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Evaluating quality management in private universities: A context-input-process-output model approach

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ABSTRACT

This study applies the Context-Input-Process-Outcome (CIPO) model to assess quality management practices in private universities, focusing on identifying key influencing factors, evaluating their feasibility, and proposing strategic improvements. A total of 586 participants, including students and faculty members, were surveyed using a structured instrument covering 22 indicators across all CIPO dimensions. Data analysis, employing fuzzy logic and t-tests, reveals that measures such as adherence to accreditation standards (mean = 4.25) and faculty development initiatives (mean = 4.50) are highly valued. However, a significant feasibility gap (mean = 3.75) highlights challenges in practical implementation. Key obstacles include financial constraints, conflicting stakeholder priorities, and limited internal capacity, all of which complicate the effective implementation of quality management strategies. The study underscores the value of adopting data-driven approaches that incorporate stakeholder feedback and technological tools to make quality management initiatives more practical and effective. Additionally, fostering stronger collaboration between universities, regulatory agencies, and industry partners is essential to address implementation challenges and ensure that quality assurance efforts are responsive to real-world needs. By applying the CIPO model within the specific context of private universities, this research offers insights that can help educational leaders and policymakers refine quality management frameworks, ultimately contributing to meaningful and sustainable improvements in higher education.

Contribution/Originality: This study employs the CIPO model to evaluate quality management in Vietnamese private universities, utilizing fuzzy interval surveys to incorporate faculty and student perspectives. It addresses existing research gaps by focusing on private institutions and integrating stakeholder views to comprehensively assess the importance, feasibility, challenges, and effectiveness of quality management practices.

1. INTRODUCTION

Universities now give great importance to ensuring and raising the quality of their instruction, particularly in the competitive environment of today when they have to not only attract students but also uphold high intellectual standards. These issues are especially relevant for private universities since they usually operate with more autonomy, depend primarily on tuition fees, and must continually improve their quality control plans to remain competitive. Ensuring long-term success depends on understanding how effectively these techniques work and identifying areas where improvements are needed.

The Context-Input-Process-Outcome (CIPO) model offers a disciplined yet adaptable framework for assessing management of educational quality. This approach allows colleges to examine not only the end results but also the entire process leading up to them, enabling the identification of both areas needing more focus and strengths. Although useful, studies specifically utilizing the CIPO model particularly in Vietnam, where these colleges are becoming increasingly significant in higher education remain limited, especially in private universities. These gaps highlight the need for a more comprehensive evaluation of quality management strategies applying the CIPO model.

Numerous models of quality management in higher education including the CIPO model and other quality assurance systems have been thoroughly investigated based on solid research. Although prior studies (such as Ahmad, Ali, & Hassan, 2018; Binsahl, 2019; Bueno, 2017) have demonstrated the efficacy of the CIPO model in assessing institutional performance, its application to private universities remains underdeveloped. Furthermore, studies on quality control in Vietnamese private universities are still ongoing; most of these focus on public institutions or broader trends in higher education (Nguyen & Shah, 2019). This study expands on the body of current research by using the CIPO model, especially in private university environments, thus offering fresh perspectives on the opportunities and challenges these institutions face.

By methodically using the CIPO model to assess quality management procedures in private universities, this study seeks to close that gap. The research specifically aims to: (1) identify important factors that impact quality assurance; (2) evaluate the practicality of these strategies; and (3) suggest workable solutions to improve quality management frameworks. To achieve this, we polled 586 individuals both students and faculty and employed fuzzy logic and t-tests to analyze their responses.

By shedding light on both the successes and the challenges of current quality management practices, this research provides valuable insights for university administrators, policymakers, and education stakeholders. It also contributes to a larger conversation about how structured evaluation models like CIPO can help institutions enhance their educational standards and ensure long-term sustainability.

2. LITERATURE REVIEW

2.1. Theoretical Foundations of Quality Management in Higher Education

Quality management in higher education is viewed as a process of applying procedures and policies to ensure that all learning processes meet established standards and provide maximum learning results to learners (Calma & Dickson-Deane, 2020). As a concept, it is not new, yet it is a serious one in that it is a reaction to growing competition and heightened expectations of society, the job market, and other interested groups (Green, 2012). The usual components of quality management include applying standards, evaluating learning processes, improving curricula, instructional approaches, and learning settings (Ahmad et al., 2018).

In practice, university quality management is a process involving a sequence of steps that include regular review of training programs, collection of student and instructor feedback, and data analysis to implement necessary improvements (Shurygin, Saenko, Zekiy, Klochko, & Kulapov, 2021). The CIPO model (Context, Input, Process, Outcome) is used extensively to review various aspects of educational quality management (Santos, 2020). The model not only examines outcomes but also analyzes the entire process, beginning from planning to implementation and measurement, to ensure each stage of education is optimized to provide better quality (Sandström, 2016). The entire process requires the involvement of all participants in education administrators, instructors, and students in order to develop a culture of continuous improvement and sustainable development (Binsahl, 2019).

Applying quality management principles is helpful in assisting universities to maintain their prestige and attract students, especially in a competitive and globalized environment (Bueno, 2017). Universities need to adjust management practices dynamically to suit their specific circumstances and needs, ensuring conformity with national and international requirements (Nguyen & Shah, 2019; Pham & Starkey, 2016).

In summary, university quality management is more than a question of maintaining existing standards; it is a process of improvement and adjustment to changing learner and social requirements. The CIPO model is a broad yet flexible approach to assessing and improving educational quality that enables universities to achieve sustainable development goals in a dynamic learning system (Ahmad et al., 2018; Santos, 2020).

2.2. Overview of Studies Evaluating Quality Management Practices

The process of implementing procedures and policies to guarantee that all learning processes fulfill set criteria and provide the best learning outcomes for students is known as quality management in higher education (Kaiseroglou & Sfakianaki, 2020). Even though the idea is not new, its importance has grown as a result of increased competition and societal, labor market, and stakeholder expectations (Green, 2012). Setting standards, assessing learning procedures, developing curriculum, honing teaching strategies, and upgrading learning environments are usually important components of quality management (Ahmad et al., 2018).

In reality, university quality management entails a number of interconnected procedures, including routinely evaluating academic programs, obtaining staff and student input, and analyzing data to make the necessary adjustments (Shurygin et al., 2021). Many facets of educational quality management are evaluated using the CIPO model (Context, Input, Process, Outcome) (Santos, 2020). This strategy ensures that every element of education is improved to enhance quality by examining the entire process, from planning and execution to assessment, in addition to monitoring results (Sandström, 2016). To do this, administrators, teachers, and students must all actively participate in order to promote a culture of sustainable development and ongoing improvement (Binsahl, 2019).

In a highly competitive and increasingly globalized educational environment, colleges can maintain their reputation and attract students by implementing quality management concepts (Bueno, 2017). While maintaining compliance with national and international norms, institutions must implement adaptable management techniques catered to their unique needs and settings (Nguyen & Shah, 2019; Pham & Starkey, 2016).

In conclusion, rather than merely maintaining established standards, quality management in higher education is an ongoing process of development and adaptation to shifting student and societal requirements. The CIPO model, which provides a comprehensive yet adaptable framework for evaluating and enhancing educational quality, can help universities achieve sustainable development goals in a dynamic academic environment (Ahmad et al., 2018; Santos, 2020).

2.3. Research Gaps

The following research gaps have been identified through the examination of relevant documentation:

First off, despite the CIPO model's widespread use in educational contexts worldwide, few studies specifically employ this framework to assess quality management in Vietnam's private colleges. There is a great need for research because private colleges in Vietnam operate differently than those in other nations due to factors like market-driven strategies, autonomous mechanisms, and a significant reliance on student tuition fees.

Furthermore, previous research has often overlooked the valuable perspectives provided by instructors and students in favor of focusing primarily on management inputs and procedures. Their input remains underutilized in current studies, despite being a crucial source of data for assessing and improving quality management practices.

3. RESEARCH METHODOLOGY

By gathering opinions from instructors and students, who are important participants in the organizational-level execution of quality management policies, this study seeks to assess quality management initiatives in private universities. The study employs a quantitative research design with fuzzy data analysis techniques to capture more nuanced insights into quality management practices, ensuring methodological rigor and a structured evaluation.

The authors first asked professionals to review and improve a survey that was created using the CIPO model. Stakeholder perceptions are traditionally measured using single-response questionnaires, but these methods frequently fall short of capturing the nuanced nature of ideas (Marasini, Quatto, & Ripamonti, 2016; Sun & Wu, 2007). In order to get around this restriction, we used the interval-valued fuzzy sets concept, which was first presented by Zadeh (1975). This concept enables respondents to express their opinions across a range of values instead of choosing just one conclusive answer. This method provides a more accurate depiction of views on educational quality management. Key ideas in the literature on educational management evaluation served as the basis for the study's indicators.

3.1. Participants and Sampling

586 participants from five private universities in Ho Chi Minh City, Vietnam, including faculty and students, were surveyed for the study. These institutions are The Saigon International University (SIU), Hong Bang International University (HIU), Van Hien University (VHU), Ho Chi Minh City University of Foreign Languages and Information Technology (HUFLIT), and Ho Chi Minh City University of Technology (HUTECH). These universities were selected due to their diverse academic programs, expanding student populations, and commitment to quality assurance measures. To ensure proportional representation across different disciplines and institutional roles, a stratified sampling technique was employed, ensuring that both faculty and students' perspectives were adequately captured.

3.2. Instrument Development

Context (C), Input (I), Process (P), and Output (O) are the four dimensions into which the study divided the CIPO indicators for quality management in education. The fuzzy questionnaire included 30 essential items that were derived from a comprehensive review of the literature on quality management in higher education (Andrade-Girón, Marín-Rodriguez, Zúñiga-Rojas, Susanibar-Ramirez, & Calvo-Rivera, 2023). To guarantee thorough coverage of quality management factors, these items were organized in accordance with the CIPO model.

A panel of 15 educational specialists, comprising professors, researchers, and administrators with expertise in quality management, was asked to assess the questionnaire in order to validate the tool. These professionals, who had ten to fifteen years of experience, evaluated each indicator's significance. To account for uncertainty in their assessments, experts were able to assign responses in a range of 1 (Minimum) to 5 (Maximum) using the fuzzy survey format. To represent this ambiguity, an expert could choose both values (for example, "3" and "4"), if they felt that an item's importance fell between two values (Figure 1).

Figure 1. Fuzzy rating scale used in the survey.

To ensure an unbiased representation of responses, the gathered expert evaluations were processed to determine fuzzy mean, radius, and central values. The central value indicates the most representative rating, while the fuzzy mean shows the average of all given value ranges (Gubarenko, 2014). For inclusion in the study's evaluation of education quality management, any indicator with a central value and total weight greater than three was deemed significant.

3.3. Data Collection

A 97.67% response rate was obtained from the final questionnaire, which was distributed both in person and online between May and June 2024. This high participation rate reinforces the findings' generalizability and

guarantees the accuracy of the data collected. A more comprehensive view of quality management procedures in various institutional contexts is provided by the inclusion of several private universities.

3.4. Fuzzy Data Transformation and Analysis

Fuzzy interval data was represented using a value range [a, b], where "a" stands for the lower bound and "b" for the upper bound. By choosing a range rather than a single definitive rating, the interval approach enables respondents to convey their degree of confidence in an indicator (Carlucci, Renna, Izzo, & Schiuma, 2019; Chang, 2012; Fesenko et al., 2022; Mirasol-Cavero & Ocampo, 2023). While the central value, which represents the most likely expert rating, was calculated using the formula (a + b) / 2, the fuzzy mean was determined by averaging the lower and upper bounds of expert responses. Furthermore, $\ell = b - a$ was used to calculate the fuzzy interval's radius, which quantified the degree of variability or uncertainty in participant assessments.

The study employed fuzzy logic techniques to analyze subjective perceptions of quality management indicators, ensuring methodological rigor. Statistical comparisons between faculty and student responses were conducted using t-tests, while descriptive statistics such as means and standard deviations assessed the significance, feasibility, and effectiveness of each quality management measure (Benz-Camino, Ramírez-Valdivia, Morales-Casetti, & Sirias, 2023; Mulay & Khanna, 2020). These approaches align with established practices in quality management research in higher education (Andrade-Girón et al., 2023).

Table 2 lists the education quality management indicators that were chosen to assess the implementation at private universities. Four indicators (C1–C4), five indicators (I1–I5), seven indicators (P1–P7), and six indicators (O1–O6) are included in the Context (C), Input (I), Process (P), and Output (O) aspects, respectively. The fact that all central values are greater than three suggests that the experts considered these indicators to be very important. To measure and improve the quality of education at private universities, a survey tool has been developed using these indicators to gather information from instructors, students, and administrative personnel.

The process of developing the tool and transforming fuzzy data is illustrated in Figure 2.

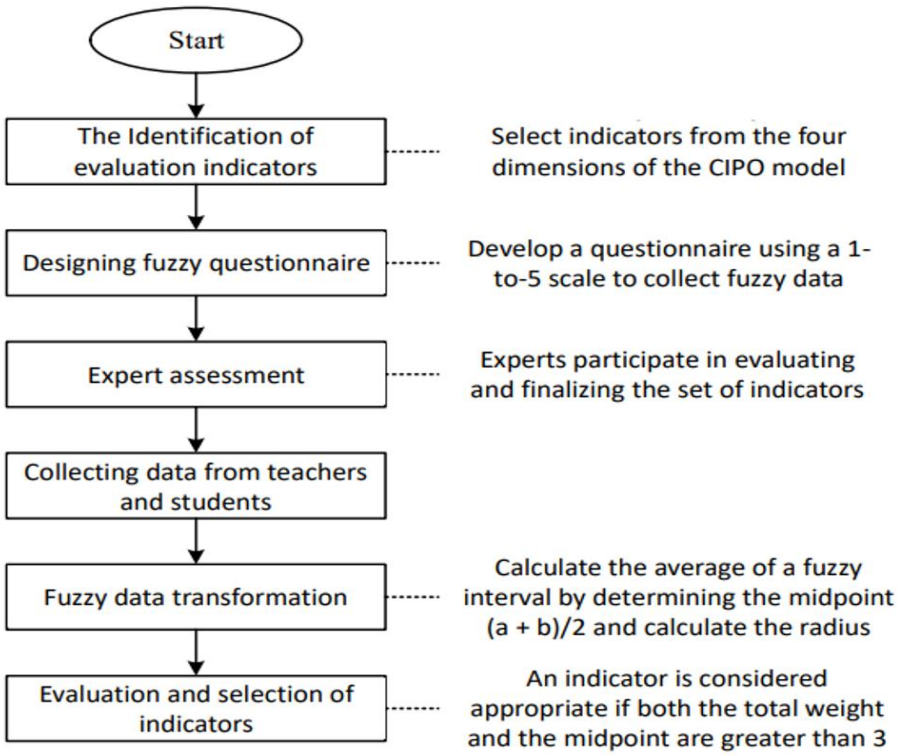

Figure 2. The process of developing tools and transforming fuzzy data.

3.5. Data Collection

In May 2024, questionnaires were distributed to 300 students and 300 faculty members at private universities. Participation was voluntary, and 586 valid responses were received, achieving a response rate of 97.67%. Of the respondents, 49.5% were students, and 50.5% were faculty members. The number of female participants was 276 (47.1% of the total). Details of the sample distribution are presented in Table 1.

Table 1. Descriptive statistics of the research sample.

Category	Valid participants	Proportion of total
Gender		
Male	310	52.9
Female	276	47.1
Role		
Students	290	49.5
Faculty	296	50.5
Field of Study		
Social Sciences and Humanities	190	32.4
Engineering and Technology	180	30.7
Health and Medicine	116	19.8
Arts and Design	100	17.1
Type of Program		
Regular Program	386	65.9
High-quality program taught in English	200	34.1
Total	586	100

3.6. Data Analysis

The data analysis process for this study began with coding to represent patterns within the data. SPSS software was used to decode and summarize the data. The study focused on evaluating four key aspects of quality management at private universities, including: (1) the importance of implementing quality management measures, (2) the feasibility of these measures, (3) challenges and barriers in implementation, and (4) the effectiveness of the measures that have been implemented. These aspects were considered to provide a comprehensive view of the implementation of quality management measures, enabling appropriate recommendations and improvement strategies (Kaiseroglou & Sfakianaki, 2020; Yahiaoui et al., 2022).

Subsequently, comparisons between the aspects were conducted to better understand the differences and prioritization of each quality management measure in practical contexts. Comparisons among importance, feasibility, challenges, and effectiveness helped identify which measures are essential and implementable while also recognizing potential difficulties in execution. This comparative analysis not only provides insight into how the measures are evaluated but also aids educational managers in prioritizing resources and developing suitable strategies to improve the quality of education at private universities (Dallasheh & Zubeidat, 2025; Ghaith et al., 2023).

3.7. Research Framework

The indicators for quality management in education selected to assess the implementation at private universities are listed in Table 2.

The research framework is customized based on the following classification variables:

- Gender: classified as male and female.
- Role: Classifies the research subjects as students or lecturers.
- Major: Classified according to academic fields, including Social Sciences and Humanities, Engineering and Technology, Health and Medicine, and Arts and Design.
- Type of Training Program: classified as regular program and high-quality program taught in English.

Table 2. Selected CIPO indicators for the study.

Dimension	Indicator	Contents	Fuzzy Mean	Center	Radius
Context	C1	Level of compliance with quality accreditation standards	[3.5, 4.5]	4	0.52
	C2	Level of cooperation with businesses and external organizations	[3.0, 4.5]	3.75	0.74
	C3	Policies for the development of faculty and staff	[3.5, 5.0]	4.25	0.66
	C4	Activities and events to increase stakeholder participation	[3.0, 4.0]	3.5	0.59
Input	I1	Effectiveness of internal quality assurance units	[3.5, 5.0]	4.25	0.71
	I2	Investment in infrastructure and information technology	[3.0, 4.5]	3.75	0.65
	I3	Policies for supporting and developing faculty expertise	[3.5, 5.0]	4.25	0.53
	I4	Diversity and quality of learning resources	[3.0, 4.0]	3.5	0.68
	I5	Budget and financial support for research and development activities	[3.0, 4.5]	3.75	0.72
Process	P1	Methods for improving and updating the curriculum	[3.5, 4.5]	4	0.55
	P2	Application of modern teaching methods	[3.0, 4.5]	3.75	0.63
	P3	Scientific research and research collaboration activities	[3.5, 5.0]	4.25	0.7
	P4	Feedback and evaluation system from students and faculty	[3.0, 4.0]	3.5	0.58
	P5	Organization of short-term training programs and professional workshops	[3.0, 4.5]	3.75	0.75
	P6	Strategies for attracting and retaining students	[3.5, 4.5]	4	0.61
	P7	Encouragement of internships and extracurricular activities	[3.0, 4.0]	3.5	0.67
Outcome	O1	Employment rate of graduates within 6 months	[3.5, 4.5]	4	0.6
	O2	Satisfaction level of students and faculty with the quality of education	[3.0, 4.5]	3.75	0.73
	O3	Number of published scientific articles in journals and conferences	[3.5, 5.0]	4.25	0.56
	O4	Completion rate of training and professional development programs for faculty	[3.0, 4.5]	3.75	0.69
	O5	Participation rate and satisfaction level of stakeholders	[3.0, 4.0]	3.5	0.57
	O6	Continuous improvement based on feedback from students, faculty, and stakeholders	[3.0, 4.5]	3.75	0.62

The results of the evaluation of the indicators by experts, presented in Table 2, the analysis indicates that the education quality management indicators are highly rated, with most center scores above 3. Specifically, indicator C1 has a center score of 4 and a radius of 0.52, and indicator C3 has a center score of 4.25 and a radius of 0.66. These values reflect that these indicators are considered important and effective in improving education quality. However, the larger radius above 0.5 for some indicators, such as C2 with a radius of 0.74, shows uncertainty or differences in assessments among experts, which requires adjustments to minimize variability and enhance the feasibility of the proposed measures.

Statistical methods, including mean tests and t-tests, are used to analyze the importance, feasibility, challenges, and effectiveness of implementing education quality management at the organizational level according to the CIPO model. The research framework is presented in Figure 2.

Figure 3 depicts the analytical framework for assessing quality-management initiatives in private universities. Respondents are grouped by gender (male, female), role (student, lecturer), discipline (Social Sciences & Humanities; Engineering & Technology; Health & Medicine; Arts & Design), and program type (regular or high-quality English-medium). Guided by the CIPO model, each measure is rated on four dimensions: perceived importance, practical feasibility, implementation barriers, and demonstrated effectiveness. Mean comparisons and independent-sample t-

tests contrast these dimensions to pinpoint priorities, flag likely constraints, and inform administrators' resource allocation and improvement strategies.

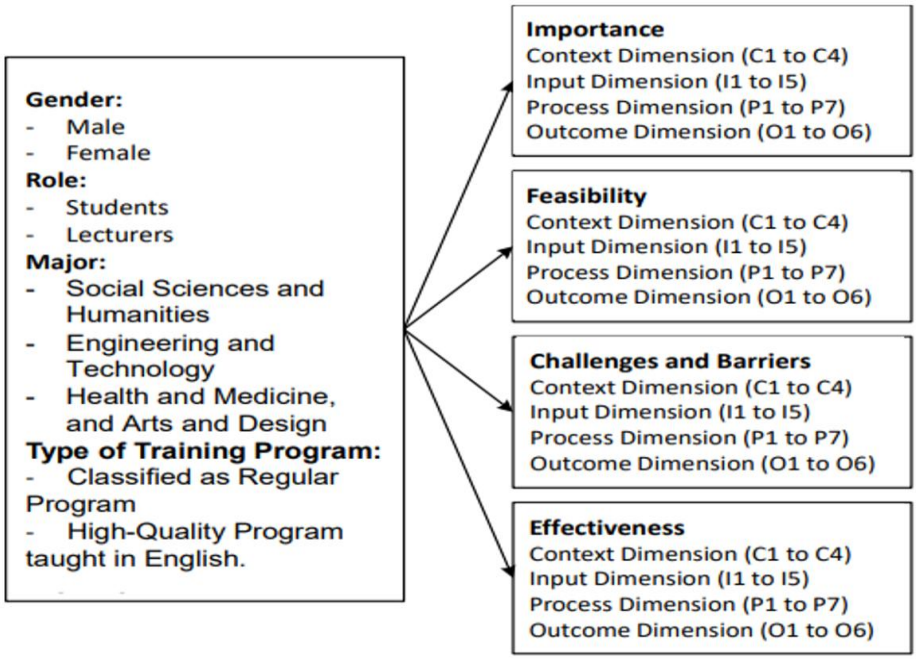

Figure 3. Research framework.

4. RESEARCH RESULTS

Table 3 presents the results of the analysis based on data collected from 586 students and lecturers at private universities.

Table 3. Analysis results of aspects of education quality management activities.

Indicator	Importance		Feasibility		Challenges		Effectiveness		I-F	I-C	I-E	F-C	F-E	C-E
	M	SD	M	SD	M	SD	M	SD						
C1	4.75	0.80	3.65	0.70	3.50	0.90	4.12	0.70	1.10	1.25	0.63	0.15	-0.47	-0.62
C2	4.55	0.60	3.48	0.80	3.35	0.60	4.08	0.80	1.07	1.20	0.47	0.13	-0.60	-0.73
C3	4.65	0.70	3.57	0.60	3.42	0.50	4.20	0.70	1.08	1.23	0.45	0.15	-0.63	-0.78
C4	4.45	0.50	3.42	0.70	3.31	0.60	4.02	0.60	1.03	1.14	0.43	0.11	-0.60	-0.71
I1	4.66	0.70	3.72	0.70	3.55	0.60	4.22	0.60	0.94	1.11	0.44	0.17	-0.50	-0.67
I2	4.72	0.80	3.62	0.60	3.45	0.70	4.16	0.70	1.10	1.27	0.56	0.17	-0.54	-0.71
I3	4.81	0.70	3.77	0.60	3.62	0.60	4.36	0.80	1.04	1.19	0.45	0.15	-0.59	-0.74
I4	4.53	0.60	3.57	0.80	3.47	0.50	4.12	0.70	0.96	1.06	0.41	0.10	-0.55	-0.65
I5	4.56	0.50	3.66	0.70	3.51	0.60	4.02	0.75	0.90	1.05	0.54	0.15	-0.36	-0.51
P1	4.86	0.60	3.76	0.80	3.61	0.50	4.34	0.60	1.10	1.25	0.52	0.15	-0.58	-0.73
P2	4.76	0.70	3.67	0.60	3.54	0.60	4.31	0.70	1.09	1.22	0.45	0.13	-0.64	-0.77
P3	4.91	0.75	3.86	0.60	3.71	0.50	4.51	0.75	1.05	1.20	0.40	0.15	-0.65	-0.80
P4	4.71	0.50	3.57	0.80	3.52	0.70	4.26	0.50	1.14	1.19	0.45	0.05	-0.69	-0.74
P5	4.61	0.75	3.71	0.75	3.56	0.75	4.21	0.75	0.90	1.05	0.40	0.15	-0.50	-0.65
P6	4.81	0.50	3.61	0.50	3.46	0.50	4.41	0.50	1.20	1.35	0.40	0.15	-0.80	-0.95
P7	4.56	0.50	3.51	0.50	3.41	0.50	4.31	0.50	1.05	1.15	0.25	0.10	-0.80	-0.90
O1	4.82	0.50	3.71	0.60	3.51	0.60	4.32	0.50	1.11	1.31	0.50	0.20	-0.61	-0.81
O2	4.62	0.70	3.56	0.70	3.42	0.70	4.22	0.70	1.06	1.20	0.40	0.14	-0.66	-0.80
O3	4.92	0.70	4.12	0.50	3.82	0.50	4.52	0.70	0.80	1.10	0.40	0.30	-0.40	-0.70
O4	4.72	0.70	3.66	0.70	3.57	0.70	4.22	0.70	1.06	1.15	0.50	0.09	-0.56	-0.65
O5	4.57	0.50	3.46	0.50	3.36	0.50	4.02	0.50	1.11	1.21	0.55	0.10	-0.56	-0.66
O6	4.77	0.70	3.61	0.70	3.52	0.70	4.32	0.70	1.16	1.25	0.45	0.09	-0.71	-0.80

Note: M: Mean, SD: Standard deviation, I: Importance, F: Feasibility, C: Challenges, E: Effectiveness.

Figure 4 illustrates the comparative differences between the four key aspects of education quality management measures importance, feasibility, challenges, and effectiveness, highlighting that while most measures are regarded as important, their feasibility is often lower, and implementation is hindered by significant challenges.

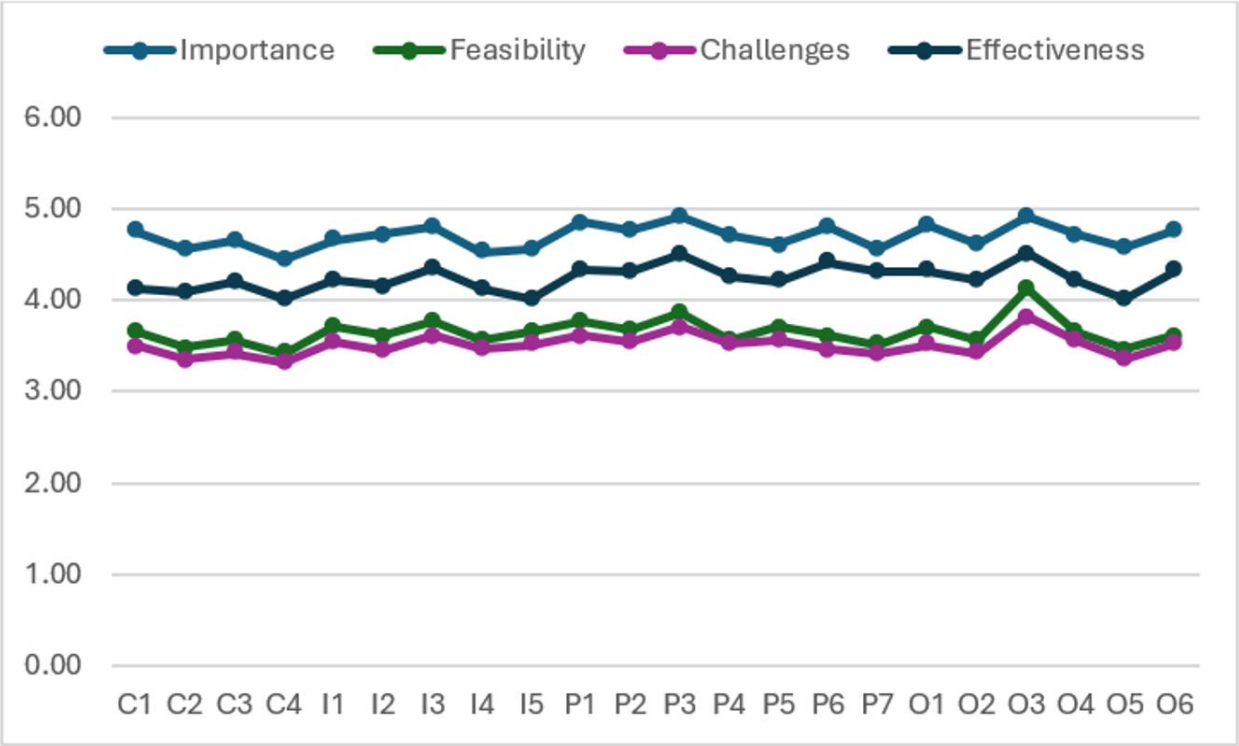

Figure 4. The differences between the aspects of education management measures.

4.1. Importance of Implementing Quality Management Measures

Based on the average values (M) and standard deviations (SD) in Table 3 for the indicators under the dimension "Importance of Implementing Education Quality Management Measures," it can be seen that these indicators are all highly rated, although there are certain differences in priority levels. Indicator C1, "Level of compliance with quality accreditation standards," has the highest average value of 4.75, indicating the significant importance of complying with quality accreditation standards in education management. However, the standard deviation of this indicator (0.80) is relatively high, suggesting considerable variation in the respondents' views on its importance.

Indicator C3, "Policy for the development of faculty and staff," also has a fairly high average value of 4.65, almost equivalent to C1, indicating that faculty and staff development is considered very necessary. The standard deviation for this indicator is 0.70, showing some differences in opinion, but not as large. Indicator C2, "Level of cooperation with businesses and external organizations," has an average value of 4.55, showing high importance but still lower than C1 and C3. The lower standard deviation (0.60) indicates relatively high agreement among the respondents on the importance of this indicator.

Indicator C4, "Activities and events to enhance stakeholder participation," has the lowest average value in the group at 4.45, although it is still considered important. The low standard deviation (0.50) indicates a higher consensus on the importance of this indicator compared to the others. This suggests that while all indicators are regarded as important, management measures related to compliance with accreditation standards and faculty development are given higher priority. This may be due to the focus of private universities on key factors to improve education quality, such as adhering to regulations and developing human resources, while other factors, such as stakeholder participation, are considered more supportive in the short term.

4.2. Feasibility of Implementing Quality Management Measures

Based on the average values (M) and standard deviations (SD) in Table 3 for the indicators under the dimension "Feasibility of Implementing Education Quality Management Measures," it can be seen that there are significant differences in the assessments of the respondents regarding the feasibility of each management measure.

Indicator C1, "Level of compliance with quality accreditation standards," has an average value of 3.65, indicating that compliance with accreditation standards is considered moderately feasible. The standard deviation of this indicator is 0.70, showing relatively high consensus among the respondents regarding this feasibility level, but also some differing opinions on its implementation.

Indicator C2, "Level of cooperation with businesses and external organizations," has a lower average value of 3.48, suggesting that cooperation with external organizations is considered less feasible than compliance with accreditation standards. The standard deviation for this indicator is 0.80, higher than C1, indicating greater differences in respondents' views on the feasibility of this indicator.

Indicator C3, "Policy for the development of faculty and staff," has an average value of 3.57, indicating that implementing such policies is considered somewhat more feasible than cooperating with businesses, but still below the general average feasibility level. The standard deviation is 0.60, suggesting greater agreement among respondents compared to C2.

Indicator C4, "Activities and events to enhance stakeholder participation," has the lowest average value at 3.42, indicating that these activities are viewed as the least feasible among the quality management measures. The standard deviation for this indicator is 0.70, reflecting some differences in respondents' views on its feasibility.

Overall, the indicators with lower average values suggest that, while these management measures are considered important, their feasibility for implementation is rated lower. This may point to challenges related to resources, technical capacity, or infrastructure necessary to implement these measures effectively. For example, compliance with quality accreditation standards is considered more feasible than activities such as cooperation with businesses or increasing stakeholder participation, possibly because these measures require fewer resources or are easier to implement in the current context of private universities.

4.3. Challenges and Barriers in Implementing Quality Management

Based on the average values (M) and standard deviations (SD) in Table 3 for the indicators under the dimension "Challenges and Barriers in Implementing Education Quality Management," it is clear that private universities are facing significant difficulties in implementing these management measures.

Indicator C1, "Level of compliance with quality accreditation standards," represents an average value of 3.50. This suggests that compliance with accreditation standards is regarded as a moderate level challenge. The standard deviation for this indicator, 0.90, which is the highest among all indicators, indicates considerable variation in respondents' opinions regarding the ease or difficulty of meeting these standards. This means that some universities find compliance challenging, some comply, while others may already be familiar with the requirements.

Indicator C2, "Level of cooperation with businesses and external organizations," which captures the average value of 3.35, suggests that cooperation with businesses and external organizations is also seen as a challenge but of lower magnitude compared to compliance with accreditation standards. The standard deviation for this indicator is 0.60, lower than C1, which indicates that respondents had a relatively higher consensus regarding the level of difficulty. This may show that most people accept that cooperative relationships are possible but they have to be worked at due to lack of time, resources, or negotiation.

Indicator C4, "Activities and events to enhance stakeholder participation," has the lowest average value at 3.31, indicating that this is the least significant challenge among the quality management measures. The standard deviation for this indicator is 0.60, reflecting moderate variation in respondents' views. Although this is the least serious

challenge, it still indicates that enhancing stakeholder participation faces certain difficulties, potentially due to a lack of commitment from stakeholders or constraints in organizing and executing activities.

In summary, this analysis indicates that the greatest challenges in education quality management at private universities are centered around compliance with quality accreditation standards and the development of faculty and staff. These challenges may be related to limitations in resources, finances, and the willingness of stakeholders to engage in the process of improving education quality.

4.4. Effectiveness of Quality Management Measures

Based on the average values (M) and standard deviations (SD) in Table 3 for the indicators under the dimension "Effectiveness of Education Quality Management Measures," it is evident the extent to which these measures are perceived as effective in enhancing education quality at private universities.

The mean score for Indicator C1, "Level of compliance with quality accreditation standards," is 4.12, which indicates that adherence to compliance standards is quite effective in managing education quality. The standard deviation for this indicator is 0.70, reflecting moderate agreement among respondents. This suggests that a majority of private universities consider adherence to accreditation guidelines vital for quality assurance in education.

For Indicator C3, "Policy for the development of faculty and staff," the average value is higher at 4.20, which indicates that the development of faculty and staff is considered very effective in improving the quality of education. The standard deviation for this indicator is 0.70, suggesting a relatively high level of consensus regarding this policy's effectiveness. This implies that private universities are likely to recognize the value added by human resource investments to educational outcomes and therefore consider it essential.

With an average value of 4.08, indicator C2, "Level of cooperation with businesses and external organizations," indicates that cooperation is viewed as reasonably effective; however, not as much as indicators C1 and C3. This indicator's higher standard deviation of 0.80 compared to others suggests some discrepancies in respondents' opinions. This may be due to different universities and businesses cooperating at varying levels or because different institutions implement cooperation differently.

Although not the most successful, indicator C4, "Activities and events to enhance stakeholder participation," has the lowest average value (4.02) but is still above average, suggesting that these activities are also considered beneficial in managing the quality of education. There is greater agreement about the efficacy of these activities, as evidenced by the standard deviation of 0.60 for this measure.

Overall, management practices pertaining to faculty and staff development and adherence to quality accreditation criteria are considered the most successful, underscoring the significance of these elements in guaranteeing and improving the caliber of education at private universities. Activities related to corporate collaboration and increasing stakeholder participation are also regarded as effective, although they receive a somewhat lower rating, possibly due to variations in their implementation. This indicates that while recognizing the importance of various complementary initiatives, universities generally prioritize funding initiatives that have a direct and noticeable impact on the quality of education.

4.5. Comparison of Aspects of Educational Quality Management Measures

4.5.1. Compare between Importance and Feasibility

The majority of the indicators demonstrate that, despite these measures being deemed significant, their implementation faces obstacles and challenges, as the average value for "Importance" is higher than the average value for "Feasibility."

As an illustration, the indicator C1, "Compliance with quality accreditation standards," has an average importance value of 4.75 and a feasibility value of only 3.65, with a 1.10 gap. This implies that even while adhering to accrediting

standards is highly valued, there are obstacles to its implementation, possibly due to the standards' stringent requirements or a lack of resources to meet them.

There is also a significant difference of 1.08 between the viability (M = 3.57) and significance (M = 4.65) of the indicator C3, "Policies for developing faculty and staff." This implies that while staff and faculty development are regarded as essential components of raising educational standards, private institutions may find it difficult to implement this concept due to financial or budgetary constraints or a lack of qualified personnel.

The average values for importance and feasibility for Indicator C2, "Collaboration with businesses and external organizations," are 4.55 and 3.48, respectively, with a 1.07 discrepancy. This disparity suggests that, although working with other organizations is crucial, it may not always be simple to create and maintain these alliances, possibly due to competing objectives or external influences.

The smallest difference between significance (M = 4.45) and viability (M = 3.42) can be found in Indicator C4, "Activities and events to enhance stakeholder participation." The difference is 1.03. Despite their importance, these initiatives are considered easier to implement than other measures, possibly because universities have more experience in planning events and activities to boost stakeholder participation.

Overall, the distinction between "importance" and "feasibility" demonstrates that although private institutions acknowledge the importance of implementing quality management practices, they frequently encounter major obstacles due to limited funding and resources. For instance, many colleges find it difficult to meet accreditation requirements because of a lack of funding or inadequate facilities, despite the fact that compliance is considered crucial. Special support policies, such as grants or funds for infrastructure development and technology adoption, must be created at the federal and local levels to address this problem. To increase the viability of these quality management initiatives, universities may also collaborate with regional companies and global organizations to leverage outside resources and knowledge.

4.5.2. Comparison Between Importance and Challenges

When comparing "Importance" (I) and "Challenges and Barriers" (C), it is clear that, despite their high importance ranking, quality management measures in education also present significant challenges. For instance, the average score for the indicator C1, "Compliance with quality accreditation standards," is 4.75 for importance and 3.50 for difficulties, with a 1.25 discrepancy. This implies that while adhering to quality accreditation standards is highly valued, there are obstacles to its application, such as difficult requirements or a lack of funding.

According to Indicator C3, "Policies for developing faculty and staff," there is a notable 1.23 difference between issues (M = 3.42) and importance (M = 4.65). This implies that although funding faculty and staff development is crucial for raising educational standards, private institutions struggle to implement it due to a lack of highly qualified staff or financial limitations. The average score for Indicator C2, "Collaboration with businesses and external organizations," is 4.55 for importance and 3.35 for difficulties, with a 1.20 discrepancy. This suggests that although working together with companies and other organizations is valued, private institutions still face challenges in creating and sustaining these connections. Challenges may include conflicting goals, the expense of teamwork, and the time needed to develop solid collaboration and trust.

The difference between obstacles (M = 3.31) and importance (M = 4.45), which is 1.14, is less pronounced in Indicator C4, "Activities and events to enhance stakeholder participation." This implies that although these initiatives are valued, the difficulties in implementing them are viewed as less significant than those of other projects. This may be due to the fact that colleges are better at planning these events or that they require fewer resources than other indicators.

The comparison of "Importance" and "Challenges and Barriers" concludes that although staff and faculty development is highly valued, there are also major obstacles, primarily due to a lack of highly qualified faculty members and financial constraints on professional development. The findings imply that attracting and retaining top

academics requires a more strategic approach. Offering competitive compensation packages, opportunities for professional growth, and collaborations with foreign universities to enhance training initiatives are some strategies to achieve this. By supporting research initiatives and recognizing exceptional accomplishments in both teaching and research, universities can foster a welcoming environment that promotes faculty involvement and dedication.

4.5.3. Comparison Between Importance and Effectiveness

When evaluating the "Effectiveness" and "Importance" of quality management practices in education, it is found that those that receive high importance ratings also typically exhibit comparatively high effectiveness. Still, there is a gap between these two elements, which reflects variations in how they are executed and their capacity to yield the intended outcomes. For example, indication C1, "Compliance with quality accreditation standards," has an average effectiveness score of 4.12 and an average importance score of 4.75, which differ by 0.63. This suggests that while fulfilling accrediting standards is regarded as essential, its actual efficacy might be constrained by factors such as funding shortages or the capacity to fulfill stringent requirements.

Indicator C3, "Policies for developing faculty and staff," has an average score of 4.65 for importance and 4.20 for effectiveness, resulting in a 0.45 discrepancy. This disparity demonstrates that even though this policy's significance and efficacy are widely acknowledged, some obstacles still prevent it from being implemented effectively. Due to time, financial, or evolving working conditions, universities may have invested heavily in the training of their faculty and staff, but the results may not be at their best yet.

The average importance and effectiveness ratings for Indicator C2, "Collaboration with businesses and external organizations," are 4.55 and 4.08, respectively, with a 0.47 discrepancy. This suggests that although working with companies and outside groups is highly valued, its application has not yet achieved the anticipated degree of effectiveness. This may be a sign of trouble in sustaining long-term partnerships or creating win-win connections, especially when private universities are under financial and competitive strain.

The average scores for effectiveness and importance in Indicator C4, "Activities and events to enhance stakeholder participation," are 4.02 and 4.45, respectively, with a 0.43 discrepancy. This slight variation indicates that while these activities are considered significant, they also demonstrate a fair level of success in increasing stakeholder participation. To ensure that these programs more effectively improve educational quality, issues such as insufficient funding and stakeholder engagement challenges need to be addressed.

In general, the comparison of "Effectiveness" and "Importance" shows that while policies like faculty development and adherence to quality accreditation standards are regarded as both important and effective, their actual implementation usually falls short of expectations because of problems with strategic planning and a lack of resources. In this way, a data-driven approach to quality management could be advantageous for private colleges. For instance, in order to continuously monitor and modify quality management practices, they should set up regular feedback systems involving students, teachers, and outside stakeholders. This will guarantee that resources are distributed efficiently and that interventions are modified to address the actual needs and difficulties that colleges face.

4.5.4. Comparison Between Feasibility and Challenges

When comparing "feasibility" and "challenges and barriers" in the implementation of quality management measures in education, measures that are rated as less feasible tend to have more of them, reflecting the actual difficulties in the implementation process.

For example, for indication C1, "Compliance with quality accreditation standards," the average challenge value of 3.50 and the average feasibility value of 3.65 differ by 0.15. This small disparity suggests that meeting quality accreditation standards is not only viewed as less feasible but also faces several challenges and barriers, such as strict requirements and a lack of funding.

For Indicator C3, "Policies for developing faculty and staff," the average feasibility and difficulty values are 3.57 and 3.42, respectively, with a 0.15 discrepancy. Similar to indicator C1, this gap indicates that significant barriers still exist to the implementation of these policies, even though they are considered fairly feasible. Among these challenges are the inability to recruit and retain top-tier teachers and the lack of funding and resources for professional development programs for faculty and staff.

The average feasibility and challenge scores for Indicator C2, "Collaboration with businesses and external organizations," are 3.48 and 3.35, respectively, with a 0.13 discrepancy. This minor difference suggests that forming and maintaining alliances with companies and external groups is perceived as less feasible and presents certain difficulties, including divergent objectives, approaches, and interests. To address these challenges, private universities may need to invest more in developing effective channels for collaboration and establishing strategic partnerships.

The average feasibility and difficulty values for Indicator C4, "Activities and events to enhance stakeholder participation," are 3.42 and 3.31, respectively, with a 0.11 discrepancy. Although these activities are considered less feasible, they tend to present fewer difficulties when implemented, as indicated by the narrowest gap between issues and feasibility. This may be because they require fewer resources than other metrics, or because universities have more experience in planning events of this nature.

The relationship between "feasibility" and "challenges and barriers" generally implies that acts that are less feasible are more likely to encounter obstacles and challenges. This suggests that projects that are both significant and doable given their current scope should be prioritized. For instance, universities should adopt a phased approach, beginning with high-impact areas that demand fewer resources but produce observable quality gains, rather than trying to overhaul the curriculum entirely at once. To overcome obstacles and improve the sustainability of quality management systems, it can also be helpful to look for outside partnerships, such as those with regional businesses or foreign academic institutions.

4.5.5. Comparison Between Feasibility and Effectiveness

Comparing the "feasibility" and "effectiveness" of quality management techniques in education makes it clear that the more realistic ones are usually more successful. However, there are still significant differences between these two elements, indicating that while some acts may be perceived as feasible, they may not necessarily yield the desired results when carried out.

For example, the average feasibility value of 3.65 and the effectiveness value of 4.12 for indicator C1, "Compliance with quality accreditation standards," differed by -0.47. This disparity implies that, although following accrediting requirements is considered less feasible, it nevertheless produces relatively high efficacy. This demonstrates that when private universities invest the required resources and strive to satisfy strict accreditation requirements, excellent outcomes are possible.

For Indicator C3, "Policies for developing faculty and staff," the average feasibility and effectiveness values are 3.57 and 4.20, respectively, with a negative difference of -0.63. Although educating professors and staff may be challenging and less practical, the outcomes are quite successful when implemented, as indicated by the fact that this discrepancy is larger than that of C1. Notwithstanding implementation difficulties, initiatives to improve the standard of faculty and staff research and instruction may provide significant and enduring results.

For Indicator C2, "Collaboration with businesses and external organizations," the average feasibility and effectiveness values are 3.48 and 4.08, respectively, with a negative difference of -0.60. This disparity indicates that, although collaborating with businesses and other organizations is perceived as challenging, private universities can derive significant benefits when they establish and sustain successful alliances. Nevertheless, additional strategies and efforts may be necessary to overcome current barriers and promote cooperative endeavors that are mutually beneficial.

For Indicator C4, "Activities and events to enhance stakeholder participation," the average feasibility and effectiveness values are 3.42 and 4.02, respectively, with a negative difference of -0.60. Similar to the previous indicators, this difference shows that although these initiatives may be challenging to carry out, when they are successful, they produce positive results and help to improve educational standards. These efforts have the potential to improve managerial and instructional methods by boosting stakeholder engagement and involvement.

The relationship between "feasibility" and "effectiveness" suggests that measures considered more feasible tend to be more effective. However, a number of outliers indicate that even feasible techniques may not achieve the desired results if implemented incorrectly. To improve the effectiveness of quality management programs, universities should set clear goals, make prudent use of their resources, and regularly assess outcomes. For example, establishing a dedicated quality management team or center within the university can facilitate coordination, sharing best practices, and providing professors and staff with ongoing support in implementing quality improvements.

4.5.6. Comparison Between Challenges and Effectiveness

When comparing the "Effectiveness" and "Challenges and Barriers" of quality management measures in education, it is evident that the latter are generally associated with lower effectiveness. However, a small number of outliers indicate that overcoming these challenges can lead to positive outcomes.

For example, there is a -0.62 gap between the average challenge value and effectiveness value of indication C1, "Compliance with quality accreditation standards," which are 3.50 and 4.12, respectively. This suggests that, although following accrediting criteria can present a number of challenges, such as stringent protocols and high expectations, when implemented properly, it significantly improves the quality of education.

For Indicator C3, "Policies for developing faculty and staff," the average challenge and effectiveness values are 3.42 and 4.20, respectively, with a gap of -0.78. This larger discrepancy implies that although this strategy faces many challenges, especially regarding funding, budget, and a lack of skilled professors, if universities can overcome these challenges, the outcomes could be very positive and long-lasting. This emphasizes the importance of making long-term strategic investments in the human resources and professional development of academics and staff.

For Indicator C2, "Collaboration with businesses and external organizations," the average difficulty and effectiveness values are 3.35 and 4.08, respectively, with a -0.73 discrepancy. Despite the challenges of establishing and maintaining partnerships, particularly when there are differences in the goals and strategies of the parties, the effectiveness achieved by these alliances is nevertheless highly valued. This illustrates how reducing barriers to cooperation can help improve education by facilitating the exchange of resources, knowledge, and experience.

For Indicator C4, "Activities and events to enhance stakeholder participation," the average challenge value of 3.31 and the effectiveness value of 4.02 differ by -0.71. This distinction demonstrates that even if encouraging stakeholder engagement presents certain difficulties, if done well, these initiatives can still have a major impact. This can be a result of private institutions' accumulated expertise in planning such events or their ability to draw in stakeholders.

The relationship between "Effectiveness" and "Challenges and Barriers" generally suggests that difficulties in implementing quality management measures, such as adhering to certification criteria or encouraging external cooperation, can significantly influence their effectiveness. Private institutions should focus on enhancing internal capacity to mitigate these challenges. This includes investing in infrastructure, training employees on quality management concepts, and establishing robust internal quality assurance procedures. Furthermore, actively engaging with legislators to promote more supportive laws and expand funding sources may help address some external issues faced by these organizations.

4.6. Results of the Difference Testing

Table 4 displays the findings of the t-test difference testing for the research sample's characteristics. First off, several indices show notable gender variances. For instance, there are noticeable variations between male and female respondents in indices C1 ("Compliance with quality accreditation standards") and I1 ("Effectiveness of internal quality assurance departments"). This could be a result of varying viewpoints and experiences regarding the degree of compliance and the efficiency of university quality assurance departments.

Second, there are significant differences in several indices based on the responsibilities of the persons, such as teachers or pupils. For instance, indices C2 ("Degree of collaboration with businesses and external organizations"), C3 ("Policy for developing faculty and staff"), and I3 ("Policy for supporting and developing faculty professional skills") show notable differences between faculty and students. This could be due to their different roles and responsibilities in the classroom.

Thirdly, the field of study also shows differences in the implementation of quality management measures in education. For example, indices P1 ("Method of improving and updating the curriculum") and P2 ("Application of modern teaching methods") show significant differences between fields of study, indicating that improvements in the curriculum and teaching methods may be perceived differently depending on the academic discipline.

Lastly, the program type exhibits variations over a number of indices. Indicators C1 ("Compliance with quality accreditation standards") and C3 ("Policy for developing faculty and staff"), for example, demonstrate notable distinctions between different program kinds, such as regular programs and high-quality programs taught in English. This could be a result of variations in the tools and methods these programs use to preserve and raise the standard of education.

Table 4. Differences for CIPO model indicators.

Indicators	Gender	Role	Field of study	Type of program
C1: Compliance with quality accreditation standards	●		●	●
C2: Degree of collaboration with businesses and external organizations		●	●	●
C3: Policy for developing faculty and staff	●	●		●
C4: Activities and events to enhance stakeholder participation			●	●
I1: Effectiveness of internal quality assurance departments	●	●		
I2: Investment in facilities, IT	●		●	●
I3: Policy for supporting and developing faculty professional skills		●		
I4: Diversity and quality of learning resources	●	●		
I5: Budget and financial support for research and development activities	●		●	
P1: Methods for improving and updating the curriculum	●	●	●	
P2: Application of modern teaching methods	●		●	
P3: Scientific research activities and research collaboration		●		●
P4: Feedback and evaluation system from students and faculty	●		●	●
P5: Organization of short-term training programs, workshops	●	●		
P6: Strategy for attracting and retaining students		●	●	
P7: Encouragement of internships and extracurricular activities		●	●	●
O1: Employment rate of graduates within 6 months	●		●	
O2: Student and faculty satisfaction with education quality		●	●	
O3: Number of published research papers in journals and conferences	●		●	●
O4: Completion rate of faculty training and development programs	●	●		
O5: Stakeholder participation rate and satisfaction level			●	
O6: Continuous improvement based on feedback from students, faculty, and stakeholders	●	●	●	●

5. CONCLUSION

The CIPO model was used in this study to assess private universities' quality management initiatives. There were 586 participants in the research sample, including staff and students from private universities. To gather quantitative information on the significance, viability, difficulties, and efficacy of quality management practices in education, we employed a survey instrument that included 22 variables drawn from various facets of the CIPO model. To find statistically significant differences between the groups, the data was analyzed using fuzzy logic and t-test procedures. The results of the survey showed that all quality management indicators were highly valued in terms of importance, especially those related to staff and faculty development and conformity with accreditation standards. This demonstrates how maintaining and enhancing educational quality through standard-setting and human resource investment is a top goal for private universities. However, the study also found significant differences in the necessity and feasibility of these measures, highlighting the challenges faced by private universities in the implementation stage. These challenges include insufficient funding, conflicting goals among stakeholders, and the ability to maintain fruitful collaborations with external organizations. Furthermore, there are sometimes significant barriers to the actual implementation of quality management methods, despite the fact that they are valued and believed to be advantageous. Despite being highly respected, a lack of financing and execution strategies may have prevented initiatives like faculty development and accrediting standards compliance from being as successful as expected.

To improve the effectiveness of their quality management programs, private colleges need to establish regular stakeholder feedback channels, employ a data-driven approach, and form strategic partnerships with businesses and international organizations. This will ensure that quality management techniques are applied successfully and that they meet the actual needs and challenges those institutions face.

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