THE MEDIATING ROLE OF TOTAL QUALITY MANAGEMENT IN THE RELATIONSHIP BETWEEN VALUE ENGINEERING AND COMPETITIVE ADVANTAGE IN THE CONTRACTING SECTOR IN JORDAN

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Abstract

This investigation sought to elucidate the influence of Value Engineering (VE) on the Competitive Advantage (CA), with a particular focus on the mediating function of Total Quality Management (TQM) in Jordanian contracting firms. Data collection involved the design of a bifurcated questionnaire, one segment focusing on demographic particulars, the other on investigative parameters. The questionnaires, disseminated through a Google Form to a sample size of 700 contractors in Jordan, yielded a response count of 346, which were then scrutinized using the Statistical Package for the Social Sciences (SPSS) and Analysis of Moment Structures (AMOS). The findings generated a compendium of statistically significant results. Notably, VE dimensions, namely function, cost, and quality, wield a discernible influence on the CA of Jordanian contracting firms. Additionally, VE significantly impacts the TQM in these firms. The investigation also established a statistically relevant relationship between TQM and the CA of these companies. A salient discovery was the mediating function of TQM in the interrelation between VE and CA in Jordanian contracting organizations. Consequent to the conclusions drawn, it is recommended that organizational personnel be incentivized to shoulder quality-related responsibilities by implementing an endorsed multifunctional communication system steered by the quality department. Moreover, ongoing assessment of individual team efforts within the organization, coupled with regular personnel training, can be instrumental in understanding and catering to customer requirements, thereby ensuring holistic customer satisfaction.

Keywords: Value Engineering, Competitive Advantages, Total Quality Management, Contracting Sector.

INTRODUCTION

Technological advancements and globalization present Jordanian contracting firms with significant challenges. These include stiff global competition and evolving consumer demands (Hameed et al., 2021). To respond, firms are employing innovative practices, including Total Quality Management (TQM), to stay competitive and profitable (Oakland et al., 2020; Jimoh et al., 2019). TQM, along with effective human resources management practices, are fundamental to superior work outputs and long-term success (Heyns &

Boikanyo, 2019). However, there are ongoing problems with the quality of construction and customer satisfaction, even though improvement programs have been implemented (Cruz et al., 2019; Maqbool & Wood, 2022).

Value Engineering (VE), a solution-oriented methodology, is considered to increase performance efficiency and work quality while reducing cost (AbdEllatif et al., 2018; Shrubsole et al., 2019). VE provides a systematic framework for analyzing and enhancing project outcomes (Elger et al., 2020; Sharma & Srikonda, 2021). However, the Jordanian contracting sector still faces challenges related to competition, quality assurance, and attaining a competitive edge (ISO).

Emanating from the preceding discourse, our research study will primarily be orchestrated around the delineation of the influence exerted by VE - focusing specifically on its integral components of function, cost, and quality - on CA accrued by contracting firms in Jordan. The subsequent sub-queries, inextricably interwoven with the central question, are aimed at deciphering the interplay of TQM as a mediating agent in the dynamics between VE and the CA of these Jordan-based contracting organizations.

The importance of this investigation is underscored by the substantiality of the sector under scrutiny, evaluated in terms of the sheer magnitude of business operations and capital inflow, along with its significant contribution to the nation's gross domestic product. Furthermore, the rippling effects this sector imparts onto various interrelated economic domains, its employment of a sizable contingent of specialized technical workforce comprising of engineers, technicians, and laborers, amplify its importance. Equally noteworthy is the critical role this sector plays in delivering high-performance and high-quality project outcomes. The escalating number of contracting companies, compounded by the potential intrusion of non-Jordanian entities into the Jordanian construction market, catalyzes an atmosphere of intensified competition.

At its core, this research endeavors to ascertain the determinant role of the TQM mediator in modulating the relationship between VE and the CA enjoyed by contracting firms in Jordan.

Uniquely, this academic pursuit stands as a pioneering study within Jordan, with its focused analysis on the ripple effects of VE on CA, while simultaneously considering the mediating influence of TQM within the sphere of contracting enterprises operating in Jordan.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Value Engineering and the Competitive Advantage

The results of Alobaidy (2022) indicate that the integration between target cost and VE contributes to providing green products that meet environmental specifications at an appropriate cost, thus achieving a CA. It recommends the use of VE to support the green target cost methodology to achieve CA. VE is an effective method based on creative solutions to evaluate what exists and find alternatives without affecting the quality or

function of product characteristics, as it works to introduce modernization into product design and exclude unnecessary ideas, according to Abdullah & Mohammad (2021).Where they stated that the application of VE in management techniques in the field of industrial companies' work, especially in research, development and design activities, contributes to advancing the business environment and gaining a CA .

Another study by Alsgheer and Bahloul (2021) aimed to determine the extent to which VE elements are used to achieve CA from the point of view of a sample of condor electronic tires. The results showed that the independent variables were able to explain 54% of the variation in the dependent variable, and the rest was attributed to other factors, which is a high explanatory power, which indicates the existence of a statistically significant relationship at a significance level of $\alpha \leq 0.05$ between the elements of VE (functional performance, quality, cost) and CA.

Fehmi et al. (2021) investigated the effect of using VE on achieving a CA for companies listed on Egyptian stock market and operating in the sector of pharmaceutical industry in Arab republic of Egypt. They found a statistically significant correlation between using VE and achieving a CA. Moreover, Elamir (2017) reported that the combination of target costing and VE had a significant impact on operational performance. However, the positive role of applying VE to the operational performance of manufacturing firm has been revealed through the moderating role of the comparative strategy. The study recommends that managers should pay more attention to dimensions related to integration of target costing and VE that have achieved excellence for their firms. In addition, manufacturing firms should be more proactive to improve financial performance by thinking of scale, employment, efficiency and leverage. According to Abdel Raheem (2016), VE contributes to reducing costs during the products design stage, hence promoting the CA. He suggested applying the strategic cost methods together to activate the CA continuously.

Based on the above, the following hypothesis can be reached:

H₁: There is a statistically significant impact of Value Engineering on the Competitive Advantages.

Value Engineering and Total Quality Management

Several conclusions were reached by Hamim (2022), the most important of which was that the dimensions of VE (function, quality, costs, efficiency, impactiveness) have an effective role in enhancing the high performance of human resources (training, organizational structure, organizational performance, labor relations). According to Danku and Antwi (2021), the need for optimum value benefit realization on road projects in developing countries has become topical. While the traditional Cost Control project management process only aligns actual costs with planned costs, VE is a sustainable and systematic innovative methodology for establishing the best functional balance among desired features of a project. TQM has gained international attention recently and is being used in many businesses, notably in developed economies, according to Dahlgaard-Park et al. (2018).

Hamad (2018) recommended focusing on the dimensions of VE, namely: performance support, cost cut as well as quality maintaining. It is also necessary to follow specific steps by starting with collecting information about production and concluding with conclusion and results. Organizing training courses should be given consideration to improve employees' efficiency and acquaint with the latest development in cost and management accounting. It is important to reduce the cost of a product's life cycle from the initial stage before planning for production processing starts so as to compete on price basis to carry out valuable researches and studies continuously to improve the product quality and cost decline at the same time was recommended

TQM has changed primarily as a result of changes in the global economy and the forces of supply and demand. Although many industries have long practiced quality control, TQM has just recently become a key concern for enterprises all over the world. The results that were anticipated from the traditional control systems used in industries to ensure quality have not been achieved. According to Ali and Al-Musawi (2015), the concepts of quality cost and VE have emerged as the most prominent accounting and management methods to keep pace with scientific progress and changes in the modern manufacturing environment to achieve the goal that most economic units seek, which is to meet the requirements and desires of customers. Quality costs play a major role in improving the quality of the product and then enhancing the competitive position of the economic units. As for the method of value re-engineering, it primarily emphasizes the need for economic entities to change their operations and activities that suffer from weakness in performance or cases of frequent technical or technological defects.

In addition, Khattab (2015) concluded that the entrance to the quality functional function helps to prioritize the needs, requests and expectations of customers; the VE method helps to reach alternative components of a product with the characteristics and features required by customers; and the target costing system facilitates the search for cost reduction without compromising quality during the product design phase. Integration between the three approaches through a mathematical model helps to reach products that satisfy and meet customer needs, with technical components characterized by characteristics s and features that customers need and expect, at a lower cost.

Based on the above, the following hypothesis can be reached:

H$_2$: There is a statistically significant impact of Value Engineering on Total Quality management.

Total Quality Management & Competitive Advantage

Elhawi (2022) sought to investigate the connection between CA and TQM. The study has reached several findings, including the recognition by banks in Jordan of the value of improving a functional environment and the proficiency of bank managers in communicating TQM and their extensive knowledge in their respective fields. In light of this, a number of suggestions were made, one of which was that managers should monitor their regular performance by paying more attention to their managerial procedures, particularly those that are connected to the client sector, in order to gain a

CA. Othman et al. (2020) examined the influence of TQM on CA in a sample of banks operating in the Erbil/Iraq. The results indicated that leadership, management of staff, information, and analysis, and customer attention have been found to be strong predictors of banks CA. Moreover, Firman and Thabrani's (2018) research sought to understand and analyse the contribution of innovation, dynamic skills, and comprehensive quality management to CA. The findings demonstrated that dynamic capabilities and innovations significantly and favorably affect CA. This study falls short of demonstrating how innovation functions as a mediator between comprehensive quality management, dynamic capacities, and CA. The results of Alaoun (2018) show that there is a significant impact of TQM on competitive priorities. The results also show that employee empowerment, reward, recognition, and customer focus have positive significant impact on competitive priorities. However, top management commitment, employee training, employee involvement and continuous improvement do not demonstrate a significant impact on competitive priorities.

Based on the above, the following hypothesis can be reached:

> **H₃: There is a statistically significant impact of Total Quality management on the Competitive Advantages.**

The mediating role for TQM in the relationship between VE on the CA

According to Chen et al. (2020), improving performance through better processes should be the focus of quality professionals. The research findings are summarized as follows:

(1) TQM significantly affects transformational leadership, executive ability and sustainable CA.

(2) Transformational leadership and executive ability significantly affect a firm's sustainable CA and each of them has the mediating impact between TQM and sustainable CA.

(3) Both of them have a serial mediating impact on the relationship between TQM and SCA. Masrom et al. (2022) aimed to explore the role of innovation as mediating role in relationship between TQM and CA within manufacturing sector in Malaysia.

The result of analysis shown that TQM and innovation had a significant positive impact on CA. In addition, innovation played a significant positive mediating role in the relationship between TQM and CA. Imran et al. (2018) investigated the mediating role of TQM between entrepreneurial orientation (EO) and SME export performance in the manufacturing sector of Pakistan. The findings reveal significant relationship between EO and TQM with SME export performance. Furthermore, this study found the complementary mediating role of TQM between EO and SME export performance of manufacturing sector of Pakistan.

Based on the above, the following hypothesis can be reached:

> **H₄: There is a mediating role for Total Quality management in the relationship between Value Engineering and the Competitive Advantages.**
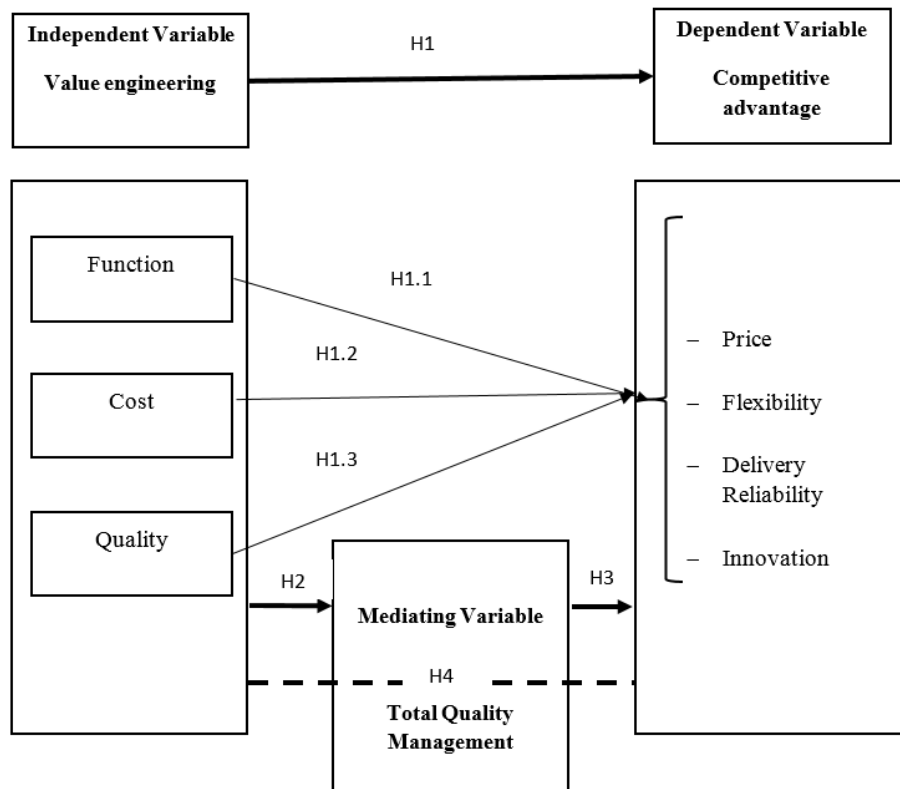
Research Model

Figure 1: The Research Proposed Model for Variables and Their Relationship

METHODOLOGY

Population and Sample

The study population comprises 3246 contractors in Jordan, as reported by the Jordanian Construction Contractors Association in 2023. A stratified random sample was taken from the managers and employees of the Jordanian contracting companies based on the classification of the company from the first to the fifth degree; the sample size was 346 according to the Krejecie, R& Morgan table.

The questionnaire was distributed electronically through Google Form to 700 Jordanian contractors with the intended size of the sample, and 346 questionnaires were obtained, all of which are valid for statistical analysis.

Instrument and Measures

The questionnaire was the primary technique used to collect data in order to achieve the objectives of the study. The researchers devised a questionnaire based on the literature review and presented it to a committee of expert arbitrators.

Based on previous studies, a special instrument was developed to measure the dimensions of Edge, drawing from the research of (Distanont and Khongmalai, 2020; Hamad, 2018 ; Sachitra, 2017), and the measurements of the dimensions of VE were obtained from the studies conducted by (Hamim, 2022; Alsagheer and Bahloul, 2021 ; Zonnenshain and Kenett,2020 ; Alketbi , 2020). The questionnaire was developed to reflect the study's methodology and hypotheses. The questionnaire was then verified by a panel of reviewers and some experts were interviewed.

The questionnaire is divided into the following two sections:

First: The Demographic Section: It includes the following dimensions: educational qualification, job title, number of years of experience in the company, classification of the company, number of employees in the company, and the year of establishment of the company.

Second: The Study Variables Section: the independent variable VE, which includes three main dimensions (function, cost, and quality), which were measured through 18 items. And the dependent variable Edge, which includes four main dimensions (price, flexibility, reliability of delivery, and innovation) and is measured through 13 items. Finally, the intermediate variable TQM, which is measured through 14 items. To gain insight into managers' perceptions, each item was measured using a five-point Likert scale, with values ranging from 1 (totally disagree) to 5 (totally agree).

RESULTS

Reliability Tests

Cronbach's alpha value has been calculated to verify consistency and appropriateness of the items included in the questionnaire. If the result is greater than 0.70, the value is statistically acceptable and the closer it is to one (or 100%), the more stable the search tool (Sekaran and Bougie, 2016). As shown in Table 1, Cronbach's alpha ranges from 0.910 to 0.988. In other words, the study instrument is stable, and the data it produces are accurate and reliable in measuring variables. Since all the dimensions of the independent and dependent variables and the mediator are greater than 70%, reliability has been confirmed.

Table 1: Cronbach Alpha Values for Study Tool Variables

Variable	No. of items	Cronbach's Alpha
Function	7	0.938
the cost	6	0.910
the quality	5	0.942
Value Engineering	18	0.978
the price	3	0.912
Flexibility	4	0.948
Delivery reliability	3	0.933
Innovation	3	0.925
Competitive Advantage	13	0.988
Total Quality Management	14	0.934

Hypotheses Testing

Convergent Validity for the Model

Once the construct validity and reliability have been achieved, the Composite Reliability (CR) and Average Variance Extracted (AVE) need to be examined for convergent validity. The recommended value for Composite Reliability (CR) is 0.7 and greater; whereas, 0.5 and greater is for Average Variance Extracted (AVE) suggested that in the full model, for second-order constructs, averaging the squared multiple correlations for the first order indicators can calculate the AVE for evaluation of the validity of the set of sub-dimensions. The results of convergent validity are shown in Table 2 , corresponding that the factor loadings for all sub-constructs are ranging from 0.71 to 0.91 Further, the values of CR and AVE are corresponding that: function consisted (CR = 0.961, AVE = 0.701), cost (CR = 0.96, AVE = 0.71), quality (CR = 0.958, AVE = 0.702), price (CR = 0.97, AVE = 0.74), flexibility (CR = 0.96, AVE = 0.70), reliability delivery (CR = 0.98, AVE = 0.74), innovation" (CR = 0.98, AVE = 0.78). and Total quality (CR = 0.94, AVE = 0.65). The results of the measurement model have attained the required thresholds of CR ≥ 0.70 and AVE ≥ 0.50. Therefore, the measurement model is adequately acceptable for further analysis to analyze the discriminant validity.

Table 2: Standardized Loading, Cronbach's a, CR, and AVE for Full Model

Construct	Sub-Construct	Items	α(>0.7)	Std β (>0.7)	CR(>0.7)	AVE (>0.5)
Value Engineering (VE)	1.function	F1	0.71	0.88	0.96	0.70
		F2		0.81		
		F3		0.85		
		F4		0.87		
		F5		0.81		
		F6		0.87		
		F7		0.78		
	2.cost	C1	0.75	0.88	0.96	0.71
		C2		0.83		
		C3		0.78		
		C4		0.85		
		C5		0.8		
		C6		0.9		
	3.quality	Q1	0.74	0.87	0.96	0.70
		Q2		0.78		
		Q3		0.83		
		Q4		0.86		
		Q5		0.84		
Competitive Advantage(Edge)	1.price	P1	0.78	0.85	0.97	0.74
		P2		0.82		
		P3		0.91		
	2.flexibility	Flex1	0.81	0.84	0.96	0.69
		Flex2		0.82		
		Flex3		0.86		
		Flex4		0.79		

3.Reliability delivery	Del1	0.84	0.78	0.98	0.74	
	Del2		0.9			
	Del3		0.89			
4.innovation	inn1	0.78	0.85	0.98	0.78	
	inn2		0.88			
	inn3		0.91			
Total quality / Total quality	m1	0.85	0.71	0.94	0.65	
	m2		0.85			
	m3		0.84			
	m4		0.78			
	m5		0.76			
	m6		0.81			
	m7		0.85			
	m8		0.79			
	m9		0.84			
	m10		0.82			
	m11		0.76			
	m12		0.78			
	m13		0.82			
	m14		0.83			

Discriminant Validity for the Model

Discriminant Validity was checked. Table 3 shows the summarized results of indices and corresponding that the discriminant validity is achieved. The values in the columns and rows are lower than the diagonal values, which indicate that the multicollinearity problem did not exist in the model. Consequently, once Confirmatory Factor Analysis has achieved the pre-requisite values (unidimensionality, validity, and reliability) for Measurement Model, the researcher continued to emerge with the Structural Equation Modelling (SEM).

Table 3: Summary of Discriminant Validity Index

	function	cost	quality	(Edge)	Total quality
function	0.839				
cost	0.698	0.84			
quality	0.559	0.668	0.83		
(CA)	0.570	0.523	0.572	0.854	
Total quality	0.654	0.564	0.589	0.658	0.803

Note: Diagonals represent the square root of the average variance extracted (AVE) while the other entries represent the squared correlations

Structural Model Assessment

At this stage, AMOS reported "minimum was achieved," which means there is no warning or error in the model. Meanwhile, this section also comprised the probability value, degree of freedom, and the Chi-Square test value. Table 4 is presenting structural model goodness of fit indices for each category, and the values are suggesting adequate fit between the observed data and the hypothesized model. Parsimonious fit indicates Chisq/df with 3.850 index value (1.00 – 5.00), PNFI = 0.854 > 0.05; incremental fit: NFI =

0.887 > 0.80, TLI = 0.922 > 0.90, CFI = 0.927 > 0.90, AGFI = 0.851 > 0.80; Absolute fit: RMSEA 0.043 < 0.08.

Table 4: The Fitness Indexes for Measurement Model

Name of Category	Name of Index	Acceptance Level	Index Value	Fit(yes/no)
Parsimonious fit	Chisq/df	1.00 – 5.00	3.850	YES
	PNFI	> 0.05	.854	YES
Incremental fit	NFI	>.80	.887	YES
	TLI	>.90	.922	YES
	CFI	>.90	.927	YES
	AGFI	>.80	.851	YES
Absolute fit	RMSEA	<.08	.043	YES

Hypotheses Testing (H1, H1.1, H1.2 and H1.3)

Hypotheses were tested through SEM and the results of sex hypotheses are supported as presented in Table 5, with structural model assessment. VE significantly predicts Edges (β = 0.435, S.E = 0.082, CR = 5.29, significance level < 0.004). Hence **H1**: "VE have positive significant effect on CA", Meanwhile, function significantly predicts Edges (β = 0.285, S.E =.127, CR = 2.25), significance level< 0.024). Hence **H1.1**: "function has a positive significant effect on CA". Likewise, cost significantly affects CA (β = 0.378, S.E =.079, CR = 4.778, significance level< 0.001). **H1.2**: "cost has a positive significant effect on CA. Also, quality significantly predicts CA (β = 0.443, S.E =.22, CR = 2.011, significance level< 0.044). **H1.3**: "quality has a positive significant effect on CA, the study hypotheses (H1, H1.1, H1.2 and H1.3) are supported.

Table 5: Structural Path Analysis Results

hypothesis	Path	Estimate	S.E.	C.R.	P	result
H1	(CA)<---(VE)	0.435	0.082	5.29	***	supported
H1.1	(CA) <---function	0.285	0.127	2.25	0.024	supported
H1.2	(CA) <---cost	0.378	0.079	4.778	***	supported
H1.3	(CA) <---quality	0.443	0.22	2.011	0.044	supported

Mediation Assessment

The outcomes derived from Structural Equation Modelling (SEM) in relation to the influence of Virtual Enterprises (VE) on Edge computing, incorporating Total Quality Management (TQM) as a mediating variable, are illustrated in Table 6. This analytical exploration has unveiled a statistically substantive influence of VE on Edge computing, with TQM acting as an intervening mechanism.

The table further delineates the magnitudes of both the direct and indirect influences, with the mediating variable (TQM) playing a pivotal role in moderating the relationship between VE and CA. The direct influence of VE on CA is quantified as 0.435, signifying a considerable degree of VE's effect on CA. Consequently, it can be inferred that enhancing focus on VE would consequently stimulate a discernible impact on TQM.

Likewise, TQM's direct influence on CA is estimated to be 0.519, reinforcing the notion that TQM plays a significant role in shaping CA. Therefore, increasing emphasis on TQM would correspondingly generate noticeable effects on CA. Along the same lines, the direct influence of VE on TQM is noted to be 0.69, illustrating a significant impact of VE on TQM. Thus, a heightened attention towards VE will likely elicit significant changes within TQM.

These impacts have been quantified using standardized coefficients, leading to a conspicuous observation that the effect of the mediating relationship within the function is statistically significant as it falls below 0.05. This implies an indirect effect of the mediating variable amounting to 0.358. Therefore, the aggregate effect of the independent variable on the function, in the presence of the mediating variable, measures at 0.793. The significant statistical impact of Total mediating variable affirms that there is a meaningful interaction of the mediating variable on the relationship between the independent and dependent variables.

Consequently, the study's hypothesis, which postulates that there is an effect of the mediating variable on the relationship between the independent variable and the dependent variable is validated. Thus, this observation implies a clear affirmation of the study's hypothesis.

Table 6: The Mediation Test Results of Total quality in the relationship between VE and CA

hypothesis	Path	Direct effect	indirect effect	Total effect	C.R	S.E	P	result
H1	(CA)<---(VE)	0.435	0.358	0.793	5.29	0.082	**	supported
H2	Total quality<-- (VE)	0.69		0.69	8.59	0.082	**	supported
H3	(CA)< -- Total quality	0.519		0.519	8.69	0.061	**	supported
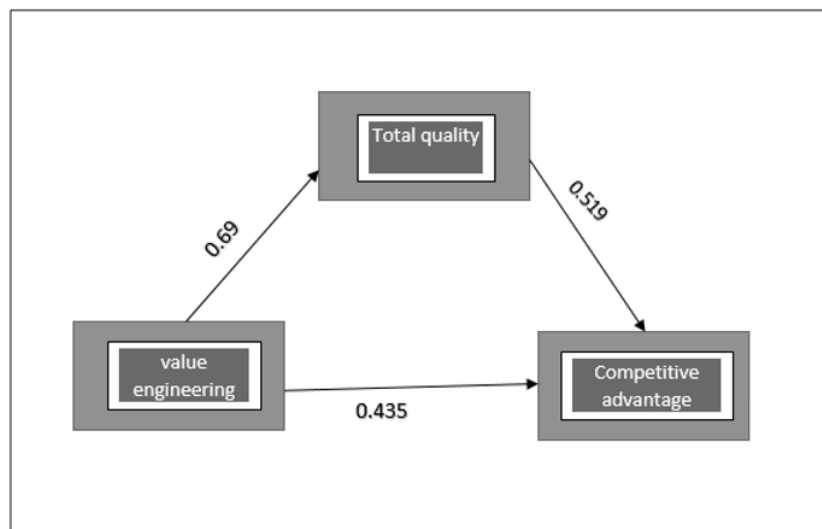
Figure 2: The Mediation Test Results of Total quality in the relationship between VE and CA

DISCUSSION AND CONCLUSION

This study aimed to ascertain the influence of Value Engineering (VE) on the competitive advantage, herein referred to as the 'CA', within the framework of contracting firms in Jordan, alongside investigating the mediating role of Total Quality Management (TQM). The findings of this research will be meticulously analyzed, and relevant suggestions will be proposed.

The data supporting the primary hypothesis (H1) indicated a statistically significant (α≤0.05) positive correlation between VE and the CA in Jordanian contracting companies. This finding aligns with previous investigations, such as those of Fehmi et al. (2021), which substantiates the statistically significant influence of VE on attaining the CA. Additionally, the study by Abdullah and Mohammad (2021) underlines how the implementation of VE in industrial management techniques contributes to enhancing the business milieu, thereby securing the CA.

In terms of the first ancillary hypothesis (H1.1), the results demonstrated a significant (α≤0.05) positive impact of functionality on the CA within the context of contracting firms in Jordan. The outcomes connected to the second (H1.2) and third sub-hypotheses (H1.3) revealed a similarly significant (α≤0.05) positive influence of cost and quality, respectively, on the CA of these companies. This is in line with the study by Asgheer and Bahloul (2021), which confirms a statistically significant correlation between the elements of VE, including functionality, quality, and cost, and the CA.

With regard to the second hypothesis (H2), the results illustrated a significant (α≤0.05) positive effect of VE on the TQM of contracting companies in Jordan. This suggests that the CA is impacted by VE, and thus, an elevated emphasis on VE could have a consequential effect on TQM. These findings corroborate the study by Hamim (2022).

The third hypothesis (H3) outcomes indicated a significant (α≤0.05) positive influence of TQM on the CA of Jordanian contracting firms. Thus, greater focus on TQM can have an impact on the CA, a conclusion supported by various studies such as Elhawi (2022), Othman et al. (2020), Firman and Thabrani's (2018), Alaoun (2018), and Yousif et al. (2017)

The fourth hypothesis (H4) results pointed to a positive influence of TQM as a mediator in the relationship between VE and the CA in Jordanian contracting companies. These findings resonate with previous investigations, for instance, Chen et al. (2020) and Saleh and Sweiss (2017).

Implication

Deriving from the conclusions of our hypothesis testing and research findings, we advocate the necessity for a standardized multifaceted communication architecture to be instated and operationalized within the context of Jordan's contracting sector. An emphasis should be placed on fostering an environment where employees are motivated to assume responsibility for quality assurance. Concurrently, the establishment of an

evaluation framework is paramount to assess the effectiveness of individual and team efforts toward quality enhancement within the organization.

The need for continual quality-focused training for all employees cannot be overstated, contributing to a culture of quality consciousness. Moreover, a comprehensive understanding of customer requirements is of critical significance, necessitating adjustments in the production process to align with these needs.

In addition, there is a compelling need to utilize customer survey instruments, feedback mechanisms, and other pivotal tracking methodologies to gauge customer satisfaction. Companies in this sector should prioritize research and development endeavors to innovatively design and refine their product and service offerings. Our research findings underscore the crucially of enhancing design activities and specifications in the preparatory stages of implementation. Concurrent efforts should be made to coordinate with the Quality Department to guarantee the unbroken enhancement of products. A competitive pricing policy should also be espoused to reinforce market standing. Further, the managerial cadre of contracting companies may find the research methodology, survey instrument, and aforementioned recommendations instrumental in refining the implementation of VE and TQM. This strategy will equip managers to efficiently curtail costs, augment project quality, and heighten customer satisfaction, thereby bolstering the company's competitive edge.

RESEARCH LIMITATIONS AND RECOMMENDATION FOR FUTURE RESEARCH

This research endeavored to elucidate the influence of VE on CA, mediated by TQM, within the context of Jordanian contracting firms. The study was delimited by the assessment of specific constructs namely VE, CA, and TQM. Further constraints arose due to the human scope of the investigation, which focused solely on contractors employed within Jordanian contracting enterprises, excluding other potential industrial sectors.

Temporal boundaries were defined by the period of the study, conducted over 2022-2023. Consequently, the results primarily reflect the perceptions of respondents employed within contracting firms during this timeframe. Considering the scope of this research, attention is drawn towards the necessity of further investigations into analogous correlations within the concrete sector. This sector not only parallels but complements the contracting sector, and understanding the impact of VE on competitive advantage within this context would provide a more comprehensive overview, especially given the intense competition characterizing these overlapping industries.

In addition to the exploration of TQM as a mediating factor, this study encourages future research to consider other crucial aspects such as innovation and digital transformation. These factors could provide additional insight into their mediating role in the relationship between VE and competitive advantage.

Moreover, we advocate for the use of alternative data collection methods in future investigations. Specifically, the incorporation of interviews, along with questionnaires, would likely augment the depth and breadth of data collected and potentially yield more extensive and nuanced insights. Furthermore, researchers are encouraged to examine the study's variables within a diverse population set, thereby enhancing the generalizability of the findings.

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