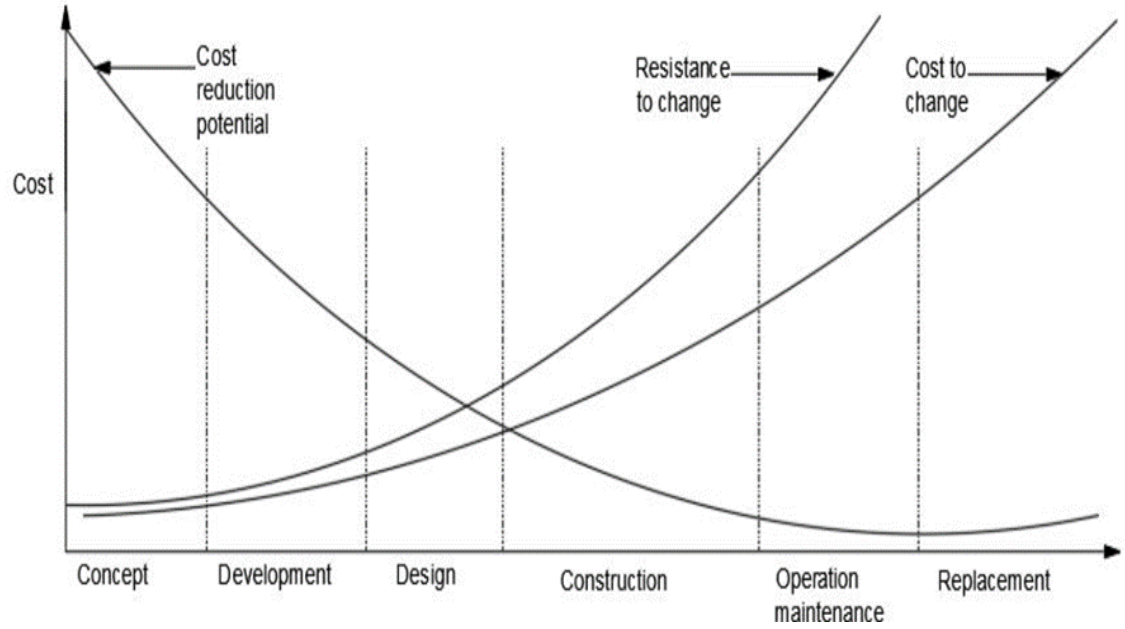

Figure 2: VE general cost changes of a construction project

1.2 Critical Success Factors for VE Implementation in Construction Projects

The success of construction projects is strongly influenced by several critical success factors (CSFs) (Ramly *et al.*, 2015). Rostiyanti (2023) identified 28 CSFs for VE, categorized into the pre-study, study, and post-study stages, and ranked them by importance in Table 1. Among these, the highest-ranked CSFs for effective VE workshops include having clear objectives for the VE study and ensuring thorough preparation and a comprehensive understanding of project information. Other key factors are the knowledge and experience of the VE team, the selection of feasible alternatives for cost savings, and the comparison of initial designs with alternative solutions from a cost perspective. Additionally, the generation of creative and innovative ideas to improve cost efficiency and the development of a practical implementation plan are essential for successful VE outcomes. Emphasizing these factors during VE workshops is critical, as they directly support the effective identification of project functions and the optimization of overall project value.

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Table 1: Ranking of CSF for VE related projects at each stage (Rostiyanti, 2023)

Stage	Drivers or Success Factors	Rank
VE Pre-Study Stage	Preparation and understanding the project information (update drawings, project's state, specifications, historical data, etc.)	1
	Clear objective of VE Study	2
	VE knowledge and experience of the VE team	3
	Conducting Site visits	4
	Professional experience and knowledge of VE team in their own disciplines	5
	VE clause or policies in the construction contract	6
	Conducting VE study before the construction phase (timing of VE study)	7
	Knowing about characteristics and type of project which has successful possibility of VE implementation	8
	Allocating time for VE study	9
	Academic qualifications of the VE team	10
	Applying VE to high-cost projects	11
VE Study Stage	Comparing the initial design with alternative designs from cost perspective	1
	Generating creative and innovative ideas which can give maximum cost efficiency	2
	Choosing the most feasible alternative which can help in cost saving and possible implementation	3
	Making several alternatives of construction method that can save budget of project	4
	Comparing the initial design with alternative designs from engineering perspective	5
	Comparing the initial design with alternative designs from time perspective	6
	Use of functional analysis	7
	VE study based on the availability of construction drawing	8
	Making several alternatives that can fulfil the main function	9
	VE study with identifying the high-cost areas or works of the project	10
VE Post-Study Stage	Develop and plan for implementation the result of VE	1
	Client's support and active participation in the VE implementation	2
	Incentives to VE team as a result of project cost efficiency	3
Supporting Factor	Cooperation, follow-up trailing, and support from all related parties (stakeholders) of project to implement VE	1
	Active cooperation, interaction, and brainstorming among VE team, during pre-study until implementation of VE result	2
	Logistics and financial support to implement the result of VE	3

1.3 Global Perspectives on VE in Construction Projects

Recent studies highlight VE as one of the most effective management tools for improving the efficiency of construction projects in both developed and developing countries (Elsonoki *et al.*, 2020). By systematically optimizing functions, VE ensures the delivery of high-quality projects at reasonable cost and within shorter timeframes, while also enhancing customer satisfaction and supporting broader infrastructure development objectives (Othman *et al.*, 2019). Despite its proven effectiveness, VE adoption remains limited in many developing countries compared to developed nations (Bowen *et al.*, 2010). In several developed economies, VE has been institutionalized through government regulations. For example, Hong Kong mandates VE workshops for all projects exceeding HK$200 million (Leung, 2009); in Malaysia, the Economic Planning Unit requires VE for public projects above RM 50 million (Japaar *et al.*, 2012); and in Indonesia, VE is compulsory for projects with building areas greater than 12,000m². In contrast, implementation remains inconsistent in countries such as South Africa, Nigeria, Ghana, and Sri Lanka (Madushika *et al.*, 2020). Tanzania reflects a

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similar trend, with minimal research, documentation, or formal mechanisms for systematic VE adoption. This underscores the critical role of government regulations in shaping VE practice, particularly in developing countries where effective integration, management, and oversight are essential for realizing its benefits (Yanita *et al*., 2018). VE provides a wide range of quantitative and qualitative benefits that directly enhance constructability and overall project performance (Russell *et al*., 1994). Quantitative benefits include reduced costs, shorter schedules, and improved quality, while qualitative benefits encompass better problem avoidance, alignment of project goals, stronger stakeholder involvement, greater team commitment, improved communication, enhanced construction flexibility, increased productivity, and reduced rework and disruptions.

2. Materials and Method

The primary objective of this study was to conduct a systematic review of existing literature to examine the current application, benefits, and challenges of VE in construction projects, both globally and within the specific context of Tanzania. To achieve this, a qualitative research design employing a thematic content analysis approach was adopted, as it facilitates the systematic identification, categorization, and interpretation of patterns and themes within scholarly sources of information (Mahdi *et al.,* 2015).

A structured search of Google Scholar and Semantic Scholar was used to retrieve peer-reviewed publications from 2005 to 2025. The inclusion criteria were strictly defined, ensuring that only full-text publications in English, published in peer-reviewed academic sources, with criterion that each journal searched must have at least one published VE topic. The primary keywords and search terms used, along with the corresponding number of hits, are summarized in Table 2**.** A similar method was used by Keegan *et al.* (2022), to review gravel road maintenance work published in the *Transportation Research Record* journal. A systematic documentary review involves the process of gathering, organizing, and evaluating existing literature within a specific domain, with the goal of advancing knowledge in the given field of study. To enhance the validity and reliability of findings, a content analysis methodology was applied to extract and synthesize data systematically. Content analysis enables both qualitative (theme identification and pattern recognition) and quantitative (frequency analysis of key terms and thematic occurrences) examinations, thereby allowing for a more comprehensive assessment of VE applications in construction projects. This methodological approach provided a structured framework for categorizing the data based on key research themes, including VE methodologies, implementation strategies, objectives, benefits, challenges, and existing research gaps**.**

In order to ensure the information obtained is relevant and current for the reviewed studies, the literature search was restricted to the last 20 years (2005 to present). The analysis focused on research that explicitly addressed VE topics, including documented methodologies, case studies, and theoretical advancements. Extracted data were systematically recorded, categorized, and analyzed to ensure alignment with the research objectives and to facilitate the identification of existing concepts and knowledge gaps. The conclusions drawn from this study are grounded in the synthesized evidence obtained through this methodological framework that address VE application, benefits and barriers, thereby ensuring objective of the research is met.

Table 2: Keywords used for the literature search

S/N	Literature search keywords	Number of hits
1	Value engineering	43
2	Construction projects	25
3	Value engineering in construction projects	56
4	Application of value engineering	24
5	Application of value engineering in construction projects	28
6	Benefits of value engineering	23
7	Other approaches to value engineering	32
8	Performance measurement of value engineering	12
9	Barriers of value engineering practices in construction projects	12
10	Efforts to improve value in Tanzania's construction projects	9

3. Results and Discussion

3.1 An overview of journals reviewed

The search process identified approximately 70 peer-reviewed publications on the application of VE in construction projects, both globally and within Tanzania. From these sources, detailed information was extracted on the applicability, benefits, and barriers of VE, as well as research gaps in value enhancement for

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construction projects. These gaps point to the need for further investigation, particularly in developing countries, with a focus on Tanzania.

The majority of reviewed studies were published in journals specializing in engineering, construction, and project management. Across the publications, VE consistently emerged as a critical management tool for optimizing value at any project stage, provided it is implemented in line with its fundamental principles. A synthesis of the most frequently cited works 32 articles representing 45% of the total, along with their leading journals is presented in Table 3. Among these, the *International Journal of Construction Management* was identified as the most influential outlet, accounting for 25% of the top-ranked publications due to its strong emphasis on cost control, project optimization, and value creation, which directly align with VE principles. With regard to Tanzania, findings revealed that only five of the 32 most-referenced articles (15.6%) specifically addressed VE in Tanzanian construction projects, underscoring the limited research in this context. The results reveal that 87.5% of the most-referenced studies were published between 2015 and 2025, demonstrating that the literature incorporated into this review is recent, relevant, and methodologically robust. To further ensure relevance, the review applied the "10-year rule," prioritizing publications less than a decade old, as summarized in Table 3.

Overall, the review of leading journals and articles confirms that VE is widely applicable across diverse construction systems and project types, reinforcing its value as a strategic approach for improving project performance, particularly in resource-constrained environments such as Tanzania.

The reviewed studies on VE in construction projects span from 2006 to 2024, with a noticeable concentration of publications after 2016, reflecting growing global interest. The International Journal of Construction Management and Engineering, Construction and Architectural Management emerge as the most frequent outlets, publishing several influential works on barriers, success factors, and benchmarking practices. Other key contributors include the *International Journal of Construction Engineering and Management*, *Civil Engineering Journal*, and regional journals such as the *Tanzania Journal of Engineering and Technology* and the *Africa Habitat Review Journal*, which highlight localized applications in Africa. The recurring themes and their corresponding significance or insights as derived from the reviewed 32 top journals are as follows;

- Barriers and obstacles to VE adoption in developing countries (e.g., Tanzania, Egypt, Ghana, Kenya, Saudi Arabia).
- Frameworks and methodologies for implementing VE in construction projects.
- Performance and sustainability impacts, with emphasis on risk management, key performance indicators, and project delivery efficiency.
- Case studies demonstrating application in infrastructure, road, and government projects.

Geographically, the review covers Africa (Tanzania, Ghana, Egypt, Kenya, Rwanda), Asia (Saudi Arabia, Jordan, Indonesia, Iran), and broader international contexts, suggesting the subject's global relevance but uneven adoption across regions. Overall, the literature highlights a steady evolution from early conceptual discussions (2006–2013), toward practical applications and barriers analysis (2015–2020), and more recently, to integrated sustainability and performance models (2021–2024).

3.2 Positive Impacts of VE in Construction Projects

Findings from recent studies demonstrate that VE has significant positive impacts on construction projects, aligning with global trends in project delivery. Beyond reducing costs and project duration, VE improves quality, enhances productivity, and supports sustainability goals (Rania *et al.*, 2023; Alshehrin, 2020). Within construction project management, VE is widely recognized as a structured methodology for achieving maximum value by balancing performance with cost efficiency (Tanko *et al.*, 2019). Several studies further emphasize its role as an organized decision-making framework that facilitates systematic evaluation of project functions to ensure optimal outcomes (Elsonoki *et al.*, 2020). By reducing life cycle costs while maintaining or improving project value, VE contributes directly to national infrastructure development. This process typically requires a structured methodology led by an experienced facilitator, with the ultimate objective of minimizing total life cycle costs (Janan *et al.*, 2018).

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Table 3: List of top journals in the review

S/N	Title of the journal article	Journal name	Year of publication
1	Obstacles against Value Management Practice in Building Projects of Dar es Salaam Tanzania	International Journal of Construction Engineering and Management	2017
2	Value Management as an Efficient Risk Management Tool	International Journal of Advanced and Multidisciplinary Engineering Science	2018
3	Value management implementation barriers for sustainable building: a bibliometric analysis and partial least square structural equation modeling	Engineering, Construction and Architectural Management	2021
4	Barriers to the adoption of value management in developing countries	Engineering, Construction and Architectural Management	2017
5	The Methodology of Using Value Engineering in Construction Projects Management	Civil Engineering Journal	2016
6	A Decade of Value Engineering in Construction Projects	Hindawi Advances in Civil Engineering	2022
7	Value in Construction: An International Study	International Journal of Construction Management	2006
8	The Selection of Benchmarking Partners for Value Management: An Analytic Approach	International Journal of Construction Management	2007
9	Principal component analysis of challenges facing the implementation of value engineering in public projects in developing countries	International Journal of Construction Management	2016
10	Value engineering practices in infrastructure projects: a case study of Ilam Gas Refinery's water transmission system at Reno Mountain, Iran	International Journal of Construction Management	2017
11	Key performance indicators of value management in the Sri Lankan construction industry	International Journal of Construction Management	2018
12	Legal aspect of value engineering implementation in Jakarta (Indonesia) construction projects	International Journal of Construction Management	2018
13	A framework of an integrated sustainability and value engineering concepts for construction projects	International Journal of Construction Management	2020
14	Critical success factors for value management techniques in construction projects: Case in Jordan	International Journal of Construction Management	2021
15	Implementation of Value Engineering in Construction Project to reduce Time of the Project	International Research Journal of Engineering and Technology (IRJET)	2020
16	Application of Value Engineering in Construction Projects	Journal of Traffic and Transportation Engineering	2013
17	Value Engineering Adoption's Barriers and Solutions: The Case of Saudi Arabia's Construction Industry	Multidisplinary Digital Publishing Institute (MDPI)	2024
18	An Evaluation on Application of Value Management in Local Government Authorities Construction Projects in Tanzania	International Journal of Innovative Science and Modern Engineering (IJISME)	2015
19	Application of Value Management in Conception of Construction Projects in Rwanda	International Journal of Innovative Science and Modern Engineering (IJISME)	2024
20	Assessments of the Application of Earned Value Management System for Construction Project Performance Measurement in Zanzibar	Tanzania Journal of Engineering and Technology	2023

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Table 3 continued.

S/N	Title of the journal article	Journal name	Year of publication
21	Perceived Benefits of Using Value Engineering on Road Projects in Ghana	World Journal of Engineering and Technology	2020
22	Identification and Analysis of Key Elements for Improving Construction Management Performance in Tanzania	International Journal of Construction Engineering and Management	2023
23	Application of Value Engineering in Construction Projects	Journal of Traffic and Transportation Engineering	2013
24	Barriers of value management implementation for building projects in Egyptian construction industry	Ain Shams Engineering Journal	2020
23	Barriers to the implementation of value management in small construction projects	Journal of Building Engineering	2022
24	Evaluation of Barriers to Value Management Application in Construction Projects	West Africa Built Environment Research (WABER) Conference 10th Anniversary Conference, 5-7 August 2019, Accra, Ghana	2019
25	Value Engineering and Its Application in Civil Engineering	Construction Research Congress 2018	2018
26	Current and Future Trends of Construction Project Performance Models: A Review	Tanzania Journal of Engineering and Technology	2023
27	Impact of Value Engineering on Construction Project Management and Achievement of Sustainable Development	International Research Journal of Innovations in Engineering and Technology (IRJIET)	2023
28	Value Engineering Techniques and its Application in Construction Projects	Journal of Engineering and Applied Sciences Technology	2023
29	Integrating theory and practice in value engineering within Egypt's construction industry	Journal of Engineering and Applied Science	2024
30	The Process of Value Engineering in Construction Projects in Nairobi, Kenya	Africa Habitat Review Journal	2022
31	A model for enhancing the application of value management in construction projects in Kenya	Journal of Agriculture Science and Technology	2024
32	Value Management Practices in Construction Industry: An Analytical Review	The Open Civil Engineering Journal	2020

Source: Authors' analysis (2025)

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Evidence also shows that VE accelerates project development by improving decision-making and addressing design-related issues early in the process (Othman *et al*., 2020). Research consistently highlights the pre-contract or pre-construction phase as the most suitable stage for VE implementation, since changes made at this point are less costly and have the greatest impact on value (Madushika *et al*., 2020; Surlan *et al*., 2016). VE is particularly effective once schematic designs are developed and cost estimates are available—typically when design completion reaches about 35% -as this enables the identification of potential savings before final design decisions are locked in (Kelly *et al*., 2004).

Overall, the reviewed literature suggests that VE offers a universally applicable framework across different construction systems and project types. It facilitates the generation of detailed proposals, evaluation of alternative solutions, and definition of technical systems through the analysis of multiple design options. By involving key stakeholders such as contractors, designers, and project managers, VE ensures collaborative decision-making that maximizes cost efficiency, performance, and long-term project value.

3.3 Barriers to VE Implementation

Despite the numerous advantages of applying VE in construction projects, the findings reveal several persistent barriers that hinder its effective implementation. Common challenges include limited knowledge and awareness of VE, cost-driven procurement systems, a shortage of trained professionals, and the absence of standardized problem-solving methods. In many regions, the novelty of the concept, limited adoption among contractors, reluctance to fully implement VE during projects, and a lack of qualified experts further constrain its application. Additional barriers identified are low awareness among clients, weak stakeholder relationships, inadequate training, and the absence of locally adapted VE guidelines (Tanko *et al*., 2019).

Institutional and managerial constraints also play a significant role. Studies highlight insufficient support from both government agencies and top management as critical obstacles to widespread VE adoption (Douglas *et al*., 2017). In developing countries, these challenges are more pronounced, where low awareness is compounded by high implementation costs, inappropriate procurement systems, rigid standards, lack of contractual provisions, poor communication, neglect of essential VE principles, and conflicts of interest (Rwamuhinda, 2019).

3.4 Regional/Contextual Findings for Developing Countries

Findings from the reviewed studies suggest that achieving construction project objectives at minimal cost while ensuring investment efficiency remains a major challenge in the development agendas of many developing countries. Evidence indicates that these challenges can be addressed through the systematic application of VE at appropriate stages of the project life cycle (Rad *et al*., 2016). Maragara *et al.* (2024) identified team dynamics, procurement policies, government regulations, and VE knowledge as key predictors of VE application, while other studies highlight regional variations in awareness and implementation across developing nations.

In Tanzania, research shows that VE has not been formally integrated into any phase of construction projects, despite its recognized potential to maximize project value (Mziray *et al*., 2015). Kajumulo *et al.* (2023) identified seven critical factors influencing construction management: problem-solving ability, leadership skills of project managers, site conditions, material and equipment costs, planned construction time, and the availability of competent staff. These factors directly affect VE implementation, and addressing them is essential for promoting its adoption in Tanzania and other developing countries facing similar challenges (Othman *et al*., 2021). However, the critical linkage between the design, construction, and maintenance phases, where VE is most effective, remains largely absent (Basondole, 2022).

Current practice in Tanzania shows partial application of specific VE techniques. Studies reveal that the industry has primarily engaged in Value Engineering Change Proposals (VECP) and Value Engineering Audits (VEA), though these are not yet formalized within standard construction contracts and often require client approval through contract variation orders (Basondole, 2022). VECPs allow contractors to submit proposals for modifying original contracts to improve value while sharing cost savings with clients (Adhikari, 2013). VEAs, on the other hand, function as assurance mechanisms, systematically reviewing project objectives and functional performance to ensure that VE principles are properly applied in large-scale projects.

Over the past 15 years, Tanzania has instead relied on Value for Money (VfM) assessments to guide project planning, procurement, and management (NAOT, 2024). While VfM has been widely adopted to evaluate

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whether construction investments deliver adequate returns, it is not equivalent to VE. As Mahadik (2015) notes, VE offers greater potential to address persistent project challenges by enhancing decision-making and maximizing value across all project phases.

Overall, the findings indicate that despite the proven benefits of VE, Tanzania lacks a formalized framework for its systematic implementation in construction projects. The current reliance on partial or alternative approaches limits the industry's ability to optimize performance, underscoring the need for strategic policies and institutional support to strengthen VE adoption.

3.5 Bridging Theory and Practices

Reviewed studies indicate that although elements of VE are applied in construction projects, execution remains inadequate, reflecting a substantial gap between theory and practice (Waweru *et al*., 2022). Closing this gap requires strengthening the role of educational institutions and professional training, enhancing public awareness and recognition of VE, and promoting its systematic integration at the early stages of the project lifecycle (Abdelrahman *et al*., 2024).

3.6 Recommendations and Strategic Solutions

Based on the overall research findings, two key recommendations for advancing VE practices in construction projects are: (i) integrating VE courses into engineering curricula to strengthen professional capacity, and (ii) introducing incentive clauses in construction contracts to encourage its systematic application. These recommendations are supported by Alhumaid *et al.* (2024) and Danku *et al.* (2020), who highlight VE as a critical tool in civil engineering and the construction industry, offering substantial benefits in cost savings and project performance improvement.

Despite persistent challenges in implementing VE, particularly in developing countries, recent studies reaffirm its importance, noting that its quantitative and qualitative benefits consistently outweigh the drawbacks, making it a worthwhile investment. To address barriers specific to developing contexts such as Tanzania, three strategic solutions are identified as most impactful: (i) organizing conferences and seminars to facilitate knowledge sharing among construction professionals, (ii) developing localized guidelines to standardize VE studies, and (iii) enhancing client awareness and understanding of VE practices. Together, these strategies provide a structured pathway for overcoming existing challenges and advancing the adoption of VE in the construction industry.

4. Conclusion

This study concludes that the adoption of Value Engineering (VE) in construction projects across developing countries remains limited, largely due to inadequate awareness, a shortage of trained professionals, and weak institutional support. In Tanzania, the use of alternative approaches such as the Value Engineering Contractor's Proposal (VECP) and Value Engineering Audit (VEA) is neither formalized nor aligned with internationally recognized VE standards. As a result, VE application often depends on the discretion of clients or top management rather than being systematically integrated into construction contracts. Furthermore, restrictive government regulations and rigid contract management procedures continue to impede its wider implementation. Additionally, incorporating a dedicated VE clause in all construction contracts and piloting VE-based projects can create a foundation for its broader adoption. Given VE's proven ability to optimize cost, quality, time, and stakeholder satisfaction, institutionalizing VE within Tanzania's contractual and regulatory frameworks is essential. Such an approach would not only enhance project outcomes but also strengthen the long-term sustainability and competitiveness of the construction industry.

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