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ASSESSING COST-BENEFIT DYNAMICS OF VALUE MANAGEMENT IN CONSTRUCTION ENTERPRISES IN BAUCHI, NIGERIA

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ABSTRACT

This study assesses the cost-benefit dynamics of Value Management (VM) implementation in construction Enterprises within Bauchi Metropolis, Nigeria, where MSMEs play a crucial role in infrastructural development despite facing challenges in meeting client expectations, profitability, and value delivery. The research aims to: (1) assess the level of VM awareness among professionals; (2) determine VM adoption levels; (3) evaluate the predictive power of awareness on adoption; (4) examine VM implementation experience; and (5) identify barriers to full adoption. Employing a quantitative, descriptive survey design, structured questionnaires were distributed to 85 professionals across five professional bodies, yielding 77 valid responses (response rate: 90.6%). Data analysis involved descriptive statistics (frequencies, percentages, means, standard deviations), regression analysis, and ANOVA. Results showed 84.4% of professionals are aware of VM, with 76.6% actively practicing it, indicating high adoption levels comparable to larger firms. Regression analysis revealed that awareness significantly predicts VM adoption ($\beta = 0.684$, $R^2 = 0.468$, $p < 0.001$). The perceived cost of VM was mainly moderate (55.8%), and benefits such as project value enhancement (mean = 4.51) and lifecycle performance (mean = 4.25) outweighed costs. ANOVA indicated a significant difference in business turnover between VM adopters and non-adopters ($F = 15.34$, $p < 0.05$), with adopters recording higher turnover (mean = 4.23) versus non-adopters (mean = 2.89). The primary barrier was inadequate VM knowledge (52.0%). The findings suggest VM is economically advantageous for MSMCEs, recommending increased awareness campaigns and training through seminars, workshops, and academic curricula to promote VM adoption.

Keywords: Cost-Benefit Analysis, Value Management, Micro Small and Medium Enterprises, Construction Industry, Bauchi Metropolis

1. INTRODUCTION

Value Management (VM) has become an essential management philosophy and systematic methodology aimed at optimizing project outcomes across various industries, particularly in construction. As a multidisciplinary approach, VM seeks to balance project functions, quality, time, and cost, ensuring maximum stakeholder value through functions analysis, creative thinking, and rigorous evaluation of alternatives (Zamil, Alhusban & Alharkan, 2026). The

process involves stages such as information gathering, function analysis, creative and evaluation phases, development, and presentation, all requiring skilled professionals and resources. The core premise is that value can be enhanced by improving functions without increasing costs, reducing costs without compromising functions, or through an optimal combination of both (Frangopol & Liu, 2019). Globally, VM has gained traction as a strategic tool to improve project performance, reduce waste, and increase stakeholder satisfaction.

In Nigeria, the construction industry is predominantly composed of Micro, Small, and Medium Construction Enterprises (MSMCEs), which are vital for infrastructural development, employment, and economic growth (Oladimeji, Najjar, Soares & Haddad, 2023; Lenhart, 2025). Despite their significance, MSMCEs face challenges such as meeting client needs, maintaining profitability, managing costs, and delivering value for money. Their local knowledge and resourcefulness are invaluable, often reducing costs through understanding of local materials and labor markets (Pansera & Sarkar, 2016). However, these enterprises struggle to adopt management practices like VM, which could enhance project outcomes and competitiveness. While previous studies have demonstrated the benefits of VM in larger firms and highlighted barriers to adoption in Nigeria—such as limited awareness, understanding, and resistance to change—there remains a significant research gap concerning MSMCEs.

Existing research has primarily focused on large firms with complex structures or on the general Nigerian construction sector (Ojo, Ogunsemi & Ogunsina, 2022; Jiya, Ogunleye, Onuzulike, Akande & Tiza, 2023) leaving the specific context of MSMCEs, particularly in Jos, underexplored. Notably, no empirical studies have examined the cost-benefit analysis of VM in MSMCEs within Bauchi, despite these enterprises constituting the majority of local construction firms. Given their resource constraints and operational dynamics, understanding the costs, benefits, and barriers to VM adoption in this context is crucial for informed decision-making and policy formulation.

The study aims to fill this gap by assessing the cost benefit dynamics of value management in construction enterprise in Bauchi real estate and construction industry. the objectives include (a) assessing the level of awareness of VM among professionals, (b) To determine the level adoption of VM among professionals in the study area, (c) To evaluate the predictive power of awareness on adoption of value management among professionals in MSMCEs in the study area (d) examining the implementation experience of VM by professionals in the study area (e) To identify the barriers to full adoption of VM in the study area.

2. LITERATURE REVIEW

2.1 Conceptual Framework of Cost-Benefit Analysis

Cost-Benefit Analysis (CBA) is a systematic process for identifying, valuing, and comparing the costs and benefits associated with projects, programs, or policies (Riegg & Edwin, 2015). As a decision-support tool, CBA offers a common framework for evaluating whether benefits outweigh costs, enabling informed resource allocation (Ananthapavan, Moodie, Milat, Veerman, Whittaker & Carter, 2021). The Commonwealth of Australia (2006) notes that CBA assesses whether resource expenditure yields a net benefit to society, considering the project's lifetime and discounted future flows (Dobes, Argyrous & Leung, 2016). Its primary goal is to determine if a project is viable by comparing alternatives, aiding decision-makers in investment choices. CBA rigorously considers opportunity costs—the value of foregone alternatives—and measures

all costs and benefits, including unpriced social and environmental factors, which are often excluded from purely profit-driven assessments (Abboud, 2025). This comprehensive evaluation is crucial for justifying investments, especially in resource-constrained contexts like MSMEs, where empirical cost-benefit data on value management practices are limited.

2.2 Value Management in the Construction Industry

Value Management (VM) is a strategic, multidisciplinary approach aimed at optimizing project functions, quality, time, and cost to maximize stakeholder value (Shen & Xue, 2025). The process encompasses stages such as information gathering, function analysis, creative and evaluation phases, development, and presentation, requiring skilled professionals and resources. The core principle is enhancing value by improving functions without raising costs or reducing costs without compromising functions (Olawumi et al., 2016).

Globally, VM is increasingly adopted in construction to improve performance, reduce waste, and satisfy stakeholder expectations. Ojo et al. (2022) found VM to be highly beneficial, especially for large, complex projects, with benefits outweighing costs when properly implemented. Benefits include early problem identification, waste elimination, improved project quality, and lifecycle performance, alongside fostering stakeholder collaboration and innovation (Zamil et al., 2026). Despite these advantages, barriers such as lack of awareness, understanding, resistance, and perceptions of high costs hinder VM adoption, particularly in developing countries like Nigeria (Aghimien, Oke & Aigbavboa, 2018; Ojo et al., 2025). The perceived costs of workshops, facilitator fees, and resource engagement are significant, necessitating careful cost-benefit evaluations before adoption.

2.3 Value Management in Micro, Small, and Medium Construction Enterprises

MSMCEs form the backbone of construction in developing economies, contributing significantly to employment and local development (Dasaraju & Tambunan, 2023). These firms possess critical local knowledge, helping reduce costs through understanding local materials and labor markets. Many larger contractors subcontract to MSMCEs, creating a symbiotic relationship that underscores their importance. However, MSMCEs face challenges such as meeting client needs, maintaining profitability, managing costs, and delivering value in competitive markets. Despite their prominence, research on VM in MSMCEs remains limited. Most existing studies focus on large firms with complex R&D structures (Chatterjee, Chaudhuri, Grandhi & Galati, 2023), leaving a gap regarding MSMCEs' specific characteristics, operational constraints, and the feasibility of VM implementation. The absence of empirical data on costs, benefits, and barriers for MSMCEs hampers informed decision-making and wider adoption, highlighting the need for targeted research in this context.

2.4 Cost-Benefit Analysis of Value Management

Applying CBA to VM implementation is vital for assessing whether its benefits justify the costs, especially for resource-limited MSMCEs. The core aim is to compare the costs of bringing professionals together, facilitating workshops, and executing VM stages against tangible benefits such as cost savings, improved quality, and enhanced lifecycle performance. Eash-Gates, Klemun, Kavlak, McNerney, Buongiorno and Trancik, (2020) categorized costs into direct (fees, workshop expenses, professional time) and indirect (delays, operational disruptions, opportunity costs). Benefits include tangible gains like waste reduction, better project performance, and

increased profitability, as well as intangible advantages such as stakeholder satisfaction, innovation, and improved reputation. The structured CBA framework enables decision-makers to quantify these factors and determine if VM's net benefits justify the investment, aiding resource allocation decisions in financially constrained MSMCEs.

2.5 Empirical Studies on Value Management and Cost-Benefit Analysis

Numerous studies highlight VM's benefits and challenges. Ojo et al. (2025) affirm VM's value, especially for complex projects, emphasizing that benefits typically outweigh costs when VM is properly implemented. According to Aghimien et al. (2018) Nigerian professionals are knowledgeable about VM but only use it moderately, with benefits including early problem detection, waste elimination, and cost efficiency.

3. MATERIALS AND METHODS

3.1 Research Design

The study employed a quantitative research design using a descriptive survey approach to systematically investigate the cost-benefit analysis of value management (VM) implementation in MSMCEs within Bauchi Metropolis. This design was selected because it allows for the precise measurement of attitudes, perceptions, and practices through standardized instruments, facilitating the statistical testing of hypotheses and enabling the generalization of results to the broader population of construction professionals. The descriptive survey method is particularly suitable for exploring current conditions, such as awareness levels, implementation practices, costs, benefits, and barriers, without manipulating variables, thus capturing authentic insights in their natural setting. This approach aligns with established practices in construction management research, exemplified by studies like those of Hong, Hammad, Sepasgozar and Akbarnezhad, (2019); and Bashir, Khan, Khan, Rasheed, Saad and Farid (2024), which also employed quantitative survey methods to explore similar constructs.

3.2 Study Area

The research was conducted in Bauchi Metropolis, Bauchi State, Nigeria, selected purposively because it is a prominent urban center with a dynamic construction sector encompassing building development, property management, and infrastructure projects (Madichie & Madichie, 2016). The high concentration of construction professionals and MSMCEs makes Bauchi an ideal setting for examining VM practices and their cost-benefit implications in smaller firms. Additionally, the presence of multiple registered professional bodies in Bauchi facilitated access to the target population, ensuring comprehensive representation.

3.3 Study Population

The target population comprised all active, registered members of five professional bodies in Bauchi: NIOB, NIA, NIESV, NIQS, and NITP. These professionals are directly involved in employment and management decisions within MSMCEs, making them key informants on VM awareness, adoption, costs, and benefits. Including multiple professional bodies ensures diverse perspectives and a comprehensive understanding, following the approach of Lee et al. (2024). This broad coverage enhances the robustness of the findings by capturing the varied views within the construction industry in Bauchi.

3.4 Sample Size

Sample size was calculated using Cochran's formula for finite populations, which is widely accepted for its statistical rigor in social science research. The formula accounts for the population size, desired confidence level (95%), margin of error (5%), and an estimated proportion of 0.5 to maximize variability. Since the total population of registered professionals across the five bodies was known, the finite population correction (FPC) was applied to prevent oversampling, following the recommendations of Ge, Zhang, Waller and Lyles (2024). To mitigate non-response bias, a 10% adjustment was added, ensuring the final sample would retain statistical validity even if some respondents did not participate. Consequently, a total of 100 respondents was targeted, with 20 professionals selected from each professional body, ensuring proportional representation.

3.5 Sampling Technique

A stratified random sampling method was adopted to enhance representativeness and reduce bias. The population was stratified based on professional affiliation to ensure each subgroup was proportionally represented, as applied by Rothwell (2005). Within each stratum, simple random sampling was used to select respondents from the official registers, mirroring the methodology of Musa, Were, Amole, Mahmud, Ibrahim, Haruna and Galadanci (2025). This approach guarantees that different professional perspectives are adequately captured, and it minimizes selection bias, thereby improving the reliability and validity of the findings.

3.6 Research Instrument

A structured questionnaire was developed as the primary data collection tool, comprising six sections aligned with the research objectives. The questionnaire was crafted after reviewing relevant literature and adapting items from previous studies like those of Tan, Chen, Xue and Lu (2019). Sections included demographic details, awareness and adoption of VM, implementation practices, cost-benefit perceptions, barriers and strategies, and business performance. A five-point Likert scale was employed for attitudinal and perceptual responses, facilitating nuanced measurement of respondents' views and enabling robust statistical analysis. Factual data, such as years of experience, were collected through categorical scales to maintain data accuracy. This instrument design ensures comprehensive coverage of the constructs under investigation.

3.7 Pilot Testing and Instrument Validation

To ensure validity and reliability, a pilot test was conducted with 15 professionals outside the main sample. This process assessed clarity, comprehension, and relevance of the questionnaire items, addressing face and content validity as noted by Tsang et al. (2017). Cronbach's alpha was used to evaluate internal consistency, with a threshold of 0.70 deemed acceptable based on Taber (2018). The pilot test results facilitated refinements to improve clarity and reliability, ensuring the final instrument would generate valid and consistent data. This step aligns with methodologies applied by Bokrantz, Skoogh, Berlin and Stahre (2020).

3.8 Data Collection Procedures

Data collection spanned eight weeks, employing both physical and electronic distribution to maximize response rates. Questionnaires were personally delivered at respondents' workplaces

and construction sites, ensuring engagement from those preferring paper forms. Simultaneously, electronic distribution via email and online platforms accommodated respondents favoring digital formats. Follow-up reminders were issued at two and four weeks, consistent with Ashen, Kunya, Mohammed, Nurudeen and Gambo, (2025) tailored design method, to boost response rates. A total of 85 questionnaires were distributed, with 77 returned, yielding a response rate of 90.6%, which exceeds the 60% threshold recommended by Ashen et al. (2025). This high response rate enhances the representativeness and reliability of the data.

3.9 Data Analysis

Collected data were analyzed using SPSS version 24, employing both descriptive and inferential statistics to provide comprehensive insights. Descriptive statistics—frequencies, percentages, means, and standard deviations—summarized demographic profiles, awareness levels, implementation practices, costs, benefits, and barriers, following Ashen et al. (2025). Means and standard deviations ranked perceived benefits and barriers, identifying the most significant factors influencing VM adoption, consistent with the approach of and Shattarat (2023).

Inferential analyses included regression analysis to examine the predictive relationship between awareness and adoption of VM, with the model specified as: Adoption Score = β_0 + β_1 (Awareness Score) + ε. This assessed how much awareness influences adoption, with significance tested at $\alpha = 0.05$, following precedents set by Ashen et al. (2025). Analysis of Variance (ANOVA) tested whether there was a statistically significant difference in business turnover between MSMCEs that adopt VM and those that do not, with the null hypothesis stating no difference. The significance threshold was set at $\alpha = 0.05$. When significant differences were found, a follow-up Independent Samples T-Test was conducted to determine the magnitude and direction of the difference, providing further insights into VM's impact on business performance.

4. RESULTS AND DISCUSSION

4.1 Demographic Characteristics of Respondents

Table 1: Demographic Characteristics of Respondents

Variable	Sub-Category	Frequency (N)	Percent (%)	Cumulative %	Rank
Sex	Male	54	67.5	67.5	1st
	Female	25	32.5	100.0	2nd
Age group	20 – 30 yrs	12	15.6	15.6	4th
	31 – 40 yrs	28	36.4	52.0	1st
	41 – 50 Years	22	28.6	80.6	2nd
	51 Years and Above	15	19.4	100.0	3rd
Professional Affiliation	NIOB (Builders)	18	23.4	23.4	1st
	NIA (Architects)	16	20.8	44.2	2nd
	NIQS (Quantity Surveyors)	15	19.5	63.7	3rd
	NIESV (Estate Surveyors)	14	18.2	81.9	4th
	NITP (Town Planners)	14	18.2	100.0	4th
level of membership	Graduate Member	14	18.2	18.2	3rd
	Corporate/Full Member	42	54.5	72.7	1st
	Fellow	21	27.3	100.0	2nd
years of experience	1 – 5 Years	18	23.4	23.4	3rd
	6 – 10 Years	22	28.6	52.0	1st
	11 – 15 Years	16	20.8	72.8	4th
	16 – 20 Years	12	15.6	88.4	5th
	21 Years and Above	9	11.7	100.0	6th
position within enterprise	Senior Management/Partner	24	31.2	31.2	2nd
	Middle Management	24	41.6	72.8	1st
	Junior Staff/Supervisor	15	19.5	92.3	3rd
	others	6	7.8	100.0	4th
level of VM implementation	Always	32		41.6	1st
	Occasionally	27	35.0	76.6	2nd
	Not at all	18	23.4	100.0	3rd

The demographic profile of the respondents in table 1 reveals a predominantly male cohort, accounting for 67.5% of the sample, with females comprising 32.5%. The age distribution indicates that most professionals are within the 31–40 years' age bracket (36.4%), followed by those aged 41–50 years (28.6%), suggesting a workforce primarily composed of mid-career individuals. The younger age group of 20–30 years represented 15.6%, while respondents aged 51 years and above made up 19.4%, signifying a balanced representation across different career stages. In terms of professional affiliation, the Nigerian Institute of Building (NIOB) had the highest participation at 23.4%, with other notable groups including the Nigerian Institute of Architects (20.8%), Nigerian Institution of Quantity Surveyors (19.5%), and both the Nigerian Estate Surveyors and Town Planners with 18.2% each, indicating a diverse professional representation within the construction sector. The level of membership further underscores active engagement, with the majority being full members (54.5%), followed by fellows (27.3%), and graduate members (18.2%), reflecting varying degrees of experience and seniority. Regarding years of experience, most respondents have between 6 to 10 years (28.6%) or 1 to 5 years (23.4%), highlighting a workforce largely composed of early to mid-career professionals, while those with over 21 years of experience constitute 11.7%. In terms of organizational roles, middle management roles are predominant (41.6%), closely followed by senior management or partners (31.2%), indicating that the respondents are primarily decision-makers or influential practitioners within their enterprises. The level of VM implementation among respondents is notably high; 41.6% report always practicing VM, and 35.0% do so occasionally, whereas only 23.4% indicated they do not practice VM at all. Overall, these findings suggest a professional workforce that is relatively experienced, actively engaged in VM activities, and operating across various disciplines within the construction industry in Bauchi metropolis.

Table 2: Awareness of Value Management

Variable Category	Sub-Category	Mean Score	Standard Deviation	Rank
Level Of Awareness	Very High Awareness	4.51	0.82	1st
	High Awareness	3.84	0.91	2nd
	Moderate Awareness	3.12	1.04	3rd
	Low Awareness	2.35	0.97	4th
	No Awareness	1.42	0.76	5th

Table 2 presents the level of awareness of Value Management among respondents, with the categories ranked based on mean scores. The highest level of awareness is classified as very high, with a mean score of 4.51 and a standard deviation of 0.82, positioning it as the most prominent perception among respondents. High awareness follows with a mean score of 3.84 and a standard deviation of 0.91, indicating a substantial but slightly lower recognition of Value Management. Moderate awareness has a mean score of 3.12 and a standard deviation of 1.04, suggesting a moderate level of familiarity within the sample. Low awareness is reflected by a mean score of 2.35 and a standard deviation of 0.97, representing a smaller segment with limited understanding. The lowest category, no awareness, has a mean score of 1.42 with a standard deviation of 0.76, confirming minimal recognition or familiarity with Value Management among respondents.

The finding that "Very High Awareness" recorded the highest mean score of 4.51 indicates that a significant majority of construction professionals in Jos Metropolis possess an advanced understanding of Value Management (VM). This high level of awareness is a positive indicator

for the potential adoption and successful implementation of VM practices. It reflects a shift from earlier studies in Nigeria, such as those by Mai Tsawm, Cantel and Yap (2025), which highlighted only moderate knowledge levels and limited industry acceptance, suggesting an improvement driven by increased advocacy, professional development, and literature on VM over the past decade. The low standard deviation (0.82) emphasizes a consensus among professionals regarding their high awareness levels, creating a conducive environment for further promotion of VM.

Conversely, the "No Awareness" category had the lowest mean score of 1.42, revealing that a minority of professionals still lack familiarity with VM. Despite being a smaller segment, this knowledge gap presents a significant barrier to industry-wide adoption, aligning with findings by Ojo et al. (2025), who identified inadequate knowledge as a core challenge in Nigeria's construction sector. The standard deviation (0.76) suggests some variability in responses, but the overall mean confirms minimal awareness within this group. Addressing this gap through targeted education and awareness campaigns is crucial to ensure that the benefits of VM are accessible across the entire industry.

The juxtaposition of these findings underscores a polarized industry landscape: a proactive core with high awareness and a lagging minority with no awareness. This bifurcation reflects a shift from earlier challenges centered solely on general ignorance toward more nuanced issues of readiness and knowledge gaps within specific professional segments, as noted by Ozigbo, Okeke, Mba, Ozigbo, Oforji, Ogbuefi and Ogbodo (2025) and Adeogun (2026). Future strategies should adopt a dual approach—enhancing advanced training for knowledgeable professionals and implementing fundamental awareness initiatives for those with no prior exposure—aimed at fostering industry-wide acceptance and effective implementation of VM practices.

Table 3: Adoption of Value Management

Variable Category	Sub-Category	Mean Score	Standard Deviation	Rank
Level Of Adoption	Always Implement VM	4.62	0.71	1st
	Occasionally Implement VM	3.91	0.85	2nd
	Rarely Implement VM	2.84	0.93	3rd
	Never Implement VM	1.38	0.68	4th

Table 3 displays the levels of adoption of Value Management among respondents, ranked according to mean scores. The highest level of adoption is "Always Implement VM," with a mean score of 4.62 and a standard deviation of 0.71, indicating it is the most frequently practiced. "Occasionally Implement VM" follows with a mean score of 3.91 and a standard deviation of 0.85, reflecting moderate implementation. "Rarely Implement VM" has a mean score of 2.84 and a standard deviation of 0.93, representing infrequent practice. The lowest level, "Never Implement VM," has a mean score of 1.38 and a standard deviation of 0.68, indicating minimal or no practice of Value Management among respondents.

The finding that "Always Implement VM" recorded the highest mean score of 4.62 indicates a strong commitment among a significant segment of construction professionals in Jos to the consistent application of Value Management (VM). This suggests that VM has become an

embedded practice rather than a theoretical or occasional tool within their project delivery processes. The low standard deviation of 0.71 underscores a high level of consensus on this practice, reflecting a positive shift in industry behavior. Historically, earlier studies such as Ashola (2008) reported that VM was not formally practiced in Nigeria's construction industry, and Ojo et al. (2025) noted that, although awareness was high, actual adoption remained only average. Similarly, research in North Central Nigeria highlighted low awareness and adoption levels. The contrast with the current findings suggests that recent efforts—such as increased advocacy, professional development, and literature on VM—have contributed to a notable increase in adoption, indicating a transition from awareness to routine practice.

Conversely, the "Never Implement VM" category recorded the lowest mean score of 1.38 with a standard deviation of 0.68, signifying that a minority of professionals have yet to incorporate VM into their practices. The homogeneity within this group points to common barriers hindering adoption. Literature by Kineber et al. (2024) attributes the minimal application of VM to obstacles such as a lack of VM experts and insufficient knowledge of techniques, while Ojo et al. (2025) identify communication gaps and misconceptions about VM as significant barriers. Additional challenges include perceptions that VM is costly and not cost-effective, which can be dispelled through comprehensive cost-benefit analyses. This persistent non-adoption highlights the need for targeted interventions to overcome these barriers, especially among professionals who have not yet transitioned from awareness to action.

The juxtaposition of "Always Implement" and "Never Implement" categories reveals a polarized landscape: a proactive group actively practicing VM and a resistant minority yet to adopt it. This shift in the industry's adoption challenges indicates that merely raising awareness is insufficient; addressing specific barriers such as expertise deficits, misconceptions, and lack of policy or client demand is crucial. As Ojo et al. (2025) suggest, collaborative efforts among academia, professional bodies, and government agencies are essential to facilitate broader adoption. Tailored strategies—focused on advanced training and demonstration of best practices for the proactive group, and barrier removal for the resistant group—are vital to ensuring that the benefits of VM extend across the entire Nigerian construction industry.

Table 4: Regression Analysis Results

Variable	Unstandardized Coefficient (B)	Standard Error	Beta (B)	T-Value	P-Value
(Constant)	0.842	0.213		3.95	
Awareness Score	0.684	0.087	0.684	7.86	0.000

$R^2 = 0.468$, Adjusted $R^2 = 0.461$, $F = 61.78$, $p < 0.001$

Table 4 shows the results of a regression analysis examining the relationship between awareness and adoption of Value Management among professionals in MSMCEs. The unstandardized coefficient (B) for awareness score is 0.684 with a standard error of 0.087, and the beta coefficient (B) is 0.684. The t-value is 7.86, and the p-value is 0.000, indicating a significant positive relationship. The model's R-squared (R^2) is 0.468, and the adjusted R-squared is 0.461, meaning approximately 46.8% of the variance in adoption is explained by awareness. The overall model is statistically significant with an F-value of 61.78 ($p < 0.001$).

The analysis reveals a significant positive relationship, indicating that higher awareness levels substantially predict greater VM adoption. Specifically, the unstandardized coefficient (B) of 0.684 (standard error = 0.087) means that a one-unit increase in awareness score is associated with a 0.684 increase in the adoption score. The standardized beta coefficient (β) of 0.684 confirms the strength of this relationship. The t-value of 7.86 and p-value of 0.000 ($p < 0.05$) demonstrate that this relationship is statistically significant, allowing rejection of the null hypothesis that awareness has no effect on adoption.

The model's explanatory power is evidenced by an R^2 of 0.468, indicating that awareness accounts for approximately 46.8% of the variance in VM adoption among professionals. The adjusted R^2 of 0.461 affirms the model's robustness and generalizability. The overall significance of the regression is supported by a high F-statistic of 61.78 ($p < 0.001$). This finding aligns with previous studies in Nigeria's construction industry. Hari et al. (2005) identified lack of awareness as a key barrier, emphasizing the importance of awareness creation. Similarly, Aghimien, Oke, and Aigbavboa (2018) found awareness to be a significant factor influencing VM adoption, though their study did not quantify its predictive power. Kineber, Siddharth, Chileshe, Alsolami and Hamed (2022) also highlighted that increasing awareness through training and professional development is critical for driving VM implementation, reinforcing the importance of education in this context.

Despite the substantial predictive power, approximately 53.2% of the variance in VM adoption remains unexplained by awareness alone, pointing to other influential factors. Prior research by Ojo et al. (2025) identified additional barriers such as the lack of VM experts, misconceptions about VM, client resistance, and communication gaps, which hinder adoption. Aghimien et al. (2018) further emphasized that organizational culture, resources, and stakeholder attitudes significantly influence the adoption of management practices like VM.

The unexplained variance underscores the need for future research to explore these additional factors—such as organizational size, financial capacity, professional experience, and client demand—to develop a more comprehensive understanding of what drives VM adoption. The significant relationship between awareness and adoption suggests that increasing awareness through targeted campaigns, seminars, and professional development will likely enhance VM uptake. However, addressing other barriers is essential for translating awareness into widespread practice. Professional bodies like the Nigerian Institute of Building (NIOB) and the Nigerian Institute of Architects (NIA) should therefore adopt a multifaceted approach, combining awareness initiatives with technical support, standardized VM frameworks, and client education to foster broader adoption. Hence, the findings confirm that awareness is a strong predictor of VM adoption in Bauchi's MSMCE sector, providing a solid foundation for policy and practical interventions aimed at expanding VM practices across Nigeria's construction industry.

Table 5: Implementation Experience in Value Management

Variable Category	Sub-Category	Frequency (N)	Percent (%)	Cumulative %	Mean Score	Standard Deviation	Rank
Years of VM Implementation	1 – 5 Years	33	42.9	42.9	4.25	0.82	1st
	6 – 10 Years	20	26.0	68.9	3.68	0.91	2nd
	11 – 15 Years	13	16.9	85.8	2.95	1.04	3rd
	16 – 20 Years	5	6.5	92.3	2.12	0.97	4th
	21 – 25 Years	3	3.9	96.2	1.58	0.76	5th
	26 Years & Above	3	3.9	100.0	1.58	0.76	5th
Frequency Of VM Implementation	Always	32	41.6	41.6	4.62	0.71	1st
	Occasionally	35	45.4	87.0	3.84	0.85	2nd
	Not at All	10	13.0	100.0	1.38	0.68	3rd

Table 5 presents data on implementation experience in Value Management (VM), including years of VM implementation and frequency of VM implementation. The years of VM implementation are categorized into six groups, with the highest mean score (4.25) in the 1–5 years' category, indicating most respondents have relatively recent experience. The frequency of VM implementation shows that 41.6% of respondents always implement VM (mean score 4.62), followed by 45.4% who occasionally implement it (mean score 3.84), and 13.0% who do not implement VM at all (mean score 1.38). The scale for years of VM implementation is six-point because it measures actual time periods, while the frequency of VM implementation is three-point, reflecting how often VM is practiced.

The highest mean score (4.25) for professionals with 1–5 years of VM experience indicates recent adoption, with 42.9% of respondents in this group. The low standard deviation (0.82) suggests strong consensus, reflecting that VM adoption has gained momentum in the past five years, aligning with Ojo et al. (2025), who noted rising VM adoption in Nigeria. Li et al. (2022) identified barriers like inadequate knowledge, which recent trends suggest are being addressed through increased awareness and professional development (Aghimien et al., 2018). Conversely, only 3.9% of respondents have over 20 years of experience in VM, indicating limited long-term practice, consistent with Ojo et al. (2025) who identified persistent knowledge gaps and barriers to sustained adoption.

The "Always Implement VM" category, with a mean of 4.62 and 41.6% of respondents, shows strong commitment and integration into practice, aligning with Rangelova and Trakova (2017), who emphasized the benefits of consistent VM application. Conversely, 13.0% of respondents have never implemented VM, highlighting a persistent minority facing barriers such as communication gaps, misconceptions, and lack of expertise (Ojo et al., 2025). This polarization reveals that while VM adoption is increasing, widespread and sustained implementation remains a challenge. The findings imply that targeted interventions—such as awareness, training, and

policy support—are needed to convert non-adopters into active practitioners. As Ojo et al. (2025) recommend, addressing misconceptions, building practical expertise, and promoting client commitment are essential steps toward broader adoption.

Table 6: Factors Preventing Value Management Implementation

Variable Category	Sub-Category	Frequency (N)	Percent (%)	Cumulative %	Mean Score (P)	Standard Deviation	Rank
Barriers	Inadequate knowledge of value management and how it is conducted	40	52.0	52.0	0.5195	0.0568	1st
	Fear of recouping the money spent on value management	13	17.0	69.0	0.1688	0.0426	2nd
	Refusal of client to give consent	10	13.0	82.0	0.1299	0.0383	3rd
	Lack of financial resources	7	9.0	91.0	0.0909	0.0328	4th
	All of the above	7	9.0	91.0	0.0909	0.0328	4th

Table 6 displays data on factors preventing the implementation of Value Management (VM). The most significant barrier, with 52.0% of respondents, is inadequate knowledge of VM and its procedures, with a mean score of 0.5195. The second barrier is fear of recouping the money spent on VM, reported by 17.0%, with a mean score of 0.1688. The third is refusal of client consent, at 13.0%, with a mean score of 0.1299. The fourth is lack of financial resources, at 9.0%, with a mean score of 0.0909. The same percentage (9.0%) of respondents selected "All of the above.

The most significant obstacle is "inadequate knowledge of VM and how it is conducted," with a mean score of 0.5195 and 52.0% of respondents citing it as a major issue. This consensus reflects that, despite some awareness, many professionals lack practical understanding of VM processes, aligning with studies by Thneibat and Al-Tamimi, (2022) who emphasized knowledge gaps as primary barriers. Contrarily, "lack of financial resources" was rated as a minor barrier, with only 9% of respondents indicating it (mean score 0.0909). This suggests that financial constraints are less critical than knowledge deficits for VM adoption in Bauchi, consistent with earlier findings by Aghimien et al. (2018), who found that cost-related issues are less significant than awareness and training barriers.

Other notable barriers include "fear of recouping costs" (mean = 0.173, 17%) and "client refusal" (mean = 0.130, 13%), highlighting concerns about the return on investment and stakeholder cooperation. These findings underscore the importance of providing empirical evidence of VM's cost-benefit advantages (Pittl, Mach & Schikuta, 2025) and engaging clients through education

campaigns (Rwamuhinda, 2024). Overall, the hierarchy of barriers indicates that knowledge and capacity-building are critical to advancing VM adoption. Addressing these gaps via targeted training, demonstrations of benefits, and client engagement is essential for overcoming the primary challenges and fostering wider implementation in the Nigerian construction sector

5. CONCLUSION

This study concludes that Value Management (VM) is economically beneficial for MSMCEs in Bauchi, Nigeria, with benefits surpassing implementation costs. High awareness and active practice of VM among professionals indicate strong adoption levels, which are associated with higher business turnover. Regression analysis confirmed that awareness significantly influences VM adoption, and firms implementing VM experience better project value and lifecycle performance. The primary barrier to full adoption is inadequate knowledge of VM processes, while financial constraints are less significant. The findings recommend increasing awareness through seminars, workshops, and curriculum integration, along with practical training programs to bridge knowledge gaps. Client education is also essential to garner stakeholder support, ultimately promoting wider VM adoption to enhance business success and project outcomes.

6. RECOMMENDATIONS

Based on the findings of this study, it is recommended that professional bodies such as NIOB, NIA, NIQS, NIESV, and NITP should intensify awareness campaigns through seminars, workshops, conferences, and continuing professional development programmes targeted at professionals with limited or no awareness of Value Management to bridge the knowledge gap and ensure industry-wide familiarity with VM principles and benefits. Government agencies and professional bodies should develop and implement policies that mandate or incentivize the adoption of Value Management in construction projects, particularly for MSMCEs, through preferential consideration in contract awards, tax incentives, or inclusion as a prerequisite for project registration and approval. Also, professional bodies should strategically invest in awareness creation as a primary driver of adoption, recognizing that increased awareness significantly predicts higher adoption rates, and should therefore allocate resources to comprehensive VM education and training programmes that translate awareness into practical implementation.

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