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SYSTEMATIC REVIEW

Value Management Practices in Construction Industry: An Analytical Review

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Abstract:

Background:

Every building project needs a plan for it to optimize value and minimize cost for better profitability. Currently, in the construction industry around the world, not all stakeholders are aware of value management and its benefits.

Aim:

This review aims to explore the awareness level of value management among all players in the construction industries. Also, to raise dust on the significance of applying value management within the construction workplace.

Objective:

The objective was explored using research and review papers from 30 studies for 18-years (2000-2018).

Methods:

Value management is essential at the briefing stage, specifically in the contractor's health and safety performance, the design process, cost and quality, contract strategy, and performance of time.

Results:

Results indicated that the level of awareness and implementation of value management varies from region to region and country to country. Some implementation barriers include lack of knowledge and awareness, no standard method of problem-solving, lack of value management practices by contractors, the concept is new in many regions, contractors not willing to implement VM fully during projects, and lack of qualified personnel to adopt VM. From this review, some of the benefits of adopting VM include maximizing productivity, better sustainability, and expected targets achieved within a reasonable time.

Conclusion:

In conclusion, the construction industry needs to put forth efforts to maximize the awareness and applications of value management to enhance project outcomes. The study is valuable for all the value management professionals involved with construction, in general, to try and incorporate it into their work ethics for better productivity.

Keywords: Awareness, Application, Systematic literature review, Value management. Maximizing productivity, Construction industry.

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1. INTRODUCTION

The growth of economic sectors within a country depends on the significant contribution of the construction industry. This industry is responsible for physical and infrastructure development that includes the building of roads, bridges, tow-

ers, as well as residential houses. Every sector, somehow, needs the construction industry to provide an area for different operations [1]. For instance, the construction industry operates the building of company offices, premises, and factories.

It also escalates the GDP of a country where the global construction projects in 2017 reached a figure of \$17140 billion, and forecast an expected increase to \$15.5 trillion by 2030 [2]. The overall construction project is expected to increase at an average percentage of 4.3%. These figures

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increase stresses on the integration of value management practices, which reinforces innovation, novelty as well as advancement into the existing construction practices [3]. Though the concept has existed for over a century, its application has remained confined. Luvara, & Mwemezi [4] stated its successful application among US public construction projects. The application of the value management function has proven to be useful to attain the construction objectives, *i.e.*, to enhance the project design, construction, along with cost-effectiveness [5].

Value management is a structured analytical process, which tends to develop innovative holistic solutions for intricate issues [6]. It aims for the best value through a wide range of design and construction processes to fulfill the perceived needs of its clients [1]. The functions of value management ensure that projects achieved by construction companies attain the value for their products without ignoring their clients' needs. It also resolves the associated constraints on expenditure as well as a restriction for mitigating the additional cost while sustaining the project quality as well as reliability [7]. Recent work by Noor *et al.* [8] demonstrated the effectiveness of value management in the decision making of construction industry agents.

Application of value management is not satisfactory in most of the regions, even though value management in terms of planning, cost management, conflict management, and dispute resolution has been in the construction industry for a long time. Moreover, a lack of awareness regarding value management is a significant reason for the failure of applying value management within the construction industry [9]. The main aim of implementing value management is to provide all necessary functions to the industry at the lowest cost, which is consistent

with the required levels of product quality and performance of the industry. Ong [10] stated that developed countries like UK, USA, Australia widely practice value management; whereas, countries like Saudi Arabia and Malaysia lacked the practice of value management due to lack of awareness of its existence and various applications.

The level of awareness among employees of the construction industry remains unidentified, and the implementation of value management by the construction companies was still at an elementary stage [11]. Moreover, the stakeholders need to analyze the level of acceptance and impact of value management as they are exposed to buildability and fast technology changes. Value management mainly focuses on the functioning and value of money; rather than a reduction in the overall cost [1]. It proceeds in an innovative way to collaborate and achieve the needs of clients and stakeholders. Therefore, the present study reviewed and analyzed the level of awareness of value management practices in the construction industry globally.

2. RESEARCH METHODS

This study systematically reviewed the significance of value management in the construction industry based on the level of awareness and its application to attain the above objectives research studies, including review articles, original articles, cross-sectional studies, case studies, and field studies, which discusses the level of awareness and application of value management in construction industries globally, fulfilling the inclusion criteria for the selection of studies. Also, studies conducted between the period of 2000-2018 were considered. However, studies were excluded based on abstract inappropriate or incomplete findings, literature reviews, and duplications.

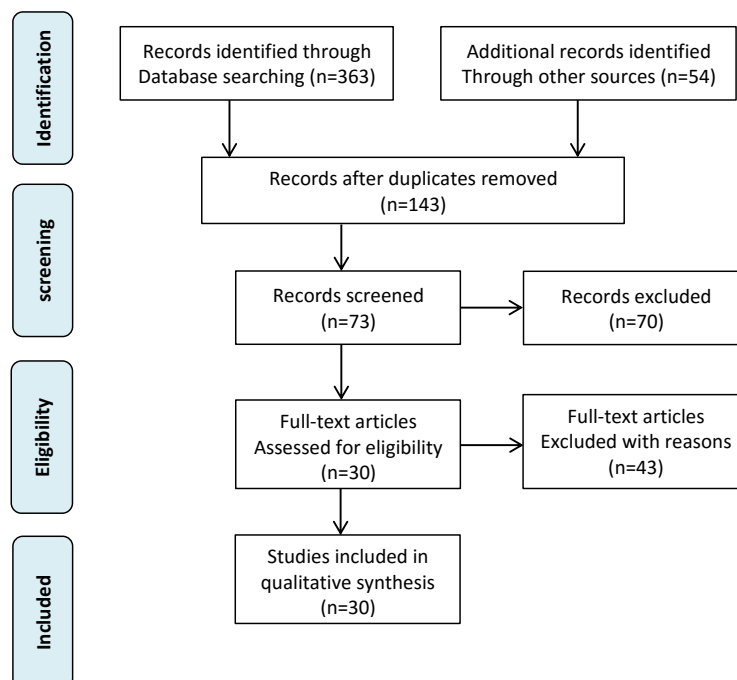


Fig. (1). The search strategy of a systematic review.

Several databases and information sources were used to identify and collect articles, which resulted in the provision of a different number of articles. For instance, Google Scholar (254 articles), EBSCO (16 articles), ScienceDirect (12 articles), Emerald (23 articles), JSTOR (34 articles), Semantic Scholar (15 articles), and Scopus (9 articles) were used to collect the articles (Fig. 1). All the studies were collected within two weeks, from 21st February to 5th March 2018. The search process on databases was performed using different keywords, like, Value management, challenges, barriers, implementation, importance, OR construction industry.

3. ANALYSIS OF RESULTS

A total of 30 studies was included in this systematic literature review for exploring the level of awareness and application of value management during the period 2000-2018. The classification of these studies is held on a random basis, as shown in Fig. (2).

A comprehensive review of studies has been presented in Table 1, shedding the crucial elements in terms of awareness level and application adoption in the construction industry.

Value management has been a growing paradigm around the world that is responsible for concentrating continuous improvement of value that is developed by the customers [29]. Commonly it is developed and acknowledged similar to an important device, which is capable of controlling the development task [38]. There is a lot of variation in application of value management and results are obtained to the time within resolution procedure. It helps in the identification of innovative techniques and develops strategies to meet service requirements [9]. At the initial phase, a project can be considered as a

successful one if it tends to meet the identified goals and objectives, and achieve its technical performance. The technical performance needs to be achieved according to the planned schedule and agreed costs [39].

Keng and Shahdan [32] investigated the level of awareness regarding value management among construction practitioners. The results showed a low level of awareness among the key players in the construction industry of Malaysia. Although the key workers in the construction industry tend to apply the concepts of value management in construction projects, their application is not intensive. Therefore, great efforts are needed to enhance the level of application of value management in the construction industry [32]. Value management is likely to be earned through a method that quantifies the technical performance of an ongoing project and also monitors the physical project progress [40]. It is also necessary to identify factors that hinder the application of value management in the construction industry.

Kim *et al.* [9] identified the hindering factors that would help the practitioners in assessing barriers in the application of value management. The study has applied a factor analysis method to investigate the correlation impact of those factors. The results depicted four critical components that represent hindrance factors. The components include [9];

- Lack of qualified personnel implementing value management
- Inheriting difficulties in the workshop of value management
- Lack of value management application documents
- Low level of awareness regarding the existence of value management

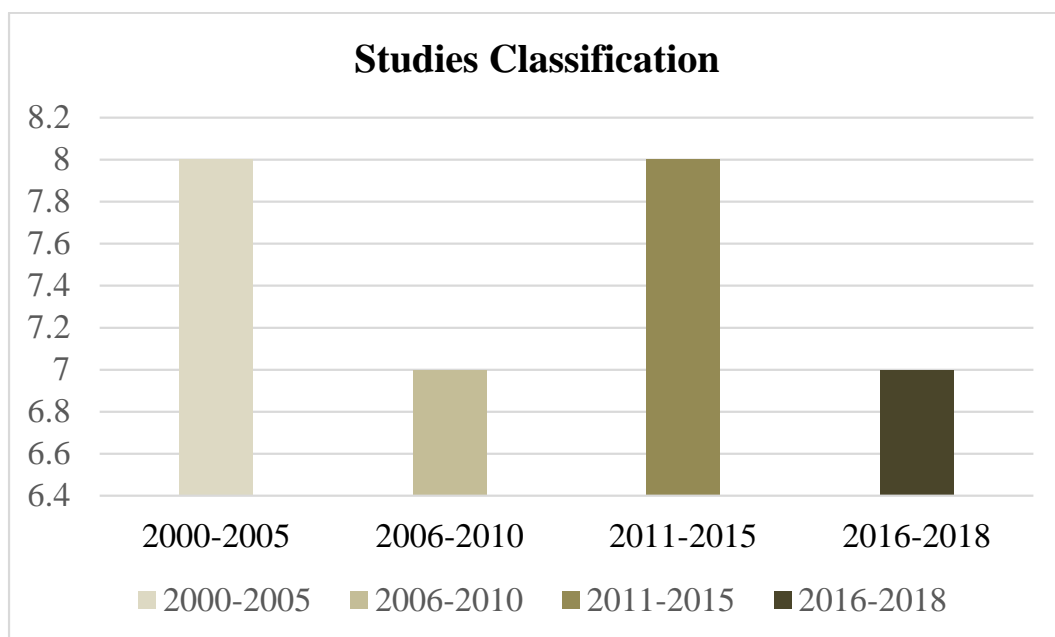


Fig. (2). Studies classification.

Table 1. Studies indicating level of awareness and application of value management.

Years	Study	Method	Findings	Implications
2000-2005	Hiley & Gopsill [12]	Case study: Postal questionnaires	Significant barriers identified regarding the implementation of value management in the UK construction industry with the lack of education serving as the core hurdle behind the implementation of value management.	The study shows there is an awareness of value management benefits; however, its potential is not entirely in practice within the industry.
	Thomson & Austin [13]	Systematic literature review	The findings have indicated that there is a need to establish methods of problem-solving processes for all designers in the supply chains to tackle value delivery and the appropriateness of the value-adding toolbox.	The study is of particular significance that a shared understanding of values should be developed within project progression and endowing an objective and framework for construction projects.
	Mat & CVM [14]	Systematic literature review	The consideration of complex interrelationships is allowed by the system based functional analysis of value management.	The findings are of significance for managers and constructors in distilling or focusing preferences or objectives and in developing alternative solutions.
	Al-Hajj & Rizkallah [15]	Systematic literature review	There is a very insufficient extent of practitioners regarding the awareness and application of value management in construction projects for better performance and achieving construction outcomes.	Willingness is vital among contractors and stakeholders to enhance value management practices for stimulating finding from the survey the future of the industry.
	Al Freidi [16]	Systematic review approach	The application of value management is based on project manager risk management, policy and technical project management, project planning, solution sustainability, monitoring and communications, and internal and external project management.	The study is of particular significance to the outstanding, familiar, and average construction projects.
	Perera & Karunasena [17]	Literature Review, Pilot survey, case studies.	The current study indicated time, cost, and quality of work as the significant indicators of value management. Also, the concept of VM is relatively new in Colombo	The study highlighted the useful outcomes where VM is successful in improving the structures of site management, reduced waste, and improve project outcomes.
	Daddow, Therese & Skitmore [18]	Interview survey approach	The findings indicated a 33% acceptance level of value management among construction workers in Brisbane and Sydney.	The study is of particular significance to the contribution, identification, and management of value management of the risks associated with the project delivery.
	Abidin [19]	Case study	The findings have shown immense awareness of value management in construction projects.	The implications reveal the foundation of new construction thinking as sustainability enhances the provision of the services to fulfill the increasing demand for better quality and value.
2006-2010	Perera, Clifford [20, 21]	Systematic literature review	The findings have shown a significant benefit of partnering, risk management, and value management on project teams. These features have extensively reduced the team inputs and maximize the gains.	Value management and risk management approaches can be used to improve processes that have been traditionally used in waste through non-value adding activities.
	Noor, Kamruzzaman & Ghaffar [8]	Field study	The study found that participants have a moderate level of knowledge concerning the value management concept (48%), and approach (52%), sustainability issue (48%) and design (50%). Besides, Malaysian construction projects lack awareness regarding the benefits of value management.	The integration of value management practice in buildings projects to ensure better sustainability involvement in current government practice is encouraged.
	Jaapar <i>et al.</i> [11]	Questionnaire survey approach	Revealed that evolution in value management affects the construction projects of the Malaysian industry. However, 51% of the respondents indicated that they are not practicing value management methods within the construction industry.	The construction industry should ensure the implementation of value management to have better involvement in the projects.

(Table 1) contd....

Years	Study	Method	Findings	Implications
	Abidin [22]	Questionnaire survey approach	The findings indicated that contractors were aware of the value management techniques; still, the management of sustainability practices is recorded at 43% in Malaysia.	The study is of significant benefit and requires more effort of contractors to implement value management and encourage actions and strategies toward a sustainable environment.
	Coetzee [23]	Case studies	The study indicated that value management is not a well-developed concept in South Africa. Construction engineers are not much concerned about value management; also, the curriculum of South African universities lack in providing relevant knowledge regarding the given concept.	The significance of this study provides appropriate attention to the contractors and stakeholders associated with the construction industry.
	Al-Yami [24]	Postal questionnaires	The findings have indicated that there is no experience of contractors and stakeholders in the construction industry regarding sustainable construction principles.	The study has emphasized that value management could be of significant potential to promote and establish sustainable principles and to enhance awareness within the construction industry.
	Kolo & Ibrahim [25]	Theoretical approach	Lack of knowledge, complex internal relationships, lack of correct decision-making practices are some of the leading indicators of value management in the Nigerian Construction industry.	The study can improve the decision-making process in the construction industry.
	Perera, Hayles & Kerlin [26]	Mixed-Method Approach: Survey results and 3 case studies	Findings indicated that in Northern Ireland's construction industry, value management serves to satisfy consumer needs and is needed to be implemented at the initial stage of the project.	The study is useful as it outlines the views and perspectives of different professionals about value management.
	Oke & Ogunsemi [27]	Semi-structured interviews	The findings indicated that value management is not completely initiated in the Nigerian construction industry, even though people have a good level of knowledge regarding value management.	The study recommends that construction industry clients and contractors adopt value management on their projects.
2011-2015	Maznan <i>et al.</i> [28]	Semi-structured interviews	Findings highlighted a significant lack of knowledge among the workers of the Malaysian construction industry. However, lack of understanding and knowledge on value management were the main reasons for the skeptical and negative perceptions of contractors toward value management.	The study has recommended undertaking the acceptance of value management in the construction industry for successful project outcomes.
	Othman [29]	Questionnaire survey technique	The findings showed that value management is vital at the briefing stage, specifically in the contractor health and safety performance, the design process, cost and quality, contract strategy, and performance of time in the Malaysian construction industry.	It indicates that incorporating these management tools gives a more holistic and practical solution to construction problems regarding managerial expertise, financial, and technical resources.
	Whyte & Cammarano [30]	Semi-structured interviews	The findings showed that the concept of value management is well-aware among engineers and stakeholders of Western Australia. Also, employees are aware that value management contributes to cost reduction and increases the project life cycle.	The study recommends that there is a requirement for value management in the construction industry and argues to uptake and utilize the resources of value management.
	Lop <i>et al.</i> [1]	Quantitative study: A Questionnaire survey technique	The findings indicated a positive and a higher level of awareness with the value management issues in the construction industry of the Kelantan state of Malaysia.	The study imposes recommendations to improve the implementation of value management among developers in the Malaysian construction industry.
	Mesbah [31]	Systematic literature review	The findings showed that value management is a practical, structured, and analytical approach procedure that signifies to expand the project values by questioning for specific functions of a project and then reviewing and enhancing them.	The study is of particular significance that allows proper and structured documentation of knowledge and expertise of value management among engineers and designers.

(Table 1) contd.....

Years	Study	Method	Findings	Implications
-	Keng & Shahdan [32]	Questionnaire survey technique	The findings indicated a low awareness level among key players, such as stakeholders and contractors of the Malaysian construction industry. From the overall 33 participants, only a single participant was able to answer the 9 out of 10 questions correctly.	The level of awareness and application should be increased among stakeholders and contractors in the construction industry.
	Lourens [33]	Quantitative study: A questionnaire survey	The study found that only specific techniques of value management were implemented, about 63.1% in the construction industry of South Africa. Also, the adoption of value management is significantly challenging here.	New information should be incorporated in the construction industry for the position of value management adoption.
	Kim, Lee & Nguyen [9]	Questionnaire Survey technique	Findings indicated that lack of awareness, lack of qualified personnel to adopt value management, inherent complexities with value management workshops, and lack of value management application documents are major hindrance factors in the adoption of value management in the construction industry of Vietnam.	The findings can be of particular significance to promote the application of value management in the construction industry.
	Zhao & Moh [34]	Case studies	The application of value management is crucial to achieve the expected targets and to resolve the construction and design challenges in the construction industry of China.	Value management can enhance the construction management and can coordinate construction management and coordination of several existing construction projects.
-	Morad and El-Sayeg [35]	Quantitative research design: a survey method	The findings showed that the construction industry of UAE lacks the successful implementation of value management, as only 47% of the responses indicated that value management is always implemented in their work practices.	The study indicated that the implementation of value management must be encouraged since it highly contributes to controlling project costs.
	Ncube & Rwelamila [36]	Quantitative Study: Research questionnaire	The findings of the study indicated that most of the respondents (93%) have the right level of value management knowledge in the construction industry of Gauteng, South Africa. However, only 53% of organizations currently practice value management in their everyday work.	The study is useful specifically for the Gauteng province of South Africa to improve its construction industry. Adequate knowledge regarding the benefits of VM may improve the work practices of the construction industry.
	Luvira & Mwemezi [4]	Quantitative study: a questionnaire survey	The lack of understanding of value management in the construction industry of Tanzania is found to be the most critical obstacle. However, the lack of trained value managers and the wrong choice of procurement route are other obstacles found in the construction industry.	The study emphasized that efforts should be made to create awareness of value management in the industry and to reinforce contract conditions.
	Ekanayake <i>et al.</i> [37]	Qualitative approach: Semi-structured interviews.	Findings indicated that the implementation of value management is limited in the construction projects of Sri Lanka. Common barriers include a lack of risk-taking ability, lack of expertise, and knowledge.	The potential implication of value management is beneficial once the barriers are mitigated. This would further help in increasing the technical knowledge as well as capital investments in the construction industry.

3.1. Awareness and Application of Value Management (2000-2005)

The awareness and the application of value management have not been much seen during 2000-2005. However, studies in this era have revealed that there were hindrance factors that restrict the application of value management in the construction industry. Similarly, Hiley and Gopsill [12] emphasized that the awareness advantages of value management in the UK, even though its ability throughout the industry has not been actualized. The efficiency of the value management was conducted through a questionnaire which specifically focused on the importance of construction design in value management, value management as a useful design management tool, the correct phase for implementing value management in construction projects, along with the estimates for current practices of value management in the construction industry. The results

of the study indicated cost-effectiveness as a significant benefit behind the implementation of value management.

The study of Daddow *et al.* [18] asserted that the experiences of stakeholders and contractors are essential in contributing to the management and identification of the risks associated with projecting delivery in Australia. Team attributes, competent knowledge, personal acceptance and implementation were the main attributes for individual acceptance of value management.

Thomson and Austin [13] have examined the importance of value-adding tools, allowing project managers enough accurateness to structure design activity associated with the technical design to stakeholder values. The adoption of validation exercises confirms the supporting role of the toolbox as a web-based resource. However, studies conducted in the given duration indicated a significantly low level of knowledge

regarding value management (Al-Hajj & Rizkallah [15]; Daddow, Therese & Skitmore [18]; Perera & Karunasena [17]; Hiley & Gopsill [12]). Besides, significant indicators of value management were time, cost, and quality of work (Perera & Karunasena [21]).

3.2. Awareness and Application of Value Management (2006-2010)

Jaapar *et al.* [41] asserted that evolution in value management affects the construction projects of the Malaysian industry. The construction industry should ensure the implementation of value management to have better involvement in the projects. Similarly, Abidin [22] indicated that contractors were aware of the value management techniques, and they have put forth little efforts to implement in the construction industries. Coetzee [23] has asserted that the value management's benefits and costs summed up alongside each other, and the significance of value management is to be integrated into the curriculum of courses associated with the environmental industry. Research study by Al-Yami [24] is one of the influential studies showing immense awareness of value management in the construction industry. The research findings have emphasized that value management could be of significant potential to promote and establish sustainable principles and to enhance awareness within the construction industry.

The given studies indicated that the concept of value management had not been practiced fully (Jaapar *et al.* [41]; Abidin [22]; Coetzee [23]; Noor, Kamruzzaman & Ghaffar [8]), though employees were aware of the benefits associated to value management. However, the common indicators include; knowledge, complex internal relationships, lack of correct decision-making practices [25] that reflect the need for implementing value management practices.

3.3. Awareness and Application of Value Management (2011-2015)

The lack of knowledge regarding the value management among different employees of the construction industry is still significant. However, perceptions of contractors towards value management were granted significant value in the overall implementation [28]. Keng and Shahdan [32] asserted that the level of awareness and application should be increased among stakeholders and contractors in the construction industry. Mesbah [31] demonstrated that value management was an active, structured, and analytical approach procedure that signifies to expand the project values by questioning for specific functions of a project and then reviewing and enhancing them. Othman [29] argued that value management was necessary at the briefing stage, specifically in the contractor's health and safety performance, the design process, cost and quality, contract strategy, and performance of time.

The substantial awareness of value management is reported in the study of Hamid *et al.* [42] in the Malaysian industry. The study presented an integrated model of value management, where different components of value engineering, risk management, and partnering were assimilated together. It also stated that the integration of these components assists in the

provisioning of productive outcomes, which not only improve the cost-effectiveness but also cater the potential concerns of stakeholders related to the management of the uncertainty and formation of collaborative work practices.

Whyte and Cammarano [30] demonstrated that the concept of value management was well-aware among engineers and stakeholders. The benefits of value management have entirely addressed the issues of project life-cycle. Karim *et al.* [43] have developed the value management maturity model based on five levels of maturity, including awareness, repeatable, defined, managed, and optimized. The research findings argued the importance of value management by identifying awareness, knowledge, and benefits among employees. It was critically assessed that the level of awareness among employees was moderate regarding the practices of value management in the construction industry. It clearly shows the need for an emphasis on value management in the context of the awareness level of employees within the construction industry. The implementation of value management in the construction industry is to appraise the success of maturity levels, based on the standards and capability.

Yong and Mustaffa [44] found that low application of value management was due to the associated human factors, which could enhance its application practices as well as project success ratio. The research stated effective leadership and team members as the primary catalyst, which could reinforce the strategic vision of the company and paved the path for the collaborative efforts for improving communication. Aghimien and Oke [45] examined the impact of value management practice on building projects. The study asserted that the implementation of value management in construction projects was essential to enhance value for sponsors, project clients, and owners. In particular, process and workmen time, and cost reduction were two crucial benefits of value management.

Five hindering blocks are also demonstrated in the research of Fard *et al.*, [46], which impact the application of value management in the construction industry. The research highlighted negative attitude and habitual thinking, outdated criteria and specifications, the absence of local guidelines and information, lack of knowledge and practices, and alterations in the requirement of the client or owner as of the significant source of a hindrance, which could lead to its increased application. Whereas, in the context of the Nigerian industry, Aduze [47] listed a lack of governmental regulation, negative client reception, and deficiency of value management as the impeding factors for its application. Further, Akpan *et al.* [48], to value management, asserted inadequate knowledge, and non-execution of the construction principles as the primary source, which results in delays cost overrun and abandonment in the construction projects.

Considering the studies listed in Table 1 above, the leading indicators of value management include the health and safety of contractors, cost and quality controls, contract strategy, consumer satisfaction. (Perera, Hayles & Kerlin [26]; Othman [29]; Whyte & Cammarano [30]). The overall findings of the studies are consistent in indicating that the main obstacle behind the low implementation of value management is the lack of knowledge and awareness among different employees

working in the construction industry (Maznan *et al.* [28]; Keng & Shahdan [32]; Oke & Ogunsemi [27],).

3.4. Awareness and Application of Value Management (2016-2018)

Luvara & Mwemezi [2004] emphasized that efforts should be made to create awareness of value management in the industry and to reinforce contract conditions. Kim *et al.* [9] indicated that lack of awareness, lack of qualified personnel to adopt value management, inherent complexities with value management workshops, and lack of value management application documents were major hindrance factors. Also, the lack of emphasis on the application of the value management principles by the state itself was recognized as the source resulting in poor performance of the Nigerian construction projects. Rane and Attarde [49] focused on new approaches, materials, and methods implemented in the construction industry in terms of process, cost, time, feasibility, and quality. The study presented that the required functions in the construction industry were focused mostly on value engineering. Value management assists in reducing or mitigating time, unnecessary cost, and wastage of material, enhancing customer values.

Dandage *et al.* [50] highlighted that a lack of support from the top management, inadequate training, and ineffective address on the cultural difference were the factors, which made the value management application difficult. Whereas, Hatem *et al.* [51] stated the lack of input, poor knowledge of its benefit as well as resistance to changing dynamics as the stimulators for hindering the application of value management. Similarly, the findings by Durdyev *et al.* [52] highlighted that the application of the value management suffered from poor adoption capabilities of the construction professions, lack of expertise, and ineffectiveness towards the application of the new sustainable technologies.

Studies conducted between 2016-2018 provided some additional barriers to the implementation of value management. These factors include; lack of risk-taking ability, lack of knowledge and expertise, lack of qualified personnel to adopt value management, implementation of limited value management strategies, and lack of trained value managers, which create obstacles in the successful implementation of value management process (Ekanayake *et al.* 2018; Morad and El-Sayeg [36]; Kim, Lee & Nguyen [9],).

4. IMPLICATIONS

Based on the findings of literary studies, the study suggests conducting workshops and seminars, which can help enrich the knowledge of the practitioners, improving awareness, and foster a positive impact on the construction industry projects. The effective value management practices are suggested to improve the cost and time effectiveness based on the timely decisions made. Moreover, the study also suggests introducing value management undergraduate programs with the universities, which offer engineering and construction-related courses. Besides, the research also recommends the integration of the clause within the construction projects which promote the value-based practices. The inclusion of the clause promotes the

contractors to bring positive changes in their practices, which not only save cost but also improves collaborative actions. This will reinforce the idea that all the project members play a substantial role in the achievement of its objective and emphasizing the need to share their ideas for escalating the overall project output. Also, recruiting competent value managers is suggested.

CONCLUSION

The research findings identified the level of awareness among the construction industry regarding value management practices. A holistic, systematic review analysis stated the findings of previous studies to investigate the level of awareness towards value management practice. The findings suggested that the inclusion of effective value management programs will assist in improving the construction of professional knowledge. From an academic perspective, the study has provided substantial insights into its impeding factors and general practices, which affect its application. Inadequate knowledge is recognized as a major factor. The level of awareness in the construction industries was average; however, they face specific barriers for its implementation. The study contributes by implying that an education program for the engineering and construction projects needs to integrate with value management aspects for improving the project managers and stakeholder management in construction. Future studies need to be conducted on the evaluation of barriers and several facilitating factors to implement and practice value management within the construction industry.

Research study limitations include a holistic approach to value management awareness and its application throughout the construction industry. Future studies may include more variables and concentrate on a particular region for understanding its practices and overcoming any hindering factors for construction project value management. Different research approaches can further be implemented, such as quantitative, which can provide more valuable results. Moreover, the perspective of the construction industry personnel' can also be evaluated, which can provide more meaningful insights on the application difficulties faced on-site and expanding the knowledge horizon of the construction industry value management. The study is valuable for all the value management professionals involved with construction in general.

CONSENT FOR PUBLICATION

Not applicable.

STANDARDS OF REPORTING

PRISMA Guideline and methodology were followed.

FUNDING

None.

CONFLICT OF INTEREST

The author declares no conflict of interest, financial or otherwise.

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