DEVELOPING A VALUE ENGINEERING MODEL FOR A STATE-OWNED ENTERPRISE

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ABSTRACT

In this study, a value engineering model for state-owned enterprises was developed using a mixed-method approach, focusing on a South African state-owned enterprise. Key findings highlighted that strong management support, a supportive value engineering culture, an effective value engineering methodology, and an efficient value engineering team are vital enablers for successful value engineering implementation in state-owned enterprises. The study further emphasised the importance of recognising differences between state-owned enterprises and private organisations, as they require tailored value engineering approaches. In addition, the research explored factors influencing value engineering success, identified state-owned enterprise specific barriers, and provided recommendations. These findings offer unique insights into state-owned enterprises, aiding decision-makers, managers, and practitioners. Applying the model and recommendations can enhance state-owned enterprise performance, efficiency, and value realisation.

OPSOMMING

In hierdie studie is 'n waarde-ingenieursmodel vir Suid Afrikaanse ondernemings in staatsbesit ontwikkel met behulp van 'n gemengde-metode benadering. Sleutelbevindinge het beklemtoon dat sterk bestuursondersteuning, 'n ondersteunende waarde-ingenieurskultuur, 'n effektiewe waarde-ingenieursmetodologie, en 'n effektiewe waarde-ingenieursspan noodsaaklike bemagtigers is vir suksesvolle waarde-ingenieurs in staatsondernemings. Die studie het verder die belangrikheid van die erkenning van verskille tussen staatsowerhede en private organisasies beklemtoon, aangesien hulle op maatgemaakte waarde-ingenieursbenaderings vereis. Daarbenewens het die navorsing faktore wat die sukses van waarde-ingenieurswese beïnvloed, ondersoek, staatsondernemings spesifieke struikelblokke geïdentifiseer, en aanbevelings verskaf. Hierdie bevindinge bied unieke insigte in staatsondernemings wat besluitnemers, bestuurders, en praktisyns kan help. Die toepassing van die model en aanbevelings kan die prestasie, doeltreffendheid, waarde-realisering van staatsondernemings verbeter.

1.   INTRODUCTION

Value engineering (VE), also called value analysis (VA) or value management (VM), is applied by a multi-disciplinary team to improve the value of a commodity through the analysis of its functions [25]. VE is a systematic approach by a competent team that analyses and evaluates the functions of an item or commodity to achieve maximum benefit [23]. The VE process starts with an understanding of the function of a system or product [25]. The function is defined as the product's or system's intended purpose [25]. The team then analyses the product or system to identify ways to enhance its function or performance while reducing its costs [21]. This involves examining the design, materials, production processes, and end-user needs to identify opportunities for improvement [23]. By using the VE approach, organisations can create products and services that meet or exceed customer needs and expectations while maximising the use of available resources [12]. This approach can be applied to any product, service, or process, and can

be used in any industry [12]. In fact, many organisations use VE to improve their operations and to gain a competitive advantage in the marketplace [11].

The situation that arises however, is that VE in state-owned enterprises (SOEs) is being implemented in ways similar to those in profit organisations, but without incorporating the important supporting elements that are applicable to not-for-profit organisations, such as SOEs. A not-for-profit organisation is one that does not exist for the sole purpose of making a profit [16]. Not-for-profit organisations have specific missions that address needs that are not catered for by the business sector, primarily because meeting these needs is not profitable [10, 18, 22]. SOEs are independent entities or organisations that are partially or fully owned by the state [2]. An SOE is an example of an organisation that falls within the not-for-profit category, aiming to support the economy and playing a pivotal role in a country's economic development [16, 28]. Kim *et al*. [13] explain that SOEs have a distinct position and status in a country owing to their unique character. SOEs and profit organisations face different institutional pressures, and so should adapt their business strategies in different ways [19]. SOEs have a dual commercial and developmental mandate to attain various socio-economic goals of the government [24]. The services and infrastructure that they provide have a direct impact on the lives of citizens [13]. The government uses SOEs to produce employment for its citizens and to create wealth in the economy [2]. In contrast, profit organisations focus on creating financial dividends for their shareholders [15], while SOEs have the added responsibility of social effectiveness [2]. It seems, however, that VE is being implemented in a uniform manner, focusing on a theory designed for profit entities without considering their differences. This results in not-for-profit organisations (such as SOEs) not realising the maximum benefit from VE.

VE has been applied worldwide since its inception in the early 1940s [1], with a multitude of studies published on its application, advantages, and role in industry. However, there has been minimal academic material published about VE that focuses on SOEs. Studies in this domain have tended to have a broader focus on the public sector rather than being exclusively dedicated to SOEs, while those centred on SOEs have often included hybrid solutions instead of concentrating solely on VE. Furthermore, limited studies have been conducted on VE and its contributions in South Africa (SA). The findings of Van Zyl [27] revealed that a significant number of capital projects did not achieve their promised potential, as they did not access their hidden value opportunity. Bowen *et al*. [4] agreed, stating that best value was not being reached in the public sector owing to the lack of resources and VE not being sufficiently practised. Coetzee [5] argued that a low awareness of VE as a practice contributes to the non-realisation of benefits. Ncube and Rwelamila [20] similarly identify poor service delivery in the public sector as the non-achievement of best value as a result of the lack of VE. The application of VE is minimal, and has not been embraced by industry or by regulatory bodies [20]. Professionals have also not accepted VE as a knowledge base [20]. Aigbavboa *et al*. [3] maintained that VE has significant benefits and the potential to improve performance. The poor adoption of VE in SA has prevented the country from realising its potential advantages, which could be unlocked through the development of VE models [21]. Studies of VE in SA have primarily focused on the absence of VE practices and on the resulting loss of benefits, with a notable omission of VE in SOEs and their distinctive characteristics, including the absence of supporting elements that are specific to SOEs.

The primary objective of the study was to develop a model for the successful implementation of VE in an SOE. To achieve this goal, it was essential to investigate the inter-relationships between the critical components and enablers of VE within SOEs. By understanding these relationships, the study aimed to provide valuable insights into how SOEs could effectively implement VE to achieve their performance goals. Based on the objectives and the key constructs, it was thus hypothesised:

H1: The components and enablers of VE in an SOE are inter-related. In this regard, the following sub-hypotheses (H1a-h) were examined:

H1a: There is a positive relationship between management support and VE culture.
H1b: There is a positive relationship between management support and VE methodology.
H1c: There is a positive relationship between management support and VE team members.
H1d: There is a positive relationship between management support and reward & recognition.
H1e: There is a positive relationship between value realisation and VE methodology.
H1f: There is a positive relationship between value realisation and reward & recognition.
H1g: There is a positive relationship between value realisation and VE team members.
H1h: There is a positive relationship between value realisation and VE culture.

2. MATERIALS AND METHODS

2.1. Methodology and design

A mixed-method approach using an exploratory sequential design was employed at a selected SOE with the primary objective of developing a model for the successful implementation of VE in SOEs. Qualitative data collection was initially conducted through semi-structured interviews and focus groups with VE specialists and project managers in order to gain insights into VE elements, particularly in the not-for-profit context of SOEs. The themes extracted from this qualitative phase informed the development of a structured quantitative survey aimed at further investigating the relationships of VE components and enablers for successful implementation in SOEs.

2.2. Participants and Instruments

The qualitative phase included three VE specialists and seven project managers from the selected SOE in Gauteng, KwaZulu-Natal, and Western Cape. These participants were selected purposefully for their expertise in VE. In the subsequent quantitative phase, a sample of 220 key decision-makers, spanning various grades in the selected SOE, including executive management in A to junior management in F, was collected from different regions, including Gauteng, Western Cape, Eastern Cape, and KwaZulu-Natal. Sampling was proportionate, and participants were chosen using a simple random sampling technique, ensuring representativeness.

Interviews and questionnaires were the primary data collection tools. The qualitative phase started with a pretested interview schedule consisting of six semi-structured questions. These questions covered topics such as VE project details, organisational benefits, differences between VE in SOEs and private organisations, improvement areas, important elements of VE, and additional insights on VE implementation. The data collected from these interviews were analysed and used to develop a structured questionnaire. The questionnaire encompassed seven sections, focusing on participant demographics, VE experience, distinctions between SOEs and profit entities, VE elements, ratings of VE components, and the ideal time for VE implementation in SOEs. All questions in the questionnaire were measured on a five-point Likert scale.

2.3. Procedure, data collection, and analysis

To enhance data triangulation, the study employed multiple data collection methods, including face-to-face interviews, focus groups, and online surveys. During the qualitative phase, recorded interviews were transcribed, validated against audio recordings, and analysed thematically using NVivo (10) qualitative analysis software. This process identified key themes related to differences between SOEs and profit entities, critical VE elements, the potential value of VE for SOEs, and barriers to VE implementation. In the quantitative phase, 279 participants completed the self-administered online questionnaire, resulting in a 54 per cent response rate. The questionnaire took about 30 minutes to complete.

The research study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. Ethical considerations were taken into account, and ethical clearance with the Management College of South Africa (MANCOSA) Research Ethics Committee was received. Letters of information, together with the background of the study and emphasising voluntary participation, anonymity, confidentiality and assurance that the data collected would only be shared in aggregate format, were sent to all participants. Data from the survey was collected online using Survey Face, with 250 questionnaires deemed usable.

For the quantitative data analysis, the collected data were analysed using the Statistical Package for Social Sciences (SPSS), with structural equation modelling via Amos. These analytical techniques allowed for a deeper understanding of the relationships among VE components and enablers in the SOE context.

3. RESULTS

3.1. Qualitative analysis

The qualitative analysis based on interviews and focused group sessions encompassed several key themes and sub-themes.

3.1.1. Differences between an SOE and a profit entity

Participants emphasised the prevalence of bureaucratic red tape in SOEs, which often results in prolonged and inflexible processes. In addition, participants stressed that financial resources at SOEs are sometimes directed towards solutions that may not be the most cost-effective or optimal choices.

3.1.2. Critical elements of VE

Participants emphasised the significance of benchmarking SOEs with similar industries to maintain VE standards and best practices, while also advocating for the adoption of international VE codes or standards to ensure excellence. Cultivating a VE culture in the organisation was seen as paramount, requiring all stakeholders, including clients, to comprehend and value VE principles. Participants also stressed the importance of a well-structured VE team composed of mature individuals with experience. They highlighted the need for the clear, formal communication of VE processes, systems, and methodologies, emphasising the integration of VE principles into governance processes. To promote a deeper understanding of VE principles and their quantifiable value, it was suggested that individuals throughout the organisation be exposed to VE concepts. In addition, participants recommended training programmes, knowledge repositories, and metrics to measure VE outcomes. Recognising the value of the lessons learned from past projects, participants recommended a database for such insights. Post-implementation VE workshops were deemed essential for capturing valuable post-project insights. Addressing the skills gap in design and execution teams was acknowledged as crucial, with suggestions including peer mentoring and skills transfer from senior to junior resources. Participants also highlighted the need for incentives to reward innovative contributions in order to reinforce a VE culture. Finally, top management support was identified as a pivotal factor in the success of VE initiatives, with participants emphasising the importance of management buy-in and their active involvement in VE workshops.

3.1.3. The extent to which VE adds value to an SOE

Participants reported that VE facilitated cost savings, reduced construction timelines, and optimised resource and material use. It also improved collaboration and integration among stakeholders, enhancing communication and cooperation. Importantly, VE maintained or improved product and service quality, indicating its potential to enhance overall SOE performance. Participants emphasised that VE had been effectively applied in some SOE projects, ensuring cost-effective solutions while maintaining or improving product and service quality, thus suggesting that VE implementation had the potential to enhance overall performance in SOEs.

3.1.4. Barriers to implementation of VE in SOEs

Participants noted that VE was often perceived as a cost-cutting tool rather than as a value-driven approach. While a VE policy existed, transparent and formal methodologies were lacking. Although there was some leadership commitment to VE, strong support and sponsorship from executive management was perceived as inadequate. VE initiatives and innovative solutions often went unrecognised, and there were no incentives for VE teams. Participants highlighted a resistance to adopting new technology, and indicated the use of costly materials in SOEs that led to inefficiencies. VE was not integrated early enough in project lifecycles, and ad hoc approaches were common. Compliance-driven VE workshops hindered a genuine understanding and appreciation of value. Participants also stressed that many team members lacked VE experience and skills, making effective implementation difficult.

3.2. Quantitative Analysis

The SOE selected for the survey consisted mostly of male (74%) employees, and a significant number of black employees (61%) and those aged 24 to 55 (92%). The educational level was high, with all participants having completed high school and 67% having Bachelor's degrees. The majority were at level F (60%), were experienced in the organisation (91%), had prior private sector experience (64%), and had over three years of VE experience (56%). The quantitative analysis had several secondary objectives, detailed below.

3.2.1. Differences in the approach to VE between an SOE and a profit entity

The quantitative data revealed a prevailing sense of dissatisfaction among respondents with the organisation's ability to adapt its work methods (94%), its flexibility in policy and procedure implementation (92%), higher bureaucracy levels (95%), and many project lifecycle procedures (90%). These findings validated and reinforced earlier qualitative insights that highlighted similar problems. Notably, the quantitative data aligned with the qualitative findings, establishing a consistent pattern of perception among the participants.

3.2.2. The essential VE elements for the successful implementation of VE at SOEs

Structural equation modelling (SEM) was employed to develop a model with the essential VE elements for an SOE, based on the survey results. SEM offers a rigorous analytical approach to understanding the underlying structure of VE elements and how they interact with one another. The measurement model shown in Figure 1 was constructed and tested for fitness, based on the most acceptable fit statistics.
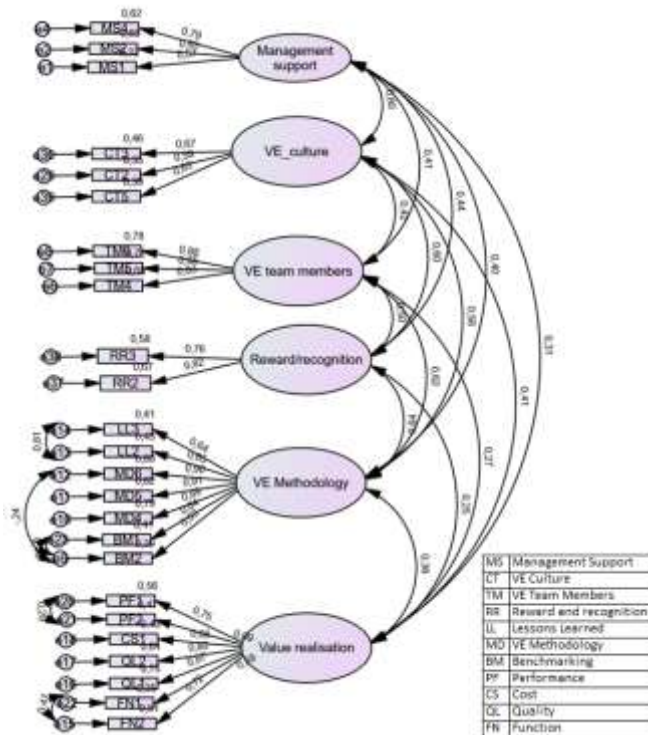

Figure 1: SEM measurement model

A good model fit is accepted if the value of the CMIN/df is < 5 [17] and if the goodness of fit (DFI) indices, the Tucker and Lewis index (TLI), and the confirmatory fit index (CFI) are all > 0.9 [8]. In addition, an adequate fit model is acceptable if the standardised root mean square residue (RMR) is below 0.08 and the root mean square error approximation (RMSEA) is between 0.05 and 0.08 [9]. For the model, the fit indices were within acceptable ranges: CMIN/df=2.071, GFI=0.86, TLI=0.916, CFI=0.929, SRMR=0.0595, and RMSEA=0.066. Apart from the GFI being below 0.9, all of the fit indices were within acceptable ranges.

Construct reliability was verified, as all values of CR were > 0.7, except for culture [9]. The factor loading scores for all variables ranged from 0.56 to 0.9, as shown in Table 1. While factor loadings above 0.7 are better, the average variance extracted (AVE) values were all above 0.5, and composite reliability (CR) > AVE for all constructs, thus verifying convergent validity. According to Kline [14], discriminant validity is assessed by calculating the heterotrait-monotrait ratio of correlations (HTMT). Values under 0.85 indicate that discriminant validity is established. In Table 2, the HTMT values across pairwise constructs are all below 0.85, the maximum being 0.81 between management support and culture. Thus discriminant validity was verified.

Given that the measurement model fit was adequate, the structural model could be implemented and the hypothesis tested. To determine the nature of the variables, the CR for all interactions other than (f) and (g) were greater than 1.96 and $p<0.05$, confirming that all covariances other than (f) and (g) were significant [26]. The Pearson product-moment correlation coefficient (PPMCC) is a standard measure to gauge the relationship strength between variables, ranging from -1 to +1 [7]. Correlation significance should be evaluated according to its strength, where 0.10, 0.30, and 0.50 are labelled as 'small', 'medium', and 'large' correlations in behavioural science [6].

Table 1: Model fit statistics

			Standardised estimates	Unstandardised estimates	SE	CR	P-value	Outcome
a) culture	<--	management support	0.879	0.884	0.135	6.552	***	Relationship
b) methodology	<--	management support	0.594	0.647	0.108	6.003	***	Relationship
c) team members	<--	management support	0.545	0.828	0.134	6.181	***	Relationship
d) reward/ recognition	<--	management support	0.628	0.781	0.124	6.319	***	Relationship
e) value realisation	<--	methodology	0.199	0.234	0.097	2.409	0.016	Relationship
f) value realisation	<--	reward/ recognition	-0.075	-0.077	0.098	-0.791	0.429	No relationship
g) value realisation	<--	team members	0.034	0.029	0.067	0.427	0.669	No relationship
h) value realisation	<--	culture	0.33	0.42	0.157	2.678	0.007	Relationship

Notes: Model fit statistics (X^2 = 646.1, df = 262; CFI = 0.90, ILI = 0.901, RMSEA = 0.07, SRMR=0.09).

Table 2: Heterotrait-monotrait ratio of correlations (HTMT)

HTMT					
	Team members	Management support	Recognition and reward	Value realisation	Culture
Methodology	0.63	0.45	0.66	0.39	0.62
Team members		0.42	0.50	0.27	0.42
Management support			0.46	0.52	0.81
Recognition/reward				0.30	0.60
Value realisation					0.48

The result from the analyses indicated a very strongly positive relationship between the elements of management support and VE culture, with a coefficient of 0.879, as shown in Table 1. The second strongest relationship was between the elements of management support and reward and recognition, with a correlation coefficient of 0.628. However, there was no statistically significant relationship between

reward/recognition and value realisation, nor between team members and value realisation. Conversely, the elements of methodology and culture were positively correlated with value realisation.

The structural equation model in Figure 2 indicated the variables linkages and relationships for a VE model for SOEs. The linkages showed that the VE team members and reward and recognition variables needed to be strengthened to have a positive impact on management support, which in turn would have an impact on VE culture and VE methodology, leading to value realisation.
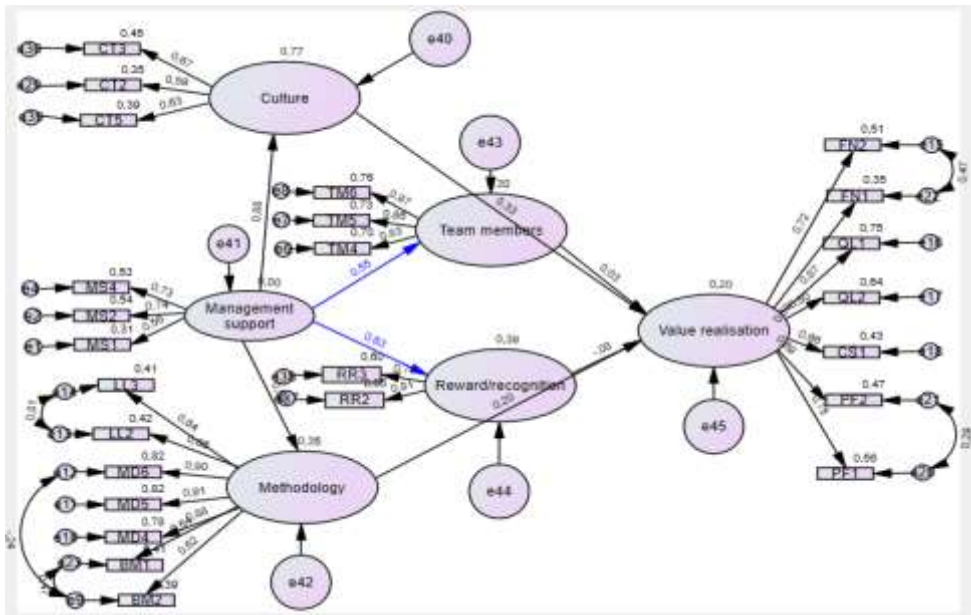

Figure 2: SEM VE model for SOEs

3.2.3. *The extent to which VE implementation could add value to an SOE*

The quantitative data revealed significant consensus among respondents about the positive impact of VE implementation in SOEs. The majority believed that VE plays a crucial role in clarifying stakeholder requirements (92%), prioritising stakeholder needs (92%), enhancing project brief definitions (94%), and verifying project purposes (88%). Moreover, respondents strongly agreed that VE aids in identifying alternative solutions in order to reduce project duration (85%), maintain or improve quality (95%), reduce costs without compromising functionality (98%), and lower both capital and operating costs (94%). VE was also seen as an effective tool for optimising design solutions (93%), finding alternative design approaches (94%), and promoting design innovation in SOEs (90%). Furthermore, VE was perceived as a valuable process for challenging unrealistic project planning assumptions (70%), evaluating project selection criteria (66%), identifying major constraints and risks (67%), improving teamwork and communication among stakeholders (78%), and implementing lean management principles by eliminating non-value-adding materials, deliverables, and processes (91%). These findings aligned closely with the earlier qualitative insights, indicating a consistent pattern of belief among participants and reinforcing the notion that VE can indeed provide substantial value to SOEs.

3.2.4. *Barriers to a successful VE implementation strategy in an SOE*

The quantitative data unveiled a clear consensus among respondents about the obstacles to successful VE implementation in SOEs. Notably, the lack of VE training was widely seen as a major hindrance (95%), highlighting the need for skills development in VE. In addition, unsupportive senior management and the absence of a senior manager as a VE champion were perceived as barriers (86%), emphasising the critical role of leadership and advocacy at managerial levels. The lack of VE integration into the project lifecycle process was considered a significant obstacle (88%), underscoring the need to align processes. Moreover, insufficient information for employees to participate in VE workshops and discomfort about expressing concerns or suggestions in these workshops were viewed as barriers (89%), highlighting the importance of open communication. The absence of positive recognition for VE initiatives (83%), a failure to select VE

team members with relevant project knowledge (75%), and a lack of technical expertise in the VE team (76%) were also seen as barriers, emphasising the importance of supportive organisational cultures, appropriate team composition, and recognition systems. Finally, the absence of clear VE policies and guidelines (83%), along with the lack of a VE lessons-learned database (86%), were identified as significant impediments, highlighting the need for formalised procedures and knowledge management in VE initiatives. These quantitative findings corroborated and strengthened the qualitative insights obtained earlier, enhancing the overall credibility of the study, and providing a comprehensive understanding of the barriers to successful VE implementation in SOEs.

3.2.5. *Ideal timing for the implementation of VE in SOEs*

The quantitative data indicated unanimity among respondents about the optimal timing for VE implementation in SOEs for both growth and sustainability projects. In growth projects, respondents believed that the program management phase offered the highest potential for value enhancement, followed by the project management phase, concept stage, and pre-feasibility stage. However, as projects progress to the feasibility, detailed design, and execution stages, the perceived opportunities for value improvement decrease, with the execution stage being the least favourable. Similarly, in sustainability projects, the feasibility stage was viewed as the most opportune time for VE implementation, providing the greatest potential for value enhancement. Conversely, the detailed design stage was seen as offering fewer opportunities for value improvement, while the execution stage was considered the least favourable time. Overall, these findings emphasised the importance of initiating VE early in both project types to maximise value improvement, with decreasing opportunities as projects advance.

4. DISCUSSION

This research aimed to address how VE approaches differ in SOEs and profit entities. The analysis of relevant variables indicated that SOEs face difficulties in adapting their work methods, policies, and procedures to changing circumstances. They also experience higher levels of bureaucracy and many more project lifecycle procedures, differentiating them from the private sector, and suggesting a need for a distinct VE approach for SOEs.

In addition, the research aimed to identify critical elements that would be necessary for successful VE implementation in SOEs. The analysis suggested that these critical elements were VE components such as functionality, quality, cost, and performance, supported by VE enablers such as management support, VE culture, VE methodology, VE teams, and reward and recognition programmes. The analysis, linkages, and associations also revealed that the relationship between value realisation and VE methodology appeared to be weakly positive, indicating that a well-implemented VE methodology could contribute to value realisation. The relationship between value realisation and VE culture was moderately positive, indicating that a strong VE culture could also contribute to value realisation. While the effective size was relatively small, it still suggested that employing a systematic and structured approach to VE could have a positive impact on achieving value realisation goals in SOEs. On the other hand, the relationships between value realisation and reward and recognition, as well as between value realisation and VE team members, did not show significant associations. VE culture and management support demonstrated a strongly positive relationship. This indicated that, when there is a supportive organisational culture that embraces VE practices, and management actively promotes and encourages them, it leads to better outcomes in respect of value realisation. This highlighted the importance of a positive VE culture and managerial endorsement for the successful implementation of VE initiatives in SOEs. Similarly, VE methodology and management support showed a moderately positive relationship. This suggested that the presence of a well-defined and effective VE methodology, coupled with supportive management practices, would contribute to improved value realisation outcomes. This relationship underscored the significance of having structured processes and management involvement in guiding VE efforts in SOEs. Furthermore, the relationship between the VE team and management support indicated a moderately positive association. This implied that, when there is strong management support for VE activities, and teams have competent and dedicated members, it leads to better value realisation. The involvement of capable team members, along with supportive management, fosters collaboration, creativity, and the efficient implementation of VE initiatives. In addition, reward and recognition and management support demonstrated a moderately positive relationship. This suggested that, when management provides recognition and rewards for VE efforts and achievements, it positively influences value realisation outcomes. Recognising and rewarding employees' contributions in VE could enhance motivation, engagement, and commitment, leading to improved performance in SOEs.

The research also explored the impact of VE implementation on value optimisation in SOEs. It revealed that VE helps to clarify stakeholder requirements, prioritise needs, enhance project briefs, and verify purposes. It is also effective in finding alternative solutions to reduce project duration, improve quality, and lower costs. VE furthermore fosters a culture of challenging project planning assumptions, evaluating criteria, and improving teamwork and communication. The evidence also suggests implementing VE during the concept and pre-feasibility stages in growth projects, and during the feasibility stage in sustainability projects, taking into consideration the distinct challenges and opportunities in each phase.

However, the research uncovered difficulties hindering VE in SOEs that need mitigation. These included a lack of VE training, unsupportive senior management, insufficient VE integration into the project lifecycle process, a lack of information and discomfort about expressing concerns in VE workshops, the absence of positive recognition, inappropriate team composition, and a lack of technical expertise. In addition, the absence of clear VE policies and of a lessons-learned database emphasised the need for formalised procedures and knowledge management in VE initiatives.

Last, SOEs operate uniquely, driven by factors such as distinct legislation, culture, and societal responsibilities that are difficult to quantify financially, making it difficult to apply findings from this study directly to for-profit organisations or other non-governmental entities. In addition, the study focused on the largest SOE in South Africa, which was chosen for its ongoing VE implementation; and it may be representative of SOEs in South Africa because of its size. The study's coverage of various management levels also limited its applicability. Thus its findings would be mainly pertinent to national-level SOEs, and may not fully serve provincial, local, or diverse-sector SOEs. Moreover, the study's South African focus constrains its generalisation to other countries. Future research across various SOEs and nations would be vital to attain comprehensive insights.

5. RECOMMENDATIONS

To enhance the effectiveness of VE implementation, SOEs should promote the widespread adoption of VE methodologies across all projects, particularly those that are large and complex, and integrate VE into their organisational culture and project management processes. SOEs should also prioritise the establishment of VE training programmes to equip employees at all levels with the necessary skills, fostering proficiency in VE principles and methodologies. It would be crucial to secure strong senior management support, with senior managers actively championing VE initiatives in the organisation. To provide structure and guidance, SOEs should formalise VE policies and guidelines, enabling a systematic integration of VE into the project lifecycle process. Creating a VE lessons-learned database would facilitate knowledge-sharing and continuous improvement. When assembling VE teams, SOEs should strategically select experienced members with relevant project knowledge. In addition, VE initiatives should be prioritised in the early project stages to maximise opportunities for saving costs and enhancing value. Establishing mechanisms to measure and monitor VE impact would help to quantify benefits, reinforcing VE's value proposition. Last, SOEs should actively share success stories and case studies of VE implementations in the organisation to inspire, educate, and encourage its continued use.

These comprehensive recommendations aim to enhance efficiency, cost-effectiveness, and overall project performance in SOEs through effective VE implementation.

6. CONCLUSION

The VE study conducted at the selected SOE, which is the largest in South Africa, has contributed valuable insights into the development of a VE model that would be applicable to SOEs. The study identified the essential VE components, VE enablers, and their relationships that would be crucial for successful VE optimisation and implementation in SOEs. The findings emphasised the significance of enablers such as management support, VE culture, VE methodology, VE team members, and reward and recognition in driving successful VE initiatives in SOEs. The study has underscored the importance of VE in optimising value and enhancing performance in SOEs. By leveraging the identified VE components and enablers, SOEs could drive continuous improvement, cost savings, and stakeholder satisfaction. The research and the developed VE model serve as valuable resources for decision-makers, managers, and practitioners who seek to optimise VE practices in SOEs. By using the model and implementing the recommended strategies, not-for-profit or service organisations such as SOEs could enhance their performance, efficiency, and overall value realisation, charting a course towards improved efficiency, competitiveness, and sustainable growth in the ever-evolving landscape of public-sector organisations.

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