

DEVELOPING AI-SUPPORTED QUALITY ASSURANCE SYSTEMS TO FOSTER SOCIAL INCLUSION, HUMAN CAPITAL AND QUALITY CULTURE DEVELOPMENT IN HIGHER EDUCATION: AN EXPERT-BASED APPROACH

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ABSTRACT

The rapid growth of artificial intelligence (AI) in higher education offers transformative potential for quality assurance (QA) systems, yet its current application often prioritizes efficiency and compliance over social inclusion and human capital development. This study develops an AI-supported QA framework, qualitatively based on theoretical bases and references, designed to strengthen equitable access, participation, and capability development in higher education. Using an expert-based qualitative approach, the research synthesizes theoretical insights and empirical findings from 10 previous studies (5 conducted in Vietnam and 5 in Indonesia) on social inclusion, human capital development, and quality culture, with particular focus on Vietnam and Indonesia. The findings highlight that while QA mechanisms have expanded, persistent inequalities, limited internal quality culture, and misalignment between graduate competencies and labour market needs continue to constrain institutional effectiveness. The study argues that AI can enable data-driven decision-making, early intervention for at-risk learners, and personalized learning pathways, but only when embedded within a human-centred, ethically grounded, and context-sensitive framework. The proposed framework positions AI-supported QA as a strategic tool that aligns technological innovation with institutional culture, governance, and stakeholder engagement. This research contributes to the advancement of inclusive, data-informed QA systems and offers practical guidance for higher education institutions seeking to foster sustainable human capital development in emerging contexts.

Keywords: Artificial intelligence in higher education, quality assurance, social inclusion, human capital, quality culture, AI-supported QA framework.

1. INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed higher education, positioning AI as a central driver of change across teaching, learning, governance, and institutional management. Within this evolving landscape, QA systems - traditionally oriented toward compliance, accreditation, and performance measurement, are increasingly being reshaped through data-driven and AI-enabled approaches [1], [2]. While these transformations enhance operational efficiency, scalability, and monitoring capacity, they simultaneously reveal critical limitations in addressing broader educational objectives that extend beyond performance metrics.

The central problem addressed in this study lies in the growing misalignment between current AI-driven QA practices and the broader societal purposes of higher education, particularly in relation to social inclusion and human capital development. Despite the integration of advanced technologies, existing QA systems remain predominantly compliance-oriented and insufficiently responsive to issues of equity, meaningful participation, and capability formation. Consequently, rather than mitigating disparities, these systems risk reproducing and reinforcing existing structural inequalities within higher education systems.

At the same time, higher education institutions are increasingly expected to contribute to inclusive and sustainable development agendas. Social inclusion emphasizes equitable access, participation, and successful outcomes for diverse learner populations [3], while human capital development focuses on equipping individuals with relevant knowledge, skills, and competencies necessary for socio-economic advancement [4]. Although AI offers significant transformative potential such as personalized learning pathways, predictive analytics, and data-informed decision-making, its application within QA systems has largely prioritized technical efficiency over inclusive and developmental outcomes [5]. This imbalance raises concerns regarding the extent to which technological innovation genuinely contributes to broader educational and societal goals.

These challenges are particularly pronounced in emerging contexts such as Vietnam and Indonesia, where structural inequalities, digital divides, and disparities in institutional capacity remain significant [6], [7]. In such contexts, uneven access to digital infrastructure, limited technological readiness, and varying levels of institutional quality create additional barriers to effective implementation of AI-supported systems. Furthermore, risks associated with algorithmic bias, lack of transparency, and insufficient ethical governance may exacerbate existing inequalities if not carefully addressed [8], [9]. These conditions highlight the importance of adopting context-sensitive approaches that align technological innovation with local realities and development priorities.

In response to these challenges, the analytical focus of this study is to bridge the gap between technological advancement and inclusive educational development by conceptualizing an AI-supported QA framework that integrates social inclusion, human capital development, and quality culture. Rather than treating these dimensions as independent domains, this study adopts a systemic perspective that emphasizes their interdependence within higher education systems. Such an approach enables a more comprehensive understanding of how technological, institutional, and social factors interact in shaping educational outcomes.

Accordingly, this study aims to develop a comprehensive and context-sensitive AI-supported QA framework through an expert-based qualitative approach. Specifically, the research seeks to: (1) analyze theoretical and empirical foundations related to AI, QA, social inclusion, and human capital development; (2) identify core dimensions and key components for integration into an AI-supported QA system; (3) construct a holistic and contextually appropriate framework that enhances inclusive participation and human capital outcomes; and (4) propose practical implications for the implementation of AI-based QA systems in emerging higher education contexts.

By addressing these objectives, this study contributes to advancing a more inclusive, human-centered, and strategically aligned approach to QA in the digital era. It further positions AI not merely as a technological tool, but as a transformative enabler capable of supporting equitable and sustainable development in higher education.

2. LITERATURE REVIEW

The transformation of higher education in the digital era has increasingly driven the convergence between AI, QA, social inclusion, and human capital development. This section synthesizes and critically analyzes the relevant theoretical foundations and empirical evidence, while also clarifying the research gaps that serve as the basis for developing an AI-supported QA framework inclusively and sustainably.

2.1. Quality assurance in higher education

QA has long served as a fundamental mechanism for maintaining academic standards, ensuring accountability, and promoting continuous improvement within higher education systems. Early conceptualizations of QA were largely compliance-oriented, emphasizing external accreditation, performance indicators, and standardized evaluation processes [1], [2]. These approaches were primarily designed to ensure minimum standards and institutional accountability; however, they have been widely criticized for promoting bureaucratic control rather than fostering meaningful educational improvement.

In response to these limitations, subsequent theoretical developments have shifted QA toward a more developmental and transformative orientation. This perspective emphasizes continuous improvement, institutional learning, and enhancement rather than mere compliance [10]. Central to this shift is the concept of “quality culture,” which highlights the importance of shared values, internal commitment, and active stakeholder participation in sustaining quality within institutions [11]. Quality culture represents a move from externally imposed control toward internally driven responsibility, where academic communities take ownership of quality processes.

Recent scholarship further reinforces this transition by emphasizing internal quality governance, institutional autonomy, and innovation as key drivers of effective QA systems [12]. These developments align QA with broader societal expectations, including responsiveness to labour market needs and social inclusion. However, despite these advances, traditional QA frameworks continue to face challenges in adapting to the rapid pace of digital transformation. In particular, rigid structures and slow feedback mechanisms limit their capacity to respond effectively to emerging technological and pedagogical changes [13]. This highlights the need for more flexible, data-driven, and adaptive QA systems capable of operating in dynamic educational environments.

2.2. Artificial Intelligence in higher education

AI has emerged as a transformative force in higher education, reshaping teaching, learning, and institutional management practices. AI applications include adaptive learning systems, intelligent tutoring, automated assessment, and predictive analytics, all of which contribute to more personalized and efficient educational experiences [5]. These technologies enable institutions to tailor learning pathways to individual student needs, thereby improving engagement and academic performance.

Empirical studies demonstrate that AI can significantly enhance learning outcomes by providing real-time feedback, identifying learning gaps, and supporting individualized instruction [8], [14]. Furthermore, AI facilitates data-driven decision-making at the institutional level through the analysis of large datasets, commonly referred to as learning analytics and educational data mining [15], [16]. These tools allow institutions to detect patterns, predict risks, and optimize resource allocation.

Despite these advantages, the integration of AI in higher education also raises critical concerns. Issues related to algorithmic bias, data privacy, and transparency have been widely documented, highlighting the ethical implications of AI adoption [9]. Without proper

safeguards, AI systems may inadvertently reinforce existing inequalities or produce unfair outcomes. Therefore, there is a growing consensus that AI implementation must be guided by ethical principles, including fairness, accountability, and transparency.

2.3. Artificial Intelligence in quality assurance systems

The application of AI within QA systems remains an emerging area of research and practice. Existing studies suggest that AI can significantly improve QA processes by enhancing efficiency, increasing accuracy, and providing real-time decision-support information [17]. Through automation, AI reduces the administrative burden associated with traditional QA processes, enabling institutions to focus more on improvement-oriented activities.

Moreover, AI enables a shift from periodic and retrospective evaluations toward continuous and dynamic monitoring of educational quality [18]. This transition allows institutions to respond more rapidly to emerging issues, thereby improving responsiveness and adaptability. Continuous monitoring also supports early identification of risks, such as student dropout or underperformance, enabling timely interventions.

However, current applications of AI in QA tend to prioritize technical efficiency over broader educational and social objectives. This narrow focus risks overlooking issues related to equity, inclusion, and human development. In particular, the use of biased datasets and unequal access to digital technologies may reproduce or even amplify existing inequalities [8]. Consequently, the integration of AI into QA systems requires a balanced approach that combines technological innovation with pedagogical considerations and ethical responsibility [19].

2.4. Social inclusion in higher education

Social inclusion has become an increasingly important focus in higher education policy and research, particularly in the context of global expansion and massification. Despite significant increases in access, inequalities in participation and outcomes persist across different socio-economic groups [20]. These disparities are often influenced by factors such as income, geographic location, ethnicity, and prior educational opportunities.

Contemporary perspectives emphasize that social inclusion extends beyond access to encompass meaningful participation, engagement, and academic success [21]. In other words, simply increasing enrolment is insufficient if students from disadvantaged backgrounds are unable to complete their studies or achieve comparable outcomes.

While digital technologies offer new opportunities to expand access and support learning, they also introduce new forms of inequality. The digital divide defined as unequal access to technology and digital skills remains a significant barrier that can exacerbate existing disparities [22], [23]. This challenge is particularly relevant in developing contexts, where infrastructure and digital literacy levels vary widely.

Therefore, the integration of AI and digital technologies in higher education must be carefully designed to promote inclusion rather than exclusion. This requires attention to accessibility, affordability, and the diverse needs of learners.

2.5. Human capital development

Human capital development is a central objective of higher education, particularly in the context of the knowledge economy. Human capital refers to the knowledge, skills, and competencies acquired through education and training that enhance individual productivity and economic potential [4]. Higher education institutions play a critical role in developing these capabilities, thereby contributing to national development and global competitiveness.

In contemporary contexts, human capital development extends beyond technical or professional skills to include critical thinking, creativity, adaptability, and lifelong learning

abilities [7], [24]. These competencies are essential for navigating rapidly changing labour markets and technological environments.

However, a persistent challenge identified in the literature is the mismatch between educational outputs and labour market demands. Many graduates lack the skills required by employers, particularly in developing countries, where curriculum relevance and industry engagement are often limited [20]. This mismatch reduces the effectiveness of higher education in contributing to economic development and social mobility.

These challenges underscore the importance of effective QA systems in ensuring that educational programs remain relevant, responsive, and aligned with societal needs.

2.6. Integration of AI, QA, social inclusion, and human capital development

Although AI, QA, social inclusion, and human capital development have each been extensively studied, their integration remains limited. Most existing research examines these domains in isolation, resulting in a fragmented understanding and lack of comprehensive frameworks.

Emerging evidence suggests that AI has the potential to simultaneously enhance educational quality and promote inclusivity through personalized learning, improved governance, and data-driven decision-making [5], [8]. However, technological solutions alone are insufficient to address complex educational challenges. As argued in the literature, meaningful transformation requires the integration of technological, social, and organizational dimensions [19].

Furthermore, ethical considerations such as fairness, transparency, and accountability are critical in ensuring that AI applications contribute positively to educational outcomes [9]. In the context of Southeast Asia, additional factors including institutional capacity, digital readiness, and socio-economic inequality must be considered in the design and implementation of AI-supported QA systems [6].

2.7. Research gaps

Despite the growing body of literature, several significant gaps remain. First, there is a lack of integrated frameworks that comprehensively link AI, QA, social inclusion, and human capital development. Second, existing AI applications in QA are predominantly technology-driven and insufficiently aligned with broader educational and social objectives. Third, there is a scarcity of context-specific research focusing on developing countries, particularly Vietnam and Indonesia. Fourth, interdisciplinary and expert-informed approaches for practical implementation remain underdeveloped.

Overall, the literature indicates a shift in QA from control-oriented approaches toward continuous improvement, while AI presents strong transformative potential. At the same time, inclusive human capital development is increasingly recognized as a central goal of higher education. However, the absence of integrated, context-sensitive frameworks remains a critical gap. This gap provides the foundation for the present study, which seeks to develop an AI-supported QA framework that promotes inclusivity, responsiveness, and sustainable development in higher education systems.

3. RESEARCH METHODOLOGY

3.1. Research design

This study adopts a qualitative, expert-based research design to develop a comprehensive framework for AI-supported QA systems aimed at promoting social inclusion and human capital development in higher education. A qualitative approach is particularly appropriate for examining complex, multidimensional phenomena that involve the interaction of

technological, social, and institutional factors, which cannot be fully captured through purely quantitative methods [25], [26]. Such an approach enables in-depth exploration of meanings, relationships, and contextual influences that shape the integration of AI into QA systems.

Specifically, the study employs a conceptual development approach supported by expert judgment. This approach integrates insights derived from theoretical literature, empirical studies, and expert perspectives to construct a coherent analytical framework linking AI, QA, social inclusion, and human capital development [27], [28]. By combining multiple sources of knowledge, the study ensures both theoretical robustness and practical relevance.

The research is guided by a constructivist paradigm, which assumes that knowledge is socially constructed through interaction, context, and experience. This paradigm is particularly suitable for this study as it allows for the development of a framework grounded not only in established global theories but also in the specific socio-economic and institutional contexts of Vietnam and Indonesia [29]. Through this lens, the framework is understood as a context-sensitive construct rather than a universal model.

3.2. Research approach: Expert-based approach to framework development

This study utilizes an expert-based approach to framework development, which involves systematically collecting, analyzing, and synthesizing knowledge from domain experts. This approach is widely recognized as effective in emerging and interdisciplinary research areas where empirical data may be limited, and expert knowledge plays a crucial role in theory building and model development [30], [31]. In such contexts, expert insight provides valuable guidance for identifying key variables, relationships, and practical considerations.

The expert-based approach adopted in this study consists of three main stages:

(1)Identify the field and theoretical components: In the first stage, the researchers conduct a systematic literature review to identify relevant fields and construct the core components of the research framework. This process focuses on the key concepts related to AI, QA, social inclusion, and human capital development, thereby establishing the theoretical foundation for the proposed model.

(2)Expert ideas and evaluation: In the second stage, expert knowledge is incorporated through secondary data derived from previous studies involving specialists in higher education, QA systems, and digital transformation in Vietnam and Indonesia. These expert contributions are used to evaluate the relevance, coherence, and contextual applicability of the identified components. This step ensures that the framework is not only theoretically sound but also grounded in practical realities.

(3)Synthesis and framework finalization: The final stage involves integrating insights from the literature review and expert evaluation through a synthesis process to construct a comprehensive and contextually appropriate framework. This stage emphasizes aligning theoretical constructs with practical feasibility, ensuring that the proposed model can be effectively applied in real-world higher education settings [32].

3.3. Research context

The study is situated within the higher education systems of Vietnam and Indonesia, which represent emerging contexts in Southeast Asia. These countries are selected based on three primary considerations: (1) ongoing efforts to reform and strengthen QA systems; (2) increasing adoption of digital technologies, including AI; and (3) persistent challenges related to social inclusion and human capital development.

Higher education institutions in these contexts face distinct structural constraints, including limited financial and technological resources, uneven digital infrastructure, and socio-economic disparities among student populations. These factors significantly influence

the implementation and effectiveness of AI-supported QA systems [8], [9]. By focusing on these contexts, the study aims to develop a framework that is both context-sensitive and adaptable, addressing global trends while responding to local challenges.

3.4. Data sources

This study relies on two primary sources of data to ensure a comprehensive and balanced analysis:

3.4.1. Literature-based data

A systematic review of relevant literature is conducted to identify key theories, conceptual models, and empirical findings related to four main domains: (1) QA in higher education; (2) AI in education; (3) social inclusion; and (4) human capital development. The literature is sourced from peer-reviewed journals, academic books, and institutional reports indexed in major databases such as Scopus, Web of Science, and Google Scholar.

Priority is given to recent publications (2015–2024) to ensure the relevance and timeliness of the analysis, particularly in relation to rapidly evolving AI technologies and digital transformation trends [8], [9]. This approach ensures that the framework reflects current developments and emerging issues in the field.

3.4.2. Expert secondary-based data

In addition to literature-based data, the study incorporates expert knowledge derived from previous empirical studies. These studies involve experts in areas such as higher education policy, QA systems, digital transformation and AI applications, social inclusion and human capital development. The use of secondary expert data allows the study to benefit from validated expert insights without requiring primary data collection.

Experts included in the referenced studies are selected based on specific criteria: (1) a minimum of five years of professional or academic experience; (2) active involvement in QA systems or educational innovation; and (3) demonstrated expertise through publications, leadership roles, or policy contributions. This ensures the credibility and relevance of the expert input.

3.5. Data collection methods and analysis techniques

This study adopts a qualitative approach integrating document analysis and thematic analysis to systematically collect, code, and interpret data. Data collection and analysis were conducted iteratively to ensure a coherent and rigorous analytical process.

3.5.1. Document analysis

Document analysis is employed as a primary method for reviewing and extracting relevant information from academic and policy sources [33]. This method enables systematic examination of textual data to identify key concepts, patterns, and relationships. The selection of documents follows a purposive sampling strategy, ensuring that all sources are directly relevant to the study's analytical domains. The document analysis process involves three key steps: (1) screening and selecting relevant documents; (2) coding key concepts and themes; and (3) categorizing into analytical dimensions. This structured approach ensures consistency and depth in data extraction.

3.5.2. Thematic analysis

To enhance analytical depth, thematic analysis is conducted following a well-established methodological framework [34]. This method facilitates the identification, analysis, and interpretation of patterns within qualitative data. The analytical process includes five stages: (1) familiarization with the data; (2) initial coding of key concepts; (3) identification of themes;

(4) review and refinement of themes; and (5) definition and naming of themes. Importantly, thematic analysis is conducted concurrently with document analysis, allowing for iterative refinement of categories and ensuring alignment between data sources and emerging themes.

3.5.3. Conceptual framework development

Following thematic analysis, the study employs conceptual synthesis to integrate identified themes into a coherent analytical framework [27]. This involves: (1) Mapping relationships between constructs; (2) Identifying core dimensions and components; (3) Developing a structured model of AI-supported QA. The framework is iteratively refined based on expert feedback to ensure clarity, relevance, and applicability.

3.5.4. Validity and reliability

Several strategies are implemented to ensure the rigor and credibility of the study: (1) Credibility is strengthened through triangulation of data sources, combining insights from literature and expert contributions, and grounding the analysis in established theoretical frameworks [25]; (2) Transferability is supported by providing detailed descriptions of the research context and methodological procedures, enabling readers to assess the applicability of the findings to other settings [29]; (3) Dependability is ensured through a transparent and systematic research process, including clear documentation of data collection and analysis procedures. In addition, ethical research practices are essential, particularly when engaging experts and interpreting their perspectives [35].

4. FINDINGS AND DISCUSSION

4.1. Findings

4.1.1. Theoretical basis

QA in higher education has undergone a significant transformation, evolving from a compliance-oriented model toward a more holistic approach that emphasizes continuous improvement, institutional accountability, and the development of a sustainable quality culture [1], [11], [12]. Despite this shift, many higher education systems continue to rely heavily on external evaluation mechanisms, which often limit institutional flexibility and responsiveness to rapid technological and societal changes. These traditional approaches tend to prioritize formal compliance over adaptive and innovation-driven quality enhancement.

At the same time, AI is increasingly reshaping QA processes by enabling advanced data analytics, real-time monitoring, and evidence-based decision-making. AI-driven tools such as predictive analytics and adaptive learning systems contribute to improved learning outcomes and enhanced institutional efficiency [5], [8]. These technologies allow institutions to identify performance trends, detect risks, and implement timely interventions.

However, the integration of AI into QA systems also presents significant challenges. Concerns related to ethical governance, algorithmic bias, and unequal access to digital technologies raise critical questions about fairness and inclusivity. If not carefully managed, these issues may reinforce existing social inequalities rather than alleviate them [9], [22]. Therefore, the effectiveness of AI in QA depends not only on technological capability but also on ethical and inclusive implementation.

From the perspective of social inclusion, inequality remains a persistent issue within higher education systems. Although digital technologies have expanded access to education, disparities related to socio-economic background, geographic location, and digital literacy continue to hinder equitable participation [3], [20]. This indicates that inclusion should not be

limited to access alone but must also encompass meaningful engagement, retention, and successful learning outcomes [21].

Furthermore, human capital development is influenced not only by access to education but also by the quality, relevance, and effectiveness of learning experiences. Persistent mismatches between graduate competencies and labour market demands highlight the need for stronger alignment between education systems and socio-economic needs [4], [24]. This underscores the critical role of QA in ensuring that educational programs are both relevant and responsive.

Overall, AI-supported QA systems offer strong potential to bridge the gap between social inclusion and human capital development. However, their success depends on context-sensitive implementation that accounts for structural inequalities, digital divides, and institutional capacity, particularly in developing regions [6], [19].

4.1.2. Context of Vietnam

This section synthesizes 5 key empirical studies conducted in Vietnam, focusing on social inclusion, human capital development, and quality culture in higher education.

(1) Social inclusion in Vietnamese higher education

Research indicates that despite significant expansion in enrolment, inequalities persist among disadvantaged groups, including rural populations, ethnic minorities, and low-income students [36]. Structural barriers such as financial limitations, unequal access to preparatory education, and geographic disadvantages continue to restrict both access and completion. Although policy measures such as scholarships and tuition support have improved participation rates, they remain insufficient to ensure equitable academic outcomes.

(2) Social inclusion and equity policy reform

Studies examining education inequality from a socio-political perspective reveal that social inclusion remains uneven due to persistent socio-economic stratification and regional disparities [37]. While policy frameworks strongly support expansion, structural inequities continue to constrain access and student retention. This suggests that inclusive policies must address systemic conditions rather than focusing solely on increasing enrolment.

(3) Human capital development and graduate employability

Evidence highlights a significant mismatch between higher education outcomes and labour market requirements [38]. Graduates often lack essential competencies such as practical skills, critical thinking, and adaptability. These deficiencies are linked to outdated curricula and weak collaboration between universities and industry. The findings emphasize the need for competency-based education and stronger partnerships with employers.

(4) Human capital and skills development in a transition economy

Higher education plays a critical role in supporting Vietnam's transition toward a knowledge-based economy; however, its effectiveness is constrained by limited research capacity, insufficient investment, and disparities in institutional quality [39]. These limitations hinder the development of a highly skilled workforce and highlight the need for improved alignment between education systems and national development strategies.

(5) Quality culture in Vietnamese higher education

Although formal QA systems are well established, they remain largely compliance-driven and externally oriented [40]. Weak internal quality culture, limited stakeholder engagement, and heavy reliance on accreditation processes restrict continuous improvement. Strengthening leadership commitment and fostering internal evaluation practices are essential for developing a sustainable quality culture.

4.1.3. Context of Indonesia

Similar to Vietnam, studies in Indonesia reveal persistent systemic challenges in social inclusion, human capital development, and quality culture in higher education.

(1) Social inclusion in Indonesian higher education

Despite increased access, participation remains highly unequal, particularly for students from low-income and rural backgrounds [41]. Financial barriers, disparities in school quality, and limited access to preparatory resources continue to restrict educational opportunities. While government programs have improved access, they have not fully addressed structural inequalities or ensured equitable outcomes.

(2) Social inclusion and widening participation policies

Widening participation policies have yielded uneven results due to governance challenges, decentralization, and institutional disparities [42]. Although enrolment rates have increased, access to high-quality and elite institutions remains concentrated among advantaged groups, reflecting broader socio-economic inequalities.

(3) Human capital development and graduate competence

Research identifies a persistent gap between graduate competencies and labour market expectations [43]. Graduates often lack both technical and soft skills required for employment, indicating weaknesses in curriculum design and limited engagement with industry. The findings highlight the importance of experiential learning and stronger university–industry collaboration.

(4) Human capital and higher education quality

Disparities in institutional quality significantly affect human capital development [44]. Students from disadvantaged backgrounds are more likely to attend lower-quality institutions, leading to weaker learning outcomes and reduced employment opportunities. Addressing these disparities requires improved resource allocation and quality enhancement across institutions.

(5) Quality culture in Indonesian higher education

Although internal QA systems are widely implemented, the development of quality culture remains uneven and predominantly compliance-oriented [45]. Limited stakeholder participation and weak integration of QA into everyday academic practices hinder continuous improvement. Strengthening leadership, institutional learning, and participatory governance is essential for fostering a sustainable quality culture.

4.1.4. Coding, theming, and categorizing

Based on the attached dataset, the analysis is conducted through (1) coding key concepts and themes and (2) categorizing findings into analytical dimensions. The results are presented in a structure.

(1) Coding of key concepts and themes

Through systematic thematic coding, a set of recurring concepts and patterns emerged across the studies from Vietnam and Indonesia. These patterns were grouped into three major domains aligned with the focus of this study: social inclusion, human capital development, and quality culture in higher education.

In the domain of social inclusion, key concepts include educational inequality, unequal access, marginalized groups, financial barriers, and policy interventions. These concepts collectively highlight the persistent gap between expanded access and equitable outcomes, indicating that structural barriers continue to shape participation and success.

Within the domain of human capital development, recurring concepts include graduate employability, skills mismatch, curriculum relevance, industry linkages, and institutional disparities. These findings reveal a consistent pattern of misalignment between higher education outputs and labour market demands, emphasizing the need for stronger integration between education and employment systems.

In the domain of quality culture, key themes include compliance-driven QA systems, weak internal quality culture, limited stakeholder engagement, and the need for continuous improvement. These patterns suggest that although QA mechanisms are formally established, their effectiveness is constrained by limited institutional ownership and engagement.

Overall, the coding process reveals that these domains are deeply interconnected, forming a complex system in which inequalities in access, institutional capacity, and quality culture interact to influence human capital outcomes.

Table 1. Thematic coding of key concepts and emerging themes across social inclusion, human capital development, and quality culture

No	Domains	Key codes identified	Key themes identified
1	Social Inclusion	1. Educational inequality 2. Unequal access (rural vs urban, socio-economic status) 3. Marginalized groups (ethnic minorities, low-income students) 4. Financial barriers (tuition, affordability) 5. Policy interventions (scholarships, widening participation) 6. Participation versus success gap 7. Institutional support systems 8. Regional disparities 9. Governance and policy implementation gaps	1. Access expansion versus persistent inequality 2. Structural barriers to inclusion 3. Policy effectiveness and limitations
2	Human Capital Development	1. Graduate employability 2. Skills mismatch 3. Curriculum relevance 4. Industry linkage 5. Knowledge versus practical skills gap 6. Competency-based education 7. Research capacity 8. Innovation and technology skills 9. Labour market alignment 10. Institutional quality disparities	1. Mismatch between education and labour market needs 2. A consistent gap exists between graduate competencies and employer expectations 3. Importance of curriculum and industry collaboration 4. Weak university-industry linkages limit effective human capital formation 5. Unequal institutional capacity 6. Differences in institutional quality affect human capital outcomes across regions and social groups
3	Quality Culture in Higher Education	1. QA systems 2. Accreditation-driven practices	1. Dominance of compliance-oriented QA

No	Domains	Key codes identified	Key themes identified
		3. Compliance versus continuous improvement 4. Internal quality culture 5. Leadership commitment 6. Stakeholder participation 7. Institutional learning 8. Governance structures 9. Quality enhancement versus quality control 10. Organizational culture	2. QA systems are largely bureaucratic and externally driven. 3. Weak internal quality culture 4. Limited ownership and engagement from academic communities 5. Need for transformative quality practices 6. Emphasis on leadership, participation, and continuous improvement

Source: Developed by the authors based on thematic analysis of ten selected studies from Vietnam and Indonesia

Based on the dataset derived from 10 selected empirical studies (5 conducted in Vietnam and 5 in Indonesia), the analysis was conducted through (1) systematic coding of key concepts and (2) categorization into analytical dimensions. As summarized in Table 1, the thematic coding reveals recurring and consistent patterns across three major domains: social inclusion, human capital development, and quality culture in higher education. The table provides a structured synthesis of key codes and their corresponding themes, demonstrating how diverse empirical findings converge into broader conceptual categories that inform the analytical framework of this study.

As presented in Table 1, the domain of social inclusion is characterized by persistent inequalities despite the expansion of access to higher education. The identified themes emphasize disparities between participation and actual outcomes, structural barriers, and policy limitations. These findings suggest that inclusion challenges are deeply embedded within socio-economic structures and institutional arrangements, rather than being limited to issues of access alone. Consequently, policies focused solely on widening participation are insufficient to address systemic inequities.

In the domain of human capital development, the analysis reveals a consistent pattern of misalignment between educational outcomes and labour market demands. Key themes, including skills gaps, weak university–industry linkages, and institutional disparities, indicate that higher education systems face significant challenges in producing graduates who are both relevant and competitive in the knowledge economy. This mismatch reflects structural weaknesses in curriculum design, institutional capacity, and labour market integration.

Meanwhile, the domain of quality culture highlights the dominance of compliance-oriented QA systems, characterized by limited internal engagement and weak institutional ownership. The themes illustrate a clear gap between formal QA mechanisms and actual practices of quality enhancement. This suggests that while QA frameworks are formally implemented, they often fail to foster continuous improvement or meaningful participation among academic stakeholders.

Importantly, Table 1 serves as a critical empirical foundation for the study’s analytical synthesis by demonstrating that these three domains are not isolated but structurally interconnected. The convergence of themes across domains points to a systemic issue in which inequalities in access and institutional capacity contribute to weak human capital outcomes, which are further exacerbated by an underdeveloped quality culture. This integrated interpretation provides a strong basis for identifying higher-order analytical dimensions and supports the argument for developing an AI-supported QA framework capable of addressing these interrelated challenges holistically.

(2) Categorization into analytical dimensions

Building upon the thematic synthesis, the findings were further organized into five higher-order analytical dimensions that capture systemic patterns across the Vietnamese and Indonesian higher education contexts.

Dimension 1: Equity of access versus equity of outcomes

This dimension highlights the critical distinction between expanding access and achieving equitable educational outcomes. While higher education systems have successfully increased participation, disparities in completion rates, academic achievement, and graduate employability persist. This indicates that inclusion remains partial and uneven, requiring a shift toward outcome-based equity.

Dimension 2: Structural inequality and systemic constraints

This dimension reflects the deep-rooted socio-economic and regional disparities that shape educational opportunities and outcomes. Structural inequalities limit the effectiveness of policy interventions and necessitate comprehensive, multi-level reforms that address underlying systemic conditions rather than surface-level indicators.

Dimension 3: Relevance and effectiveness of human capital formation

The third dimension captures the persistent misalignment between higher education systems and labour market needs. Skills mismatches, outdated curricula, and insufficient industry engagement reduce the overall effectiveness of human capital development and limit the socio-economic contribution of higher education.

Dimension 4: Institutional quality disparities

This dimension emphasizes significant variations in institutional capacity and performance. Lower-tier institutions, which often serve disadvantaged populations, tend to operate with limited resources and produce weaker outcomes, thereby reinforcing systemic inequality within higher education systems.

Dimension 5: Quality assurance and quality culture gap

The final dimension highlights the disconnect between formal QA systems and their actual impact on educational quality. Although QA frameworks are widely implemented, their effectiveness is constrained by compliance-oriented practices, limited internal ownership, and weak engagement from academic communities.

(3) Integrated analytical synthesis

The cross-country synthesis reveals that social inclusion, human capital development, and quality culture are deeply interconnected rather than independent domains. The analysis suggests a systemic chain of influence in which inequality in access leads to disparities in institutional quality, which in turn results in unequal human capital outcomes. Moreover, weak quality culture emerges as a critical mediating factor that limits institutions' capacity to respond effectively to both inclusion challenges and labour market demands. Without a strong internal quality culture, QA systems remain procedural and fail to drive meaningful improvement.

Overall, the core systemic issue can be understood as a misalignment between access expansion, institutional quality, and labour market relevance, compounded by persistent structural inequalities and weak quality culture. This misalignment provides a critical foundation for developing AI-supported QA systems to enhance inclusiveness, responsiveness, and effectiveness in higher education.

4.2. Discussion

This section presents a comprehensive interpretation of the findings derived from thematic analysis and conceptual synthesis of empirical studies in Vietnam and Indonesia. The discussion focuses on three interrelated domains: social inclusion, human capital development, and quality culture in higher education. By integrating empirical findings with relevant theoretical frameworks, the analysis constructs a coherent explanation of systemic challenges and identifies pathways for transformation.

4.2.1. *Social inclusion: From expanding access to achieving inclusive outcomes*

The findings indicate that both Vietnam and Indonesia have made significant progress in expanding access to higher education, reflecting the global trend toward massification [20]. However, increased enrolment has not been accompanied by equitable academic success, as disparities related to socio-economic status, geographic location, and institutional stratification remain evident.

These results underscore that social inclusion must be conceptualized as a multidimensional construct that extends beyond access to include meaningful participation, engagement, and academic achievement [3]. Persistent inequalities reflect a layered structure of disadvantage in which unequal access to resources and opportunities leads to unequal outcomes [22]. Consequently, access-oriented policies alone are insufficient to address deep-rooted structural barriers [21].

In response, this study emphasizes the need to shift from “access-based inclusion” to “outcome-based inclusion.” This requires reconfiguring QA systems to incorporate indicators such as student retention, learning success, and graduate employability. Within this framework, AI-supported QA systems can play a critical role by enabling early identification of at-risk students and facilitating targeted, data-driven interventions.

4.2.2. *Structural inequality and systemic constraints*

A key finding is the pervasive influence of structural inequality on higher education systems in both countries. These inequalities manifest in the form of regional disparities, socio-economic stratification, and uneven institutional capacity. From a systems theory perspective, inequalities at the input stage such as disparities in prior education and economic resources have a cascading effect on educational outcomes [2].

Furthermore, sociological perspectives on cultural and social capital provide additional insight into how advantaged groups maintain their position within the education system, reinforcing patterns of inequality across generations. These findings suggest that isolated policy interventions are insufficient; instead, comprehensive and integrated strategies are required to address structural constraints.

In this context, QA systems must expand beyond traditional performance indicators to include dimensions of equity, fairness, and value-added outcomes for learners [1]. Such an approach aligns QA more closely with broader societal goals and enhances its role as a driver of inclusive development.

4.2.3. *Human capital development: the mismatch with labour market demand*

The analysis reveals a persistent mismatch between higher education outputs and labour market demands. Graduates often lack key competencies such as practical skills, critical thinking, and adaptability, which are essential in the contemporary knowledge economy [38], [43]. While human capital theory emphasizes the role of education in enhancing productivity and economic growth [4], its effectiveness depends on the relevance and quality of educational provision.

Factors such as outdated curricula, weak industry linkages, and limited access to competency-based learning opportunities reduce the effectiveness of human capital development [24]. Additionally, disparities in institutional quality further exacerbate inequalities in employment outcomes, reinforcing the interdependence between social inclusion and human capital formation.

These findings highlight the critical role of QA systems in ensuring that educational programs remain relevant, responsive, and aligned with labour market needs.

4.2.4. The gap between quality assurance and quality culture

A significant issue identified in the analysis is the gap between formal QA systems and the development of an intrinsic quality culture. Current QA practices are predominantly compliance-oriented, focusing on external evaluation and accreditation processes rather than fostering continuous improvement and internal engagement.

This reflects a fundamental tension between two approaches to quality: control versus development [10]. The absence of a strong quality culture limits institutional adaptability and reduces the effectiveness of QA systems in addressing complex educational challenges. As a result, QA remains procedural rather than transformative.

Addressing this gap requires a shift toward a more holistic model of QA that integrates technological innovation with organizational learning and cultural change.

4.2.5. Toward an AI-supported inclusive quality assurance framework

Building on the findings, this study proposes an AI-supported QA framework as a comprehensive solution to current limitations. AI technologies enable enhanced data analytics, continuous monitoring, and evidence-based decision-making, thereby strengthening institutional capacity and improving governance effectiveness.

However, the successful implementation of AI requires a human-centered and ethically grounded approach that prioritizes fairness, transparency, and data security [7]. Moreover, the effectiveness of AI-supported QA systems depends on institutional readiness, digital infrastructure, and leadership commitment.

The proposed framework emphasizes the integration of technological innovation with governance structures and organizational culture, ensuring that QA functions not only as a control mechanism but also as a catalyst for continuous improvement and inclusive development.

4.2.6. Synthesis and theoretical implications

This study contributes to the literature by demonstrating the interconnected nature of social inclusion, human capital development, and quality culture within a unified analytical framework. It highlights the limitations of traditional QA systems and positions AI as a strategic enabler of transformation.

Theoretically, the research integrates systems theory, human capital theory, and quality culture frameworks, providing a comprehensive perspective on the evolution of higher education in the digital era.

Overall, although higher education systems in Vietnam and Indonesia have made notable progress, persistent structural inequalities and institutional constraints continue to limit their effectiveness. The proposed AI-supported QA framework offers a promising pathway for aligning technological innovation with inclusive and sustainable development goals.

5. CONCLUSION

This study examines the dynamic relationship between social inclusion, human capital development, and quality culture in higher education through a comparative analysis of Vietnam and Indonesia. Grounded in human capital theory, systems theory, and quality culture frameworks, the findings confirm that these dimensions are deeply interconnected within a complex, non-linear system rather than operating independently.

The results show that social inclusion remains constrained by structural inequalities despite expanded access. Socio-economic disparities, geographical differences, and institutional stratification continue to limit not only participation but also student success. This highlights that inclusion must go beyond access to encompass retention and meaningful educational outcomes. Similarly, human capital development remains uneven and insufficiently aligned with labour market needs. Variations in institutional quality and capacity reduce the effectiveness of translating education into relevant skills, thereby weakening higher education's contribution to socio-economic development.

In addition, quality culture across institutions is not yet fully internalized. QA systems tend to emphasize compliance and external control rather than continuous improvement, while top-down governance limits active engagement from academic stakeholders. Importantly, these three dimensions are interdependent: weak quality culture exacerbates inequality and undermines both inclusion and human capital outcomes, whereas strong quality practices can enhance inclusive and effective education systems.

In response, the study proposes an AI-supported QA framework as an integrated solution. Through data analytics, real-time monitoring, and adaptive feedback, AI can strengthen institutional capacity, support evidence-based decision-making, and foster continuous improvement, thereby bridging policy and practice.

However, limitations include reliance on secondary data, restricted geographic scope, theoretical dependence on existing frameworks, and the lack of empirical validation of the proposed model. The study recommends policy shifts toward comprehensive inclusion, institutional efforts to build internal quality culture and a labour market alignment, and future research emphasizing empirical, cross-national, and multi-method approaches. Overall, the study repositions QA as a strategic mechanism to advance inclusive and sustainable higher education in the digital era.

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