

# THE INFLUENCE OF INTERNATIONALIZATION FACTORS ON HIGHER EDUCATION MANAGEMENT QUALITY: A STRUCTURAL EQUATION MODELLING APPROACH\*

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## Abstract

This research article aims to: 1) To examine the levels of internationalization, Total Quality Management, Digital Transformation Leadership, and Higher Education Management Quality in higher education institutions in Hainan. 2) To investigate the direct and indirect effects of internationalization on higher education management quality, with Total Quality Management and Digital Transformation Leadership as mediating mechanisms. This study conducted a quantitative survey design, collecting data from 603 respondents, analyzed the data using structural equation modeling (SEM).

The research results indicate that:

1) Internationalization, Total Quality Management, Digital Transformation Leadership, and Higher Education Management Quality in

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Hainan's higher education institutions are all at a moderate level, suggesting a transitional stage of development.

2) Internationalization has a significant direct effect on higher education management quality and also exerts indirect effects through Total Quality Management and Digital Transformation Leadership, confirming the proposed governance mechanism.

**Keywords:** internationalization factors, higher education management quality, SEM, TQM, digital transformational leadership

## Introduction

Internationalization has become a central strategy for enhancing the competitiveness and sustainability of higher education systems under conditions of globalization and rapid technological change (Knight, 2004; Ota, 2018). As universities increasingly participate in cross-border teaching, research collaboration, and academic governance, the quality of higher education management has emerged as a critical determinant of institutional performance and international reputation (Altbach & Knight, 2007).

Higher education plays a pivotal role in socioeconomic development by cultivating advanced human capital, fostering innovation, and supporting national modernization agendas (Nugraha, 2018; Javed & Alenez, 2023). Consequently, internationalization is widely adopted as a policy instrument to improve educational quality, governance capacity, and managerial efficiency. Prior studies suggest that international engagement can contribute to improved institutional coordination and strategic alignment when effectively implemented (Knight, 2011).

Internationalization in higher education is a multidimensional process encompassing curriculum internationalization, international research

collaboration, faculty and student mobility, and global-oriented governance structures (Altbach & Knight, 2007). Empirical evidence from mature higher education systems indicates that sustained international engagement may stimulate innovation in academic management and organizational culture (Zhang & Cao, 2021). However, internationalization does not automatically lead to improvements in management quality. Its effectiveness largely depends on internal governance arrangements, leadership capacity, and quality assurance mechanisms.

From a theoretical perspective, internationalization functions not only as an external orientation but also as an internal transformation process that reshapes governance structures and managerial practices. Institutional theory and organizational learning theory suggest that exposure to international norms and standards exerts isomorphic pressures on universities, encouraging the adoption of standardized procedures and performance benchmarks. Nevertheless, such pressures require organizational mechanisms to be translated into stable management routines.

Total Quality Management (TQM) provides a systematic framework for embedding international standards into institutional processes through management commitment, stakeholder orientation, process management, and continuous improvement. In higher education, TQM facilitates the institutionalization of quality criteria across teaching, research administration, and student services, thereby supporting consistent governance practices. At the same time, Digital Transformation Leadership (DTL) has become increasingly important as digital technologies reshape academic governance and cross-border collaboration. Effective digital leadership enhances coordination efficiency, information transparency, and data-informed decision-making, enabling universities to manage the growing complexity associated with internationalization.

Although research on internationalization, quality management, and digital transformation in higher education has expanded, existing studies tend to address these domains separately, with limited attention to how internationalization is translated into higher education management quality through integrated internal governance mechanisms. In particular, the combined roles of Total Quality Management and Digital Transformation Leadership remain underexplored, especially in emerging international education contexts. To address this gap, the following literature review synthesizes prior research on higher education management quality, internationalization, Total Quality Management, and digital transformation leadership, thereby establishing the theoretical foundation for the proposed conceptual model.

## Objectives

1. To examine the levels of internationalization, Total Quality Management, Digital Transformation Leadership, and Higher Education Management Quality in higher education institutions in Hainan.
2. To investigate the direct and indirect effects of internationalization on higher education management quality, with Total Quality Management and Digital Transformation Leadership as mediating mechanisms.

## Literature Review

Higher Education Management Quality (HEMQ) is defined as the efficacy, stability, and maintainability of managerial procedures, which facilitate teaching, research, and service activities in higher institutions of learning. The previous researchers conceptualise HEMQ as a multidimensional construct that includes governing effectiveness, curriculum and instruction administration, faculty

development, student assistance services, and coordination of institutional resources (Wysocka et al., 2022; Guo et al., 2024).

Empirical studies have found that HEMQ is usually measured using managerial process indicators as opposed to outcome indicators exclusively. As an illustration, Wysocka et al. (2022) defined the quality of management in terms of the following dimensions: quality assurance systems, policy implementation, and institutional coordination. Likewise, Li and Xue (2022) prioritised such dimensions of the management quality measurement as governance capacity, strategic alignment, and internal quality assurance mechanisms as the essential measurements in the context of institutional internationalisation.

The latest research also brings HEMQ measurement to digital governance and data-supported management skills. Wang et al. (2024) and Fernandez et al. (2023) pointed out the growing importance of the digitalised management processes, transparency, and evidence-based decision-making as the inseparable elements of the modern quality of management in higher education. All of these studies imply that the validity of HEMQ measurement is to be confirmed as a latent construct that the standardised management processes and the effectiveness of the coordination of the teaching, research, and administration areas reflect the HEMQ.

The term internationalisation in higher education is a broad term that is often defined as the conscious adoption of international, transcultural, and interconnected aspects in the mission, operations (Knight, 2004). The literature is also very clear in presenting internationalisation as a multidimensional construct and not as an activity.

Some of the sub-dimensions of internationalization measured previously include Internationalization of Curriculum and Instruction (ICI), Internationalization of Scientific Research (ISR), Internationalization of the Faculty (IF), Student Composition Internationalization (SCI), Internationalization of

Information Technology (ITI) or Internationalization of Organisational Strategy and Governance (IOSG) (Texeira-Quiros et al., 2022; Zhu & Wang, 2022).

Empirical operationalisation is most often based on the perceptual indicators that determine the degree to which the international factors are incorporated in teaching materials, research partnerships, mobility of lecturers, governance systems, and technological infrastructure (Li & Xue, 2022). Ferreira Santos (2024) also highlighted that the measurement of internationalisation is becoming more of a digital aspect, which indicates the intersection of the global and digital transformation.

In general, the available evidence advocates the measurement of internationalisation as a second-order latent construct that consists of several dimensions of first order that describe the academic, organisational, and technological international involvement.

Total Quality Management (TQM) has found a lot of application in higher learning as a procedural method of enhancing organisational performance by the process of continuous improvement, stakeholder orientation, and process standardisation. TQM in higher education is usually theorised as a multidimensional concept that encompasses the management commitment, customer orientation, employee involvement, process management, supplier management, and continuous improvement (Texeira-Quiros et al., 2022; Amalia et al., 2025).

TQM measurement is normally based on the Likert-scale measures that measure the degree to which the principles of quality are incorporated in the institutional practises. As an example, Texeira-Quiros et al. (2022) used the dimensions of leadership commitment, process control, and continuous improvement culture to measure TQM. Amalia et al. (2025) also proved that the TQM practises are operationalizable based on the curriculum management

procedures, quality assessment mechanisms, and cross-functional cooperation.

Systematic reviews also show that TQM measurement in higher education focuses more on internal quality and less on short-term performance results, and this highlights that this measurement is an enabling management mechanism and not a direct generator of outcome (Ahmed, 2026). These results support the decision to consider TQM as a mediating construct that can be used to transfer strategic initiatives, including internationalisation, into operational management advancements.

Digital Transformation Leadership (DTL) denotes the leadership skills that can help organisations to use digital technologies in a strategic manner to alter structures, processes, and models of governance. DTL is gradually being identified as an essential factor in the quality of management and the capacity to adapt to changing environment within the area of higher education (Sukandi, 2024; Laufer et al., 2025).

According to the literature, DTL is often quantified based on the dimensions that reflect digital mindset and sensitivity, capability to curate digital resources, capability to nurture digital talent, and cross-functional digital coordination (Fernández et al., 2023; Makda, 2025). Ferreira Santos (2024) highlighted that digital leadership in internationalised universities goes beyond the technical adoption to the strategic implementation of digital systems in teaching management, research governance and student services.

DTL is operationalised using perceptual indicators that represent the skills of leaders in encouraging digital platforms, facilitating the use of data in decision-making, and integrating digital transformation within the organisation when used empirically (Benabed et al., 2024). These measurement strategies confirm the opinion that DTL is an enabling and mediating process that increases management controllability, transparency and efficiency of coordination in an internationalised higher education setting.

According to the literature reviewed, the conceptualization of this study is the HEMQ, Internationalization, TQM, and DTL as latent factors measured as a number of indicators (observed) related to managerial processes, organisational practises, and leadership capabilities. The current empirical evidence justifies that perceptual survey measures can be used to measure these constructs, especially in analysing their structural relationships with the help of SEM.

Through the incorporation of internationalisation as an exogenous variable and TQM and DTL as intermediaries, the current study builds on the previous studies by providing an empirical study on how the global engagement initiatives can be transformed into the management quality in higher education via quality-oriented management practises and digital leadership skills.

## Methodology

### Research Design and Data Collection

A purposive sampling strategy was adopted to ensure that respondents were directly involved in or familiar with internationalization-related management practices. Faculty members and administrative staff were selected because they play central roles in planning, implementing, and evaluating internationalization, quality management, and digital transformation initiatives within higher education institutions.

Institutions were selected to reflect diversity in institutional type and administrative level within Hainan Province.

Following the pilot study, a formal questionnaire survey was conducted among faculty members and administrative staff at higher education institutions in Hainan Province. The survey instrument, Survey on Internationalization Influencing Factors of Higher Education Management Quality in Hainan, was administered anonymously. Information regarding the research purpose,

instructions for completion, and data usage was clearly provided to ensure informed consent and response reliability.

A total of 708 questionnaires were distributed, and 603 valid responses were retained after screening for completeness and consistency, yielding an effective response rate of 85.17%. According to common guidelines for structural equation modeling, a sample size of at least 10–20 times the number of observed variables is recommended. With 25 observed variables, the final sample size exceeds the suggested threshold and supports stable model estimation.

Data analysis was performed using SPSS 26.0 and AMOS 24.0. Descriptive statistics were used to summarize demographic characteristics and the distribution of key variables. Reliability was assessed using Cronbach's alpha coefficients, while construct validity was examined through confirmatory factor analysis. Convergent validity was evaluated using factor loadings, composite reliability, and average variance extracted, and discriminant validity was assessed by comparing the square roots of AVE with inter-construct correlations.

Group differences across demographic variables were examined using independent-samples t-tests and one-way ANOVA. Pearson correlation analysis was applied to explore relationships among internationalization, Total Quality Management, Digital Transformation Leadership, and Higher Education Management Quality. Multiple linear regression analysis was conducted to examine the predictive effects of the independent variables, with variance inflation factors used to assess multicollinearity.

Structural equation modeling was employed to test the hypothesized relationships among the study variables. Model fit was evaluated using commonly accepted indices, including CMIN/df, GFI, AGFI, RMSEA, CFI, TLI, and NFI. Mediation effects were further examined using bootstrap procedures with bias-corrected confidence intervals.

This study adopts a quantitative survey design to examine the effects of internationalization-related factors on higher education management quality in

Hainan Province. Data were collected from faculty members and administrative staff across 16 undergraduate and junior college institutions, yielding 603 valid responses. Participation was voluntary, and all respondents were informed of the academic purpose of the study.

### **Measurement and Variables**

This study examines the internationalization-related factors influencing higher education management quality. All constructs were measured using a five-point Likert scale, which is widely adopted in higher education management research and is suitable for capturing respondents' perceptions of latent variables in organizational and governance studies.

The independent variables include Internationalization (INT), Total Quality Management (TQM), and Digital Transformation Leadership (DTL). Internationalization is conceptualized as a multidimensional construct encompassing curriculum and instruction internationalization, international research collaboration, faculty internationalization, student composition internationalization, internationalization of social and community service, internationalization of information technology, and internationalized organizational strategy and governance.

TQM is measured through management commitment, customer orientation, process management, supplier management employee involvement and continuous improvement. These dimensions reflect the application of quality principles in daily management practises.

DTL is measured through six leadership dimensions. DTL includes These dimensions reflect transformational leadership and digital capability development.

The dependent variable is higher education management quality (HEMQ). HEMQ includes governance of strategy and organisation, faculty development

and human resource management, student administration and support, and curriculum and instruction management.

Demographic variables are included as control variables. These variables include gender, age, highest educational attainment, professional title, frequency of participation in international-related activities, and overseas experience. They are used to control for individual differences.

**Table 1** Descriptive Statistics of Key Variables (n = 603)

Variable	Mean	SD	Level
Internationalization	2.97	0.67	Moderate
Total Quality Management (TQM)	3.01	0.67	Moderate
Digital Transformation Leadership (DTL)	2.99	0.67	Moderate
Higher Education Management Quality (HEMQ)	3.04	0.67	Moderate

Note. Mean values were measured on a five-point Likert scale, with values between 2.34 and 3.66 interpreted as indicating a moderate level.

Table 1 reports the descriptive statistics of the main variables. All variables exhibit moderate mean values, ranging from 2.97 to 3.04, indicating a medium level of development in internationalization, Total Quality Management, Digital Transformation Leadership, and Higher Education Management Quality. The relatively small standard deviations suggest stable perceptions among respondents, providing a suitable basis for further structural analysis.

## Reliability Analysis

**Table 2** Reliability Summary of Measurement Scales

Construct	No. of Items	Cronbach's $\alpha$
Total Quality Management (TQM)	24	.97
Digital Transformational Leadership (DTL)	20	.96
Internationalization (INT)	27	.97
Higher Education Management Quality (HEMQ)	35	.98
Overall Scale	106	.98

Cronbach's alpha reliability analysis was conducted on the final questionnaire to assess the internal consistency of the measurement scales under large-sample conditions. The results are presented in Table 1.

### Measurement Model Assessment

Confirmatory factor analysis (CFA) was performed to evaluate the reliability and validity of the measurement model prior to testing the structural relationships. The measurement model demonstrated an excellent fit to the data ( $\chi^2/df = 1.21$ , RMSEA = .019, CFI = .997, TLI = .997), indicating that the proposed factor structure adequately represented the observed data.

All standardised factor loadings exceeded .70, ranging from 0.869 to 0.972, suggesting strong relationships between observed indicators and their corresponding latent constructs. As presented in Table 3, composite reliability (CR) values ranged from 0.960 to 0.978, and average variance extracted (AVE) values ranged from 0.793 to 0.882, surpassing recommended thresholds and indicating satisfactory convergent validity.

Discriminant validity was assessed using the Fornell–Larcker criterion. As shown in Table 4, the square roots of AVE for all constructs were greater than the corresponding inter-construct correlations, confirming adequate discriminant validity. Overall, the results demonstrate that the measurement model possesses satisfactory reliability and validity, providing a sound foundation for subsequent structural equation modeling.

**Table 3** Composite Reliability and Convergent Validity

Construct	CR	AVE
TQM	0.966	0.826
DTL	0.960	0.799
INT	0.964	0.793
HEMQ	0.978	0.882

**Table 4** Discriminant Validity (Fornell–Larcker Criterion)

	TQM	DTL	INT	HEMQ
TQM	0.909			
DTL	0.390	0.894		
INT	0.368	0.438	0.890	
HEMQ	0.463	0.476	0.486	0.939

### Data Analysis and Structural Equation Modeling

Structural equation modeling was employed because it allows for the simultaneous estimation of multiple relationships among latent constructs while accounting for measurement error, which is particularly suitable for testing complex mediation models in higher education management research.

Statistical software was used to analyse the data. First, the descriptive statistics were created to describe the demographic attributes of the respondents. To determine internal consistency, reliability analysis was carried out with the help of Cronbach's alpha. Factor structures were first examined preliminarily before confirmatory analysis was done.

Confirmatory factor analysis (CFA) was then used to determine the validity of the measurement model. The commonly accepted indices were used to evaluate the model fit, and they included 2 / df, Comparative Fit Index (CFI), Tucker Lewis Index (TLI), root mean square error of approximation (RMSEA), and standardised root mean square residual (SRMR).

The hypothesised relationships between the latent constructs were, in turn, tested using structural equation modeling (SEM). The second-order latent variables were Internationalisation (INT) and Total Quality Management (TQM), and the dependent second-order latent variable was higher education management quality (HEMQ). HEMQ was directly related to the control variables to determine the strength of the structural relationships. The analysis assessed statistical significance at the 0.05 level.

### Conceptual Framework

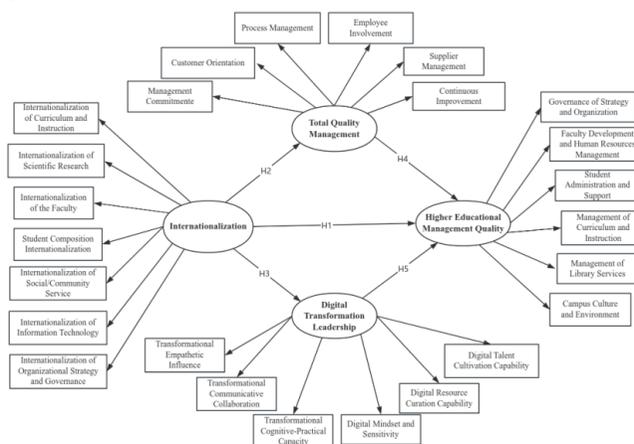


Figure 1 Conceptual framework of the study

Figure 1 presents the conceptual framework of the study. Internationalization (INT) is hypothesised to influence higher education management quality (HEMQ) both directly and indirectly through Total Quality Management (TQM) and Digital Transformation Leadership (DTL).

From a theoretical perspective, internationalization is not expected to improve higher education management quality automatically. Its governance effects depend on the presence of internal organizational mechanisms that translate external standards and global practices into institutional routines. Total Quality Management (TQM) serves as a formalized quality assurance mechanism by embedding international norms into standardized procedures, performance monitoring, and continuous improvement processes. Digital Transformational Leadership (DTL), in turn, provides the strategic and technological capacity required to coordinate complex international activities, enhance information transparency, and support data-informed decision-making. Accordingly, TQM and DTL are positioned as complementary mediating mechanisms through which internationalization influences higher education management quality, forming an integrated conceptual framework linking international engagement, organizational processes, and governance outcomes.

## Results

### Sample Characteristics

A total of 603 valid questionnaires were collected from 16 undergraduate and junior college institutions in Hainan Province, including 514 faculty members (85.24%) and 89 administrative staff (14.76%). The sample comprised 58.04% male and 41.96% female respondents. Most participants were aged between 31 and 50 years (63.85%), held a master's degree or above (79.10%), and occupied junior or intermediate professional titles (78.11%). Overall, the sample

demonstrates adequate demographic diversity and institutional representation, supporting its suitability for subsequent statistical analysis.

**Table 5** Demographic Characteristics of the Sample

Category	Option	Frequency	Percentage (%)
Identity	Faculty	514	85.24
	Administrative staff	89	14.76
Gender	Male	350	58.04
	Female	253	41.96
Age	30 years and below	128	21.23
	31–40 years	207	34.33
	41–50 years	178	29.52
	51–60 years	90	14.93
Educational level	Doctoral degree	101	16.75
	Master's degree	376	62.35
	Bachelor's degree	122	20.23
	Associate degree	4	0.66
Professional title	Junior	207	34.33
	Intermediate	264	43.78
	Senior	132	21.89

#### Research Results for Objective 1

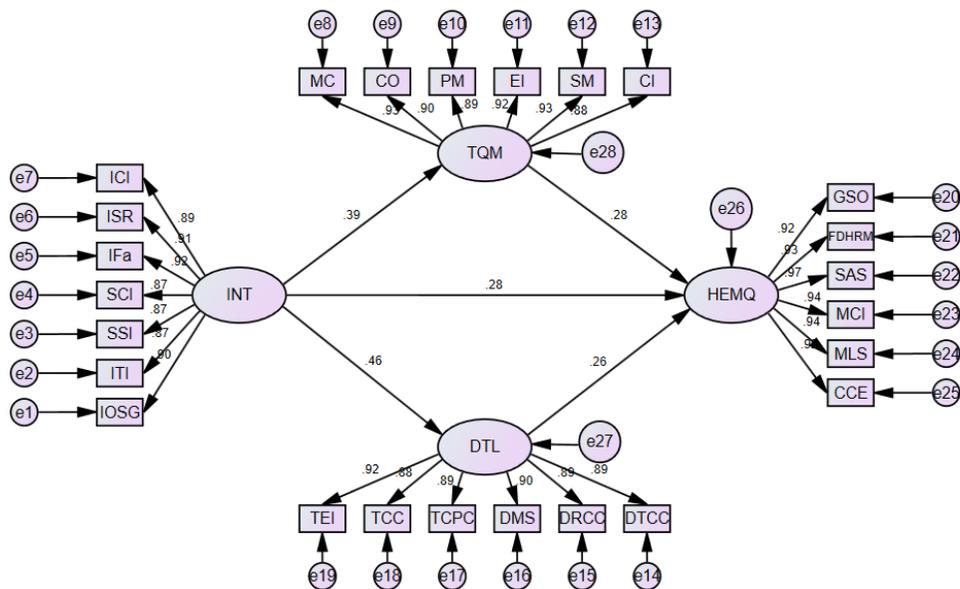
As shown in Table 1, the mean values of internationalization, TQM, DTL, and HEMQ are all at a moderate level, indicating a medium level of development across the key constructs in higher education institutions in Hainan.

These findings are broadly consistent with prior studies indicating that internationalization, quality management practices, and digital leadership in

developing or emerging higher education contexts tend to remain at a moderate level rather than reaching advanced maturity.

Similar patterns have been reported in studies conducted in regional higher education systems undergoing policy-driven international expansion, where institutional capacities and governance mechanisms are still evolving. The moderate levels observed in Hainan suggest that higher education institutions are in a transitional phase, characterized by increasing international engagement and management reform, but with uneven implementation across institutions.

### Structural Model Results



**Figure 2** Structural Equation Model for the research objective 2

Figure 2 illustrates the estimated structural paths among internationalization, Total Quality Management, Digital Transformation Leadership, and Higher Education Management Quality, with standardized coefficients indicating the strength and significance of each relationship.

### Research Results for Research Objective 2

To address Research Objective 2, this study proposed and empirically tested a structural model to examine how higher education management quality (HEMQ) can be enhanced in Hainan Province. The results indicate that internationalization (INT) has a significant direct effect on HEMQ ( $\beta = 0.28, p < 0.05$ ), suggesting that international engagement contributes directly to improvements in higher education management.

In addition, internationalization exerts significant indirect effects through two mediating mechanisms. INT has a positive effect on Total Quality Management (TQM) ( $\beta = 0.39, p < 0.05$ ), which in turn significantly influences HEMQ ( $\beta = 0.28, p < 0.05$ ), indicating that quality-oriented management practices serve as an important pathway through which internationalization enhances management quality. Similarly, INT positively affects Digital Transformational Leadership (DTL) ( $\beta = 0.46, p < 0.05$ ), and DTL further contributes to HEMQ ( $\beta = 0.26, p < 0.05$ ).

Together, these results provide empirical support for the proposed structural model, demonstrating that internationalization enhances higher education management quality through both direct pathways and complementary governance mechanisms.

The structural relationships identified in this study are consistent with existing empirical research emphasizing the role of internationalization as a key driver of management quality in higher education.

Prior studies have similarly found that international engagement contributes to governance improvement when supported by internal quality management systems and leadership capacity.

The significant mediating effects of Total Quality Management and Digital Transformation Leadership further corroborate arguments that internationalization influences management quality primarily through

organizational and managerial mechanisms rather than through direct exposure alone.

Compared with previous studies that examine internationalization, quality management, or digital leadership in isolation, this study provides empirical evidence of their integrated governance effects within a single analytical framework.

In particular, the dual mediating roles of Total Quality Management and Digital Transformation Leadership highlight how internationalization is translated into higher education management quality through complementary organizational processes.

This finding extends existing research by demonstrating that internationalization functions as a structural driver of management quality in emerging international education regions, only when supported by internal governance mechanisms.

## Discussion

The findings of this study indicate that internationalization is positively associated with higher education management quality, supporting the view that international engagement functions not only as an academic activity but also as a managerial driver. This result is consistent with prior research emphasizing the role of internationalization in strengthening governance effectiveness and organizational coordination in higher education institutions.

From a theoretical perspective, the results suggest that the influence of internationalization on management quality is not purely automatic or direct. International engagement introduces external norms, standards, and operational complexity, which require internal organizational mechanisms to be translated into stable management routines. Without such mechanisms, internationalization

may remain fragmented and fail to generate substantive governance improvement.

The structural model further highlights the complementary mediating roles of Total Quality Management and Digital Transformation Leadership in this translation process. Total Quality Management contributes procedural stability by institutionalizing international standards through continuous improvement, process management, and quality assurance practices. Digital Transformation Leadership enhances coordination efficiency, information transparency, and data-informed decision-making, thereby strengthening managerial responsiveness in increasingly complex international environments. Together, these mechanisms explain how internationalization is transformed into sustainable improvements in higher education management quality.

The observed moderate levels across internationalization, TQM, DTL, and management quality reflect a transitional stage in Hainan's higher education system. Reform initiatives related to international engagement, quality management, and digital transformation have been broadly introduced, but their integration into governance structures and leadership routines remains uneven across institutions. This pattern suggests that the primary challenge lies not in the absence of reform efforts, but in the depth of institutional embedding and coordination.

Taken together, the findings indicate that improving higher education management quality requires moving beyond fragmented or symbolic reforms toward a more integrated, governance-oriented approach to internationalization and digital transformation. Internationalization functions as a structural driver of management quality only when supported by coherent quality management systems and digitally enabled leadership practices.

## Recommendation

Based on the significant direct and indirect effects identified in the structural model, the findings suggest that improving higher education management quality in Hainan requires a more integrated governance approach. Given that internationalization exerts both a direct influence on management quality and indirect effects through Total Quality Management and Digital Transformation Leadership, internationalization initiatives should be systematically embedded within core management and quality assurance systems rather than implemented as stand-alone projects.

Specifically, the significant mediating role of Total Quality Management indicates that internationalization strategies need to be translated into standardized procedures, performance monitoring, and continuous improvement mechanisms. Universities may strengthen internal quality assurance systems by aligning international benchmarks with curriculum management, faculty evaluation, and administrative processes, thereby enhancing the institutionalization of international standards.

The significant mediating effect of Digital Transformation Leadership further highlights the importance of leadership capacity in coordinating international activities and governance processes. Strengthening leadership competencies in digital governance, data literacy, and technology-enabled change management may improve information transparency, cross-departmental coordination, and evidence-based decision-making.

At the system level, policy frameworks that promote cross-institutional collaboration, shared digital platforms, and integrated quality monitoring mechanisms may further support coordinated development. By jointly reinforcing quality management systems and digital leadership capacities, higher education institutions can more effectively convert international engagement into sustained improvements in management quality.

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