Research article

Bringing quality management to perspective in higher education institutions' research output: A focus on selected private universities in Nigeria

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ARTICLE INFO

ABSTRACT

Bringing quality management research into perspective is a critical need in Higher Education Institutions (HEIs) of most developing nations, including Nigeria. The existing literature has not sufficiently explained the relationship between total quality management implementation and the research performance in the educational industry, especially from a developing economy perspective. Therefore, this study investigated total quality management (TQM) and the research output of HEIs in Nigeria. The study adopted a descriptive design to draw insights from research-based faculty members of three reputable Universities in Nigeria and adopting the PLS-SEM analysis this study established the relationship between components of TQM tools, values, and methodologies on the research output of HEIs. Our study found that dimensions of TQM, specifically TQM tools and values were found to relate positively with HEI's research output. Our study suggests that implementing total quality management, especially through its various tools, values, and methodologies will be beneficial to improving HEIs' research outputs.

1. Introduction

The present study fills an existing research gap, especially within the strategic management and organizational behaviour literature, about the implementation of total quality management to improve the performance and overall stakeholders' expectations in the educational industry of developing nations, like Nigeria. Total quality management (TQM) has emerged as a tool for measuring and ascertaining the standard of organizational performance in HEIs, especially in terms of research output produced by their faculty [1]. Given the perspective of quality research in the education industry, for any educational organization to be able to compete with its rivals in the education industry, it has to be committed to meeting society's quality requirements through high-quality graduates and value-adding research output that can be consumed for the benefit of the larger society. More so, the global education market has become more competitive, therefore, the need to ensure quality in all facets of organizational processes has become the order of the day

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[2]. Most educational organizations have gained an edge over others through quality management implementation [3]. Many researchers proclaimed that TQM is the way to achieve viability, adaptability, and intensity of an HEI to meet the value requirements of employers and the larger society [4]. TQM emphasizes continuous improvement of operations in an organization and also aims at manufacturing quality products, decreasing costs, and reaching customer expectations.

Total quality management extends towards the academic sector to help ensure proper quality practices in carrying out educational activities. Therefore, introducing total quality management into the higher education sector depends on an already existing culture of quality practices among the administrative staff, faculty, and students of Higher Education Institutions. The prioritization of TQM goes a long way in influencing the procedure of quality practices. The educational activity is a prominent system, which is focused on training specialists who will be competitive in the global markets [5].

Notwithstanding, justifiable improvement in higher education institutions that addresses issues as pertains to the present through the provision of quality education across all levels of formal learning, has presented a serious concern to educational institutions and stakeholders in education, especially in developing countries like Nigeria [6]. Today, most HEIs in Nigeria lack proper quality practices in their operation and a full understanding of how it is being applied. According to the statement from the National Universities Commission (NUC) in Nigeria, education in Nigeria is in dire need of reform. Therefore, there is a need to look into the deplorable state of Higher Education Institutions in Nigeria such as inadequate infrastructure, obsolete educational system, strike actions seen mostly in public schools, deteriorated structures and equipment, cultism, examination malpractice, plagiarism, cheating, and brain drain [7]. Hence, the total quality management approach proffers solutions to these challenging issues through the provision of a conducive environment for learning, creating a medium through which students and faculty can engage in proper research and innovation programs, adequate remuneration to lecturers to motivate them to inculcate appropriately, presence of technical know-how to meet the world-class standard, well-replenished libraries with equipped ICT tools [8]. Bringing quality management research into perspective is a dare need in the education industry of most developing nations, including Nigeria [9,10]. Therefore, this research has the main objective of investigating the relationship between total quality management and the research output of HEIs in Nigeria. We adopted a descriptive design to draw insights from research-based faculty members of three reputable Universities in Nigeria and we used the PLS-SEM analysis to establish the relationship between components of TQM tools, values, and methodologies on the research output of HEIs.

The next two sections of this work discuss the literature review and hypotheses that this study investigated. The fourth section is the methodology, and it was followed by the analyses in section five, which depicts the statistical strength of the current study. After this, in the sixth section, the discussion section elaborated on the findings of this study concerning previous studies. Lastly, the seventh and eighth sections included the conclusion and further studies sections respectively.

2. Literature review

2.1. Quality in higher education

Quality is strategic to today's education system [11]. Schindler et al. [3], opined that education quality is a rather vague and controversial concept. Ganguly [12] also suggested that competition that exists among countries goes a long way to consider the quality of education as a strategic factor because it structures the quality of decision-making and thought of workers, managers, engineers, and teachers toward offering quality work in HEIs.

Implementation of quality higher education is seen as a medium for creating higher levels of business performance when it comes to the final output of any industry. Moreover, quality in educational institutions has advanced in terms of expansion from experience to techniques and style to the actual process. Thus, Adetunji [13] suggested different dimensions of how effective quality could be with the outcome: quality being exceptional and practically different (excellence), quality as a means of achieving consistency, quality as fitness for purpose (in conformance to customer expectation), quality as being effective, efficient and accountable (value for money) and quality as transformation, which considers education as a gradual process of transformation through empowerment and enhancement.

Considering total quality management initiatives in education, Altunay [14] adopted the Crosby model in finding a viable strategy for using total quality management principles in education. The strategy however emphasized the quality of the teaching system in higher education rather than the examination result of students. They argued that examination serves as a tool for quality assurance in the teaching system. To this effect, they opined that continuous improvement is required in directing curriculum and learning systems, to ensure that the educational needs of students are met.

2.2. TQM and research output of HEIs

Total quality management plays a role across the services and production sectors of global economies. It has been attributed to the ability to identify and curtail costs whilst reducing defects or waste in the system [15]. Hence, with TQM practices in the system, the organization can be able to identify waste, cost, and delayed deliveries, and put adequate control measures to reduce such problems and make a profit in the long run [16,17].

Within the education sector, total quality management can support quality control inspections to check and balance research outputs per knowledge outputs that drive society values. More so, it supports the theory which allows faculty, and even students, to be involved in quality checks in their respective fields and also report to the top management for adjustment purposes [18].

With TQM in place, researchers become conscious about developing self-managerial skills during the planning and execution of the

final reporting of their research findings [19]. Hence, it can be established that Management sometimes does not have all it takes to identify problems personally, TQM serves as a medium whereby the research community can lay complaints and also suggestions for better improvement measures [20]. On the other hand, it gives HEI employees a sense of direction, through knowledge and skill acquisition, HEI employees can develop their careers and acquire management skills.

3. Hypotheses development

Sakhiya [21], asserted that total quality management tools can be adopted as means of maintaining quality assurance in higher education institutions. These tools which consist of (ISO 9000 and process maps) help in coordinating different higher education research activities for effective performance. For example, obtaining quality assurance certifications like ISO 9000 builds confidence among parents, students, the government, and society at large about the processes and research outputs, such as patents, of HEIs [22]. Hoyle [23], asserted that this international quality standard provides a structure that gives higher education institutions opportunities to evaluate their research performance. Therefore, universities must acquire this international quality standard certification. Similarly, Kinchin [24], investigated the impact of process mapping, as a type of TQM tool, on university performance as the study revealed the importance of workflows and a multidisciplinary approach to achieving quality research outputs in HEIs. Process mapping monitors these processes to ensure each department is contributing to the development of Higher education institutions. Consequently, this study hypothesizes that.

Hypothesis H1. : Effective implementation of TQM tools will significantly improve the quality of HEIs' research output.

Diverse aspects of TQM values have also gained arguments about their influence on research output. Taskov and Mitreva [25] also examined the significant roles of the top management in achieving a high standard of performance, such as research outputs, among Macedonian higher education institutions. It was stressed that top management through internal participation programs could encourage research employees' engagement. Through these programs, training and development are also being encouraged among researchers, and also reward and proper recognition should be acknowledged. Furthermore, it was noted that the top management makes strategic decisions that strengthen the structure of the university to be able to withstand global competition [26]. In the same vein, customer focus (in this case societal focus) plays a significant role in the performance of Higher education institutions, as it has ensured stakeholders in the educational sector are considered the major contributors in the sector. Kim [27], suggested that the research faculty of HEIs have a different perspective as regards societal focus and its relationship with ensuring quality education and value creation. According to Mclean [28], accreditation bodies such as the New England Association of schools and colleges, Southern Association of Colleges and Schools, Middle states commissions on higher education, WASC senior college and university commission, Higher learning commission, and Western Association of Colleges and Schools, used a continuous improvement to measure HEIs research, and overall, performance. However, these associations are approved by the government of the United States, to ensure proper attainment and upholding of accreditation of HEIs [28]. Therefore, this study postulates that.

Hypothesis H2. : Effective implementation of TQM values will significantly improve the quality of HEIs' research output.
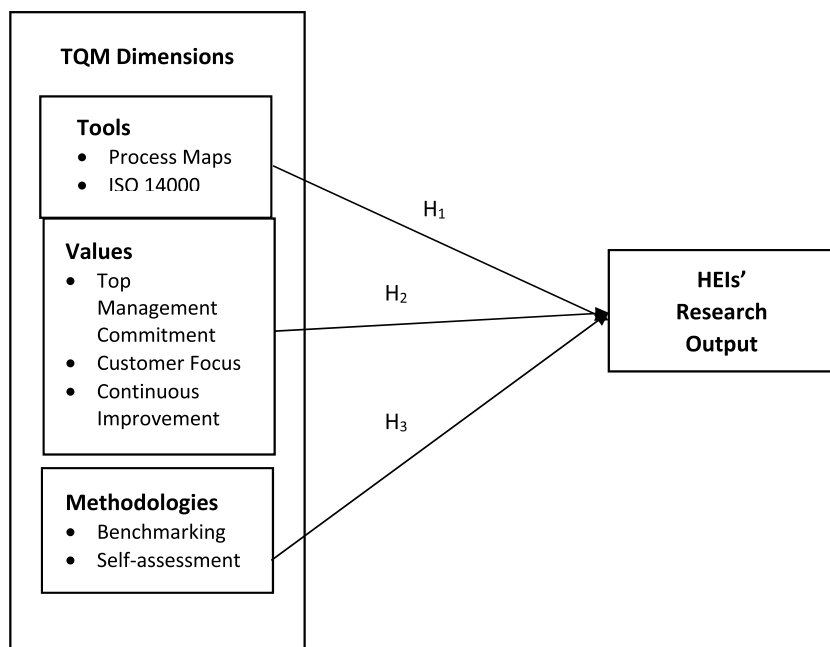

Fig. 1. Conceptual model.

Concerning TQM methodologies, a study carried out at Lithuanian higher education by Paliulis and Labanauskis [29], revealed that HEIs that are targeting quality research outputs should focus majorly on taking strategic guidelines which may include; flexibility of the internal structure and subdivisions, and acknowledgment of positive results to academic and administrative divisions. Also, benchmarking as a TQM methodology is helpful for higher education institutions aiming for qualitative enhancement and higher performance results, especially in terms of research output. Thus, benchmarking does not emerge externally but is derived through consistency in learning, it also helps HEIs to meet stakeholders' interests and adapt to the shortcomings of globalization [30]. Moreover, studies have revealed that benchmarking is pivotal in the development of HEIs research performance [31,32]. Ouda and Ahmed [33] suggested that benchmarking helps to guide and direct HEIs as to what steps to take to achieve their goals and objectives in the long run based on industry best practices. It also involves tools for constant enhancement, innovations, and execution [31]. Hence, the basic focus of benchmarking is to engage everyone strategically in the planning process, from the top management to the lower level of management. Similarly, Milenkovska and Novkovska [34] carried out a study at the Luleå University of Technology, which reveals the benefits of the self-assessment model in universities. It was noted that self-assessment creates motivation, increased participation between top management, faculty, and staff to ensure continuous improvement, and also enhances team spirit, especially for the execution of multidisciplinary research. In addition, the merits of TQM methodologies could range from high employee morale, increased teamwork mentality among research disciplines, linking the roles of faculty and staff, and increased quality research output. Therefore, this study argues that.

Hypothesis H3.   : Effective implementation of TQM methodologies will significantly improve the quality of HEIs' research output.

Fig. 1 shows the hypothesised relationships among the variables for this study. Dimensions of TQM tools, values, and methodologies respectively relates with HEI's research output.

4. Methodology

The study adopted a survey design to establish the relationships between TQM and the research performance of higher education institutions. Research-based Faculty staff of three reputable private HEIs in Nigeria were included in the study, with a total population of 1620.

4.1. Measures

Items that were included in the research instrument were adopted from existing research and modified to suit the present research context. Questions for quality control tools were drawn from the works of Neyestani [][][] [35] and TutorialsPoint [36] respectively, after the quality control process map proceeds, questionnaires on the process map were extracted from Roberts [37], then we have ISO 9000 which is practically based on quality certification, the instrument's questions were drawn from Hoyle [23]. Questions that captured continuous improvement were drawn from Ref. [27], the customer focus questionnaire was extracted from Wood [38] and Focus [39], while questions on top managerial commitment were obtained from Javed [40], Wesonga [41] and Mustafa & Bon [42] respectively. Items that measured benchmarking were drawn from Ref. [28]. Meanwhile, self-assessment questions were obtained from Svensson [43]. The research output questionnaire was obtained from Pastor & Serrano [44]. Please see Appendix 1 for the questionnaire used in this study.

4.2. Sampling

Presently, Universities in Nigeria do not have a clearly defined measure by which HEIs are ranked in terms of research impact, thus, making it somewhat a daunting task to identify the most suitable HEIs for inclusion in this study. Therefore, research output in the context of the present study is broadly explained as the involvement of HEIs in research activities without focusing on the volume of research activities of the HEIs. However, we adopted the webometric ranking of Universities to identify the top private universities in Nigeria, namely the top two universities. We further adopted a subjective evaluation based on proximity to select a third university for inclusion in the research and to enrich the data for this study. Based on Yamane, York, & Weatherhill's [45] sample size determination formula, a total of 161 research-based faculty members of the three HEIs used for this study were determined for this study. The simple random sampling technique was adopted to capture the opinion of individuals equally and avoid being biased. Thus given the population of faculty and administrative staff of the HEIs, respondents were selected randomly and the distribution and collection of the questionnaire were done physically over a space of three months. Respondents that turned down the proposal to participate in the survey were respectfully eliminated from the research process, and a replacement was determined by the same random selection process. Therefore, informed consent was verbally obtained from all participants for this research.

4.3. Validity and reliability

This research employed Cronbach's Alpha reliability test. Cronbach alpha reliability test has a coefficient that ranges from 0 to 1, with any value exceeding 0.7 identified as being highly reliable. Values between 0.5 and 0.6 are assumed to be fairly reliable. The table above indicates the reliability rate of each construct which is represented in Cronbach alpha. However, the overall Cronbach alpha value of all the constructs is given as 0.874, which surpasses the benchmark score of 0.7. Hence, the study instrument is adjudged to be highly reliable. Confirmatory Factor Analysis (CFA) was used to establish the validity of the research items. According to Fornell and

Larker [46] and Hair et al. [47], CFA must meet three conditions namely, (1) all item loading should be 0.65 and greater (2) composite reliability (CR) value should be 0.8 and greater, and (3) the values of average variance extracted (AVE) for each item should be 0.5 and above. Table 1 depicts the CFA results for items used in this study. The results indicate that all three conditions outlined above for an acceptable CFA have been met. All item loading is between 0.70 and 0.98; the CR values are within the ranges of 0.90–0.93; the AVE values all fall within 0.83–0.86. See Table 1 for details.

The present study also ensured discriminant validity for the constructs. Discriminant validity reflects the extent to which constructs differ from one another. By the general rule, Fornell and Larker [46] suggested that the AVE should be higher than the shared correlations between the constructs. As reflected in Table 2, the condition for discriminant validity is fulfilled in this study because all items are above 0.5 and are higher than the squared correlations shared between the constructs.

5. Results

A total of 205 copies of the questionnaire were administered. 161 (78.5%) of the questionnaire were filled and returned by the respondents, and 44 (21.5%) of the questionnaire administered were not returned. This was a result of misplacement, insufficient entries, and the length of the questionnaire. Table 3 below shows the demographic characteristics of respondents.

The table above indicates that 86 of the respondents are male while 75 of the respondents are female. The table above also shows that 6 of the respondents are within the age bracket of under 26 years, 43 of the respondents as shown in the table, are between the age bracket of 26–35years, 77 of the respondent are within the age range of 36–45years, and finally, 35 are between the ages of 46 years and above. However, from the analysis, it was derived that the majority of the respondent falls between the age bracket of 36–45 years. The table above indicates that 43 of the respondents are single, 114 of the respondent are married, while 4 of the respondent fall under "others" which can be categorized as Divorced, Separated, or Widow/Widower. Thus, from all indications, it was derived that the major respondent between faculty and staff of the universities are married.

5.1. Test of hypotheses

We adopted the structural equation modeling approach using SMART-PLS to determine the impact of total quality management on the performance of HEIs. The results of the analysis are presented in Fig. 2 and Table 4.

Fig. 2 shows the multivariate analysis result for this current study using SmartPLS. The result of the study shows that TQM

Table 1
Reliability of research constructs.

Measurement Items	Loadings	Indicator Reliability	Error Variance	Reliability	Composite Reliability	AVE	No. Of Items	Cronbach Alpha
PM1	0.6810	0.4638	0.5362	0.4638	0.9080	0.8453	4	0.794
PM2	0.9600	0.9216	0.0784	0.9216				
PM3	0.8480	0.7191	0.2809	0.7191				
PM4	0.8680	0.7534	0.2466	0.7534				
ISO1	0.9360	0.8761	0.1239	0.876096	0.88816	0.8191	4	0.866
ISO2	0.7200	0.5184	0.4816	0.5184				
ISO3	0.6370	0.4058	0.5942	0.405769				
ISO4	0.9400	0.8836	0.1164	0.8836				
TMC1	0.917	0.8409	0.1591	0.8409	0.88248	0.8103	4	0.667
TMC2	0.793	0.6288	0.3712	0.6288				
TMC3	0.632	0.3994	0.6006	0.3994				
TMC4	0.87	0.7569	0.2431	0.7569				
CF1	0.9590	0.919681	0.080319	0.919681	0.88152	0.8086	4	0.664
CF2	0.7250	0.525625	0.474375	0.525625				
CF3	0.7110	0.505521	0.494479	0.505521				
CF4	0.8150	0.664225	0.335775	0.664225				
CI1	0.777	0.603729	0.396271	0.603729	0.82139	0.7325	4	0.712
CI2	0.761	0.579121	0.420879	0.579121				
CI3	0.755	0.570025	0.429975	0.570025				
CI4	0.627	0.393129	0.606871	0.393129				
BM1	0.927	0.859329	0.140671	0.859329	0.87585	0.803	4	0.696
BM2	0.838	0.702244	0.297756	0.702244				
BM3	0.566	0.320356	0.679644	0.320356				
BM4	0.835	0.697225	0.302775	0.697225				
SA1	0.837	0.700569	0.299431	0.700569	0.9099	0.8465	4	0.641
SA2	0.814	0.662596	0.337404	0.662596				
SA3	0.842	0.708964	0.291036	0.708964				
SA4	0.891	0.793881	0.206119	0.793881				
RO1	0.898	0.806404	0.193596	0.806404	0.87852	0.8851	4	0.797
RO2	0.872	0.760384	0.239616	0.760384				
RO3	0.641	0.410881	0.589119	0.410881				
RO4	0.934	0.872356	0.127644	0.872356				

Table 2
Discriminant validity of the constructs.

Construct	Mean	S.D	1	2	3	4	5	6	7	8
Benchmarking	4.1398	0.61178	*0.730*							
Customer Focus	4.1720	0.51864	0.181	*0.707*						
Continuous Improvement	4.0538	0.55883	0.492	0.514	*0.731*					
ISO	3.6102	0.73209	0.250	0.032	0.200	*0.846*				
Process Map	3.7500	0.64163	0.192	0.051	0.326	0.492	*0.787*			
Research Output	4.1505	0.63539	0.186	0.251	0.292	0.196	0.194	*1.000*		
Self-Assessment	4.1344	0.50750	0.271	0.201	0.244	−0.091	0.164	0.180	*0.695*	
Top Mgt. Commitment	4.1694	0.53563	0.382	0.432	0.491	0.258	0.168	0.406	0.065	*0.710*

Notes: Average Variance Extracted (AVE) for each construct is presented diagonally.

Table 3
Demographic characteristics of respondents.

Demographic Characteristics	Frequency	%
Gender		
Male	86	53.4
Female	75	46.6
Total	161	100.0
Age		
under 26 years	6	3.7
26–35 years	43	26.7
36–45 years	77	47.8
46 years and above	35	21.8
Total	161	100.0
Marital Status		
Single	43	26.7
Married	114	70.8
Others	4	2.5
Total	161	100.0

dimensions, especially TQM tools and TQM values have significant impacts on HEI's research output.

The focus of this study was to investigate the impact of total quality management adoption on improved research outputs in HEIs of a developing economy, such as Nigeria. TQM measurement consisted of three constructs including TQM tools, TQM values, and TQM methodologies. On the other hand, the dependent variable was research output. All the measurement variables for the TQM constructs showed significant measurement weights with their respective constructs. Process map demonstrated a β value = 0.518 ($p < 0.05$) and ISO 9000 showed a β value = 0.638 ($p < 0.05$) in measuring TQM tools. Similarly, top management commitment demonstrated a β value = 0.421 ($p < 0.05$), customer focus reflected a β value = 0.380 ($p < 0.05$), and continuous improvement reflected a β value = 0.436 ($p < 0.05$) in measuring TQM values. Also, benchmarking manifested a β value = 0.695 ($p < 0.05$) and self-assessment revealed a β value = 0.555 ($p < 0.05$) in measuring TQM Method.

From a holistic perspective, the results from the statistical analysis showed that the structural constructs also demonstrated effectiveness in their various degrees of impact on HEIs' research outputs. TQM tools significantly enhance research output to the tone of β value = 0.129 ($p < 0.05$), while TQM values significantly improve the same research output to the extent of β value = 0.338 ($p < 0.05$). These results show a position that adopting TQM in the context of the research activities of HEIs significantly achieves quality research output. Specifically, quality procedures like process maps, ISO 9000 certification, top management commitment, customer focus, and continuous improvement pose as strategic activities that contribute to improved research outputs of HEIs. However, the results of the TQM method were not statistically significant with HEIs' research output β value = 0.063 ($p > 0.05$). This implies that at the 0.05 statistical level of significance, benchmarking activities and self-assessment as quality measures of the HEIs may not weld any significant amount of influence on their research output.

Table 4 shows the path coefficient of the research variables for the current study. As earlier mentioned, the significant levels among the research constructs reflected the effectiveness of TQM dimensions on the research output of HEIs. Overall, the mean values across the various research relationships are within an acceptable range of 0.1–0.6. In the same vein, the standard deviation values cluster around the mean at acceptable range values of 0.04–0.1. Except for the relationship between the TMC method and research output (T-value = 0.433, Sig. = 0.667, $p > 0.05$), all the T-values for the research construct relationships are within the appreciable range of statistical values, between 2.029 and 12.311.

6. Discussion

This study investigated the impact of total quality management on the research output of higher education institutions in Nigeria from a perspective that can establish implications for theorists and practitioners. The contributions from this study extend existing understanding in the strategic management and organizational behaviour fields by describing the various levels of influences that
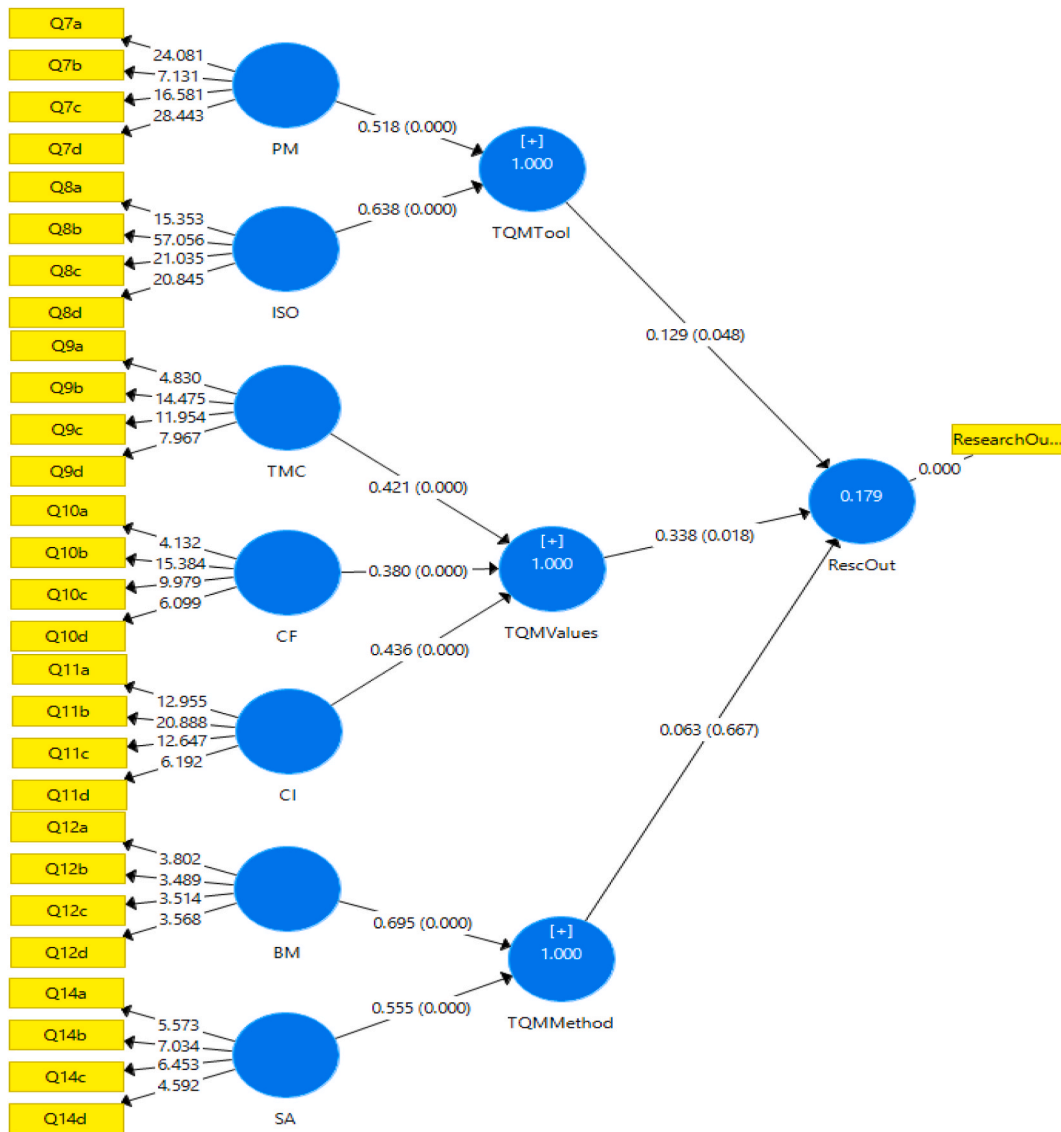
Fig. 2. Path analysis of research variables.

Table 4
Path coefficients of the research variables.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (OI/ST. DEV)	P Values
BM - > TQMMethod	0.695	0.672	0.091	7.661	0.000
CF - > TQMValues	0.380	0.368	0.040	9.448	0.000
CI - > TQMValues	0.436	0.444	0.072	6.023	0.000
ISO - > TQMTool	0.638	0.634	0.052	12.311	0.000
PM - > TQMTool	0.518	0.511	0.048	10.716	0.000
SA - > TQMMethod	0.555	0.550	0.096	5.777	0.000
TMC - > TQMValues	0.421	0.416	0.046	9.115	0.000
TMCMethod - > RescOut	0.063	0.073	0.145	0.433	0.667
TMCTool - > RescOut	0.129	0.119	0.064	2.029	0.048
TMCValues - > RescOut	0.338	0.355	0.138	2.449	0.018

different dimensions of TQM namely tools, values, and methodologies have on the research output of HEIs. Extending the theory to the developing economy perspective provides insights to HEIs in these regions about how to reposition their research efforts strategically for improved performance. Also, theorists are expected to advance the findings from this present study to better understand the

characteristics of total quality management issues surrounding research activities of HEIs in developing economies.

6.1. Implications for theory

The present study draws empirical evidence of the relationship between TQM and the research output of HEIs from a dataset that covers three private universities in Nigeria. While it appears that the dataset does not include both public and private HEIs in Nigeria, the present scope of the study is beneficial to informing theorists about the influence of TQM on the HEIs' research output. The strategic role of private universities in strengthening educational transformation in Nigeria is established by the industry stakeholders [48,49]. The incessant suspension of academic activities resulting from prolonged industrial actions in public universities has made private universities a desirable educational destination for many academics and students [50]. More so, private universities are now increasingly ranked among the leading universities in Nigeria [51]. Thus, data gathered and reported in this study supply theoretical insights for establishing the relationship between TQM and the research output of HEIs, especially from the perspective of private universities in Nigeria. Also, the methodology adopted by the present study is beneficial to guiding the theoretical framework of future research works that investigate TQM and research outcomes in HEIs.

The first research question of this study pertained to whether TQM tools improve the quality of research output of HEIs. Based on the multivariate analysis carried out, the result revealed that the adoption of TQM tools significantly and positively impacts on HEIs' research output. The statistically significant impact of process maps on HEIs' research output as gathered in this present study establishes that process maps used in HEIs to monitor quality application procedures during research processes will ensure that they are in line with the HEI's proposed quality objective and contribute value to the society. In addition, ISO 9000, which serves as a quality certification to best quality practicing institutions helps ensure that researchers' efforts are restructured and focused on the core mission of advancing teaching and learning both in the HEI and the larger society.

The second research question of this study relates to whether the implementation of TQM values will significantly improve the quality of HEIs' research output. The result of the multivariate analysis carried out revealed that implementing TQM values dimensions effectively improves the quality of HEIs' research output. This means that TQM values ensure that academic research outputs are improved over time. For example, the results from this study suggest that the top management's commitment to quality management practices in HEIs' research processes is reflected in the commitment of resources and various strategic decisions to quality improvement and to empower researchers to carry out different research activities that can directly impact the HEIs and society at large. The finding from this current study is consistent with the result from previous studies (for example [52,53]) that affirmed top management's support for quality research involves activities such as research funding, establishing quality standards, and governance for value-adding research and mentoring in the research process. The results from customer focus (focus on adding value to society) on the other hand, suggests that the research focus of HEIs should be tailored to solving practical issues and advancing environmental, social, and economic values of the larger society being the major beneficiaries of HEIs' research output. The finding from this study is in alignment with the Deming postulation that HEIs, industry, and government should cooperate as a system to improve the educational system of a country to support society's growth [54]. Overall, these results from the TQM values indicate that top management commitment, customer focus, and continuous improvement positively influence the research output of HEIs.

The third research question pertained to the whether effective implementation of TQM methodologies will significantly improve the quality of HEIs' research output. The result from the structural equation modeling analysis showed that benchmarking and self-assessment enhance the positive contributions of TQM methodologies toward HIEs' research output. Benchmarking as earlier stated occurs when organizations look out for key players in the industry who have made massive improvements over time, to understand their strategies and implement those strategies in their organization if possible [29]. The findings from this study align with Paliulis & Labanauskis [28] who asserted that HEIs that create high-profile research output benefit from intensive benchmarking of the global education industry leaders to understand their competitive strategies while creating their unique niche for effective performance. HEIs in the developing economy must comply accordingly to improve their research output profile. Also, the result from this present study shows that policy deployment serves as a medium whereby research goals and objectives set by an HEI, backed by appropriate policies, motivate research employees toward the attainment of those goals. Thus, policy deployment enforces motivation toward work and also increases efficiency among research employees [50,55]. Finally, Self-assessment is similar to self-evaluation which enhances the research output of HEIs. Thus, HEIs must embrace self-assessment, especially at the corporate level, as a means of identifying various issues in the system, proper alignment of the system's goals and activities with its research strategies, and making proper adjustments everywhere necessary. HEIs that identify their areas of strength and weakness and adopt measures to improve strategies on how to serve their customers, and overall society better could benefit from advantaged strategic positioning.

6.2. Implications for practice

The following implications apply to practitioners, policymakers, and overall stakeholders of HEIs, especially in developing economies, like Nigeria. It is expected that a more holistic approach to the adoption of TQM, such as dimensions of methodologies, tools, and values of TQM would greatly benefit HEIs' research performance. Moreover, HEIs are admonished to adopt these TQM tools to improve competency among research employees through proper evaluation of working conditions and creating a conducive environment to improve performance. The roles TQM values play in ensuring quality values are maintained in the long run is significant. Thus, top management commitment is required to ensure that there is a defined goal that aims towards quality actualization in higher education institutions, continuous improvement is also encouraged among HEIs research processes to be repositioned for global competitiveness. Customer (societal) focus helps to understand how to interact with students, parents, and employers (and their

organizations) to help serve them better. HEI practitioners and policymakers are urged to set policies in place and engage with benchmarking and self-assessment factors as a means to drive motivation among research faculty and staff to ensure competence.

7. Conclusion and further studies

The present study has extended the theory of TQM by investigating the impact of TQM dimensionalities on the research outputs of selected privately owned and managed HEIs in a developing economy, specifically Nigeria. The findings of the study can be suitably adapted to similar developing economies. The study concludes that total quality management has a positive and significant impact on the research output of higher education institutions in Nigeria. Our study makes an original contribution to the existing TQM literature by identifying TQM tools, values, and methodologies that will support HEIs' role in producing high-quality research outputs in developing economies like Nigeria. The relevance of this research was highlighted by the deplorable state of Higher Education Institutions in Nigeria such as inadequate infrastructure, obsolete educational system, strike actions seen mostly in public schools, deteriorated structures and equipment, and plagiarism. Hence, our study emphasizes that through TQM dimensions valuable research output that fulfills the stakeholders' expectations in Nigeria's education industry is a possible feat. Yet, we discuss areas of limitation of our study and make recommendations to direct future research in this area. We recognize that the present study has contributed to the literature on quality-focused research output in HEI from a private sector perspective. Meanwhile, the restriction of the study to selected private HEIs translates into a recommendation for further research to carry out investigations across both private and public HEIs in Nigeria. The context of the study is quite limited in terms of population and geographic spread, especially because the study was carried out only within private HEIs that shared their views about TQM and research performance in HEIs. Consequently, future studies should provide evidence from other geographic regions of developing economies, take to comparisons across economies, and even examine the influence of TQM on HEIs' research performance from both private and public HEIs. Nonetheless, the strength obtainable is contained in the fact that respondents' views were unbiased and provided new insights about how TQM should be directed to improve HEIs research performance in developing economies.

Funding

Author contribution statement

Ayodotun Stephen IBIDUNNI: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Benson Yuichi NWAODU: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Lerato Education MDAKA: Contributed reagents, materials, analysis tools or data.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

Supplementary content related to this article has been published online at [URL].

Availability of data and material

The data used for this study will be made available by the authors upon reasonable request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.heliyon.2023.e15443.

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