2025 European Quality Assurance Forum

QA in times of crises – Ensuring stability,
autonomy and international cooperation in higher education

Hosted by Corvinus University of Budapest, Hungary
12-14 November 2025

ISSN: 1375-3797

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Paper

Title: Performance Indicators in Higher Education Institutions: A Comparative Analysis of International Reference Models

Abstract

Higher Education Institutions (HEI) are increasingly challenged to ensure agility and resilience in times of uncertainty, while maintaining strategic coherence and societal relevance. Quality assurance (QA) systems, particularly those supported by performance indicators, can play a decisive role in enabling institutions to align their internal practices with external standards and emerging expectations. This paper explores how performance indicators can support internal quality assurance systems in Higher Education Institutions. Drawing upon a comprehensive review of organizational performance concepts and indicator frameworks, we conduct a comparative analysis of several key performance indicator frameworks. The study highlights the strengths, complementarities, and gaps in these frameworks, particularly regarding their alignment with ESG (European Standards and Guidelines for Quality Assurance in the European Higher Education Area) and national standards such as those defined the Portuguese QA agency (A3ES). The findings support recommendations for developing robust, context-sensitive indicators that reinforce HEIs' strategic goals and enhance continuous improvement efforts. These findings are of relevance for institutions and QA agencies crossing increasing demands for agility, transparency, and international cooperation.

Keywords

Quality Assurance (QA), key performance indicators, performance indicator frameworks

1. Introduction

The pursuit of quality in higher education has increased over recent decades as institutions face growing pressure to enhance transparency, improve performance, and demonstrate societal impact. Quality assurance (QA) mechanisms have emerged as critical instruments to support institutional governance, guide improvement processes and uphold academic standards. In times of crisis—be it political, economic or public health-related—QA becomes even more crucial, offering stability and direction.

This paper focuses on the role of performance indicators as tools for internal and external quality assurance in Higher Education Institutions (HEIs). While numerous performance indicator frameworks (also referred in this paper as “reference models of performance indicators”) have been proposed to measure and benchmark HEI performance, limited research has sought to compare these frameworks systematically. Addressing this gap, the present paper analyses and compares four major reference models of performance indicators in higher education. The objective is to provide a structured understanding of how these reference models align, differ and complement one another, thereby informing QA practice and policy across diverse contexts.

The SMART-QUAL project is adopted as the baseline framework for this analysis due to its conceptual and methodological alignment with the specific needs of Portuguese higher education institutions (HEIs). Unlike more generic or externally imposed models, SMART-QUAL was designed to support the development of internal quality assurance (IQA) systems that are both institutionally embedded and responsive to the strategic priorities of teaching, research, and societal engagement. This framework thus provides a structured yet adaptable approach for HEIs seeking to strengthen evidence-based management and foster a culture of continuous improvement. Within this context, this paper compares the SMART-QUAL framework with other three frameworks, examining its coherence with the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) and the Portuguese regulatory frameworks (A3ES). This approach allows for the identification of context-sensitive strategies for the enhancement of internal quality systems, grounded in both international standards and national specificities.

2. Conceptual Background

The concept of "quality" in higher education is multifaceted and context dependent. Harvey and Green (1993) famously categorised quality into five conceptions: exceptional, perfection (or consistency), fitness for purpose, value for money, and transformation. Watty (2003) argued that while not all these conceptions are equally applicable to higher education, they remain influential in shaping institutional interpretations of quality.

Quality assurance in HEIs has evolved significantly since the 1990s, particularly under the influence of the Bologna Process. The development of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) in 2005 marked a major milestone, providing a common European reference for both internal and external QA mechanisms.

According to Waal (2021), performance refers to an organization's ability to achieve its goals effectively and efficiently. Performance evaluation in HEIs involves the systematic use of indicators to measure effectiveness, efficiency, and impact across teaching, research, and societal engagement. Traditional models such as the Balanced Scorecard (Kaplan & Norton, 1992), EFQM Excellence Model[1] and the Performance Prism (Neely & Adams, 2000) have informed many institutional strategies.

The choice of indicators reflects institutional priorities, regulatory requirements, and stakeholder expectations. Researchers such as Neely (1999) and Bititci *et al.* (2011) highlight the increasing complexity and dynamism of performance evaluation systems, which must balance accountability and improvement functions. In the higher education context, frameworks must also accommodate academic autonomy and disciplinary diversity.

3. Methodological Approach

This study is based on a qualitative documentary analysis of conceptual and operational frameworks of performance indicators applied to HEIs. The analysis focused on understanding how different models conceptualise institutional missions and develop measurable dimensions to support QA.

The methodological strategy unfolded in three stages: (1) A literature-informed selection of reference models based on their prominence in recent QA and higher education performance discourses. These included SMART-QUAL (Adot *et al*., 2023), Leiber (2019, 2020), Bucur *et al.* (2018), and Bruckmann et al. (2019), as well as the ESG (ENQA, 2015) and the Portuguese national QA framework A3ES (2018). These were chosen from among a broader landscape of QA tools, models and initiatives (e.g., U-Multirank, EUA Scorecard, TEF, AQAS, CHE, etc.) due to their explicit use of structured indicator sets and their relevance to mission-based institutional performance. The four main frameworks selected are widely cited, diverse in scope, and cover different institutional missions, providing a multidimensional basis for comparison; (2) A mapping and classification of indicators from the SMART-QUAL model according to the three core missions of HEIs: Teaching and Learning, Research, and Societal Engagement. These were further aligned with the ESG standards and the A3ES reference areas to assess convergence, complementarity and divergence; (3) A comparative synthesis, combining classification tables and indicator matrices from the selected models, to identify underrepresented areas such as sustainability, internationalization, and applied research.

The primary data sources included publicly available project deliverables (e.g., SMART-QUAL final report), national QA documents (A3ES reference standards and guides), and specific peer-reviewed publications by the selected authors. Unlike a generic literature review, this study targeted model-based sources that articulate indicator taxonomies, dimensions and performance logic. The analysis was interpretative, drawing on documentary comparison to identify patterns, gaps and opportunities for integration.

The SMART-QUAL framework was selected as the central comparative reference due to its unique capacity to integrate European standards (ESG) with institutional missions and a structured hierarchy of indicators. Designed within a European consortium of HEIs and QA agencies, SMART-QUAL is both

1 http://www.efqm.org/

policy-aligned and practice-oriented, allowing it to serve as a pivot model for comparing more specific frameworks. Its indicators are explicitly organised across strategic, tactical and operational levels (Anthony, 1965), and the model offers coverage for all major institutional functions. In contrast, the other models were chosen as complementary for their specialisation: Leiber for pedagogical evaluation; Bucur for research metrics; and Bruckmann for societal engagement. This design allowed the analysis to explore how a central integrative model (SMART-QUAL) can incorporate or be contrasted with more focused frameworks, reflecting the complex needs of HEIs in different contexts.

This approach acknowledges the existence of other frameworks and QA initiatives but focuses on a subset chosen for their conceptual clarity, policy relevance and applicability to comparative indicator analysis.

4. Comparative Analysis

This study adopts the SMART-QUAL framework as the central reference point for a comparative analysis of performance indicator models in higher education. SMART-QUAL was developed as part of a European project involving 36 higher education institutions and quality assurance agencies and consists of 56 performance indicators grouped under 15 extended ESG reference areas. The model's comprehensive structure spans the three missions of higher education—teaching and learning, research, and societal engagement—while also incorporating hierarchical alignment with strategic, tactical, and operational levels of decision-making (Anthony, 1965). It is explicitly designed to support both internal quality management and external alignment with the ESG (ENQA, 2015).

Although the ESG represents the most established QA framework within the European Higher Education Area, it is widely acknowledged that its focus remains primarily on internal processes related to teaching. This is consistent with ESG standards 1.2 to 1.9, which emphasise programme design, delivery, and student support. However, ESG's limited attention to research (only briefly referenced in standard 1.1) and societal engagement (not explicitly covered) creates gaps for institutions with broad strategic agendas. These limitations present challenges for HEIs seeking to develop comprehensive internal QA systems that reflect their full institutional mission.

In contrast, the SMART-QUAL model integrates the ESG with extended dimensions that specifically address underrepresented missions. These include results and impact (ESGe12), societal contribution (ESGe15), and stakeholder collaboration (ESGe14). By explicitly categorising indicators at strategic, tactical, and operational levels, SMART-QUAL offers a practical tool for internal quality systems that support performance monitoring across the full institutional spectrum.

When mapped against the Portuguese national QA framework developed by A3ES, the SMART-QUAL model reveals notable complementarities but also gaps. While A3ES includes standards for teaching quality, resources, governance, and public information, it does not fully address key areas increasingly prioritised in European QA discourse. These include applied research, regional innovation impact, lifelong learning, sustainability, and international partnerships. Table 1 summarises the gaps identified in the A3ES standards when compared to SMART-QUAL and ESG extended dimensions.

Table 1: Identified Gaps in SMART-QUAL Compared to A3ES Reference Areas and ESG

A3ES Reference Area	**Identified Gaps or Needs**	**Related ESG Extended Dimension**
A3ES06 – Research and Development.	Applied research, innovation metrics	ESGe12 – Results and impact
A3ES07 – External Relations	Regional impact, stakeholder feedback	ESGe14 – Collaboration with stakeholders ESGe15 – Impact in society
A3ES08 – Internationalisation	Knowledge exchange, international collaboration	ESGe11 – Resources

Lifelong Learning / Sustainability	No A3ES equivalent; room for system-level inclusion	ESGe15 – Societal impact

This expanded version of Table 1 clarifies the specific performance dimensions present in SMART-QUAL and ESG but underrepresented in the A3ES framework. For example, while A3ES06 addresses research, it does not incorporate applied or collaborative research indicators nor link performance to regional innovation outcomes. Similarly, A3ES07's emphasis on external relations lacks explicit metrics for stakeholder engagement or community impact, which are key to assessing third mission effectiveness.

A3ES08 touches on internationalisation in terms of mobility and strategy, but offers no measurable indicators for transnational knowledge exchange or research collaboration. Perhaps most critically, lifelong learning and sustainability remain absent from the national QA framework. These omissions suggest important opportunities for the evolution of A3ES in line with emerging European QA standards and HEI missions. SMART-QUAL, with its enriched ESG structure, provides a bridge to integrate these missing dimensions.

The A3ES reference framework presents a highly detailed and context-sensitive approach to quality assurance, which reflects national regulatory traditions in Portugal. It includes explicit standards for resources, infrastructures, human capital and external relations—elements that are often only implicitly covered in the ESG.

While this specificity allows for greater precision in external reviews and accreditation processes, it may also reduce the flexibility of institutional QA systems to adapt to European or international criteria. This duality suggests that while A3ES enhances operational clarity, it requires careful mapping and adaptation when HEIs aim to align with broader frameworks such as ESG or SMART-QUAL. The mapping exercise in this study demonstrates how SMART-QUAL can serve as a mediating tool between national depth and European breadth.

As previously referred, the complementary models to the SMART-QUAL models include: (1) Leiber (2019, 2020), that focuses on teaching and learning quality, proposing indicators based on learning theories and subdomains of teaching/learning processes; (2) Bucur *et al.* (2018), that highlights indicators relevant for research performance, including funding, citations, and visibility; (3) Bruckmann *et al.* (2019), that emphasizes societal engagement and the third mission of HEIs, offering criteria for impact measurement.

Comparative analysis reveals significant overlaps and complementarities between models. However, gaps also emerge, particularly in areas such as applied research, regional impact, and international partnerships (Table 2).

Table 2: Comparative Focus of Indicator Frameworks in HEIs

Framework	**Primary Focus**	**Dimensions Covered**	**Notable Strengths**
SMART-QUAL	Teaching, Research, Society	Strategic, Tactical, Operational	ESG alignment; holistic; based on European HEIs
Leiber (2019, 2020)	Teaching & Learning	Environment, Processes, Outcomes	Theoretical grounding; rich in pedagogical detail
Bucur *et al.* (2018)	Research	Funding, Outputs, Impact	Practical relevance; based on institutional case
Bruckmann *et al.* (2019)	Societal Engagement	Regional Development, Transfer	Emphasis on third mission and external impact

The comparative matrix presented in Table 2 reveals complementary but distinct strengths across the four analysed indicator frameworks. SMART-QUAL offers the most holistic approach, covering all three institutional missions—teaching, research and societal engagement—while explicitly aligning with the ESG and providing a hierarchical structure across strategic, tactical and operational levels. However, it sacrifices granularity in certain domains, especially when compared to more domain-specific models.

Leiber's framework, for instance, is pedagogically rich and grounded in educational theory. It introduces a multi-level structure of teaching and learning indicators—ranging from environmental conditions to learning outcomes—that can be particularly useful for curriculum development and faculty evaluation. However, it offers little guidance for research or engagement activities, thus limiting its system-wide applicability.

The Bucur *et al*. (2018) model compensates for this by focusing on research-specific metrics, including funding acquisition, bibliometric performance, and international collaboration. These indicators are critical in the current HE landscape, where research impact and global visibility are increasingly tied to institutional prestige and funding streams. Bucur's model adds quantitative precision to the overall landscape but overlooks pedagogical or societal dimensions.

Bruckmann *et al*. (2019) provide a valuable structure for assessing societal engagement—a dimension often underdeveloped in QA frameworks. Their indicators reflect the increasing importance of HEIs' contributions to regional development, social innovation, and knowledge transfer. This model is particularly relevant considering recent EU policy shifts emphasising the third mission and community impact.

The integration of insights from these models enables a more comprehensive and responsive approach to performance evaluation in HEIs. For example, SMART-QUAL could be enriched by incorporating Leiber's pedagogical subdimensions or Bucur's metrics for research intensity. Likewise, Bruckmann's criteria for societal engagement can be adapted to create indicators for sustainability, partnerships, and lifelong learning. Thus, Table 2 is not merely a static comparison, but a foundation for synthesising a flexible, mission-sensitive and evidence-based QA model. Such a model would be highly relevant for HEIs aiming to navigate both national expectations (e.g., A3ES) and broader European standards (e.g., ESG), while also responding to their unique strategic priorities.

5. Conclusions

This paper reinforces the importance of using performance indicators to support continuous quality improvement in Higher Education Institutions. The comparative analysis undertaken confirms that while existing frameworks like SMART-QUAL, Leiber, Bucur, and Bruckmann offer robust and diverse approaches, none are entirely comprehensive when viewed in isolation.

The contribution of this paper offers a structured comparative mapping between ESG, A3ES and SMART-QUAL, supported by a multidimensional analysis of additional indicator frameworks from Leiber, Bucur and Bruckmann. By synthesising elements from these distinct models, the paper proposes a practical pathway toward the development of integrated, mission-sensitive QA systems. This synthesis provides a valuable reference for institutions and agencies aiming to strengthen both compliance and strategic alignment through meaningful performance indicators.

The SMART-QUAL model demonstrates considerable strength in aligning with the ESG standards and offers a balanced set of indicators across teaching, research, and societal engagement. However, its limited coverage of applied research, regional development, and international collaboration highlights the need for a broader scope. Conversely, the Leiber model provides detailed insights into the teaching and learning domain, grounded in educational theory, while Bucur and Bruckmann bring crucial focus on research impact and societal relevance.

A key recommendation is the integration of these complementary strengths into a more unified and adaptive framework. Institutions should consider developing hybrid indicator models that draw from multiple sources and are tailored to their specific mission and context. Moreover, national QA agencies

like A3ES could benefit from expanding their frameworks to incorporate dimensions such as sustainability and lifelong learning, which are increasingly central to European educational policy.

From a strategic standpoint, performance indicators should be embedded in institutional planning and governance processes. This integration ensures that data-driven insights directly inform decisions related to resource allocation, curriculum development, faculty development, and societal partnerships. Additionally, a participatory approach to indicator development—engaging stakeholders such as students, faculty, and external partners—can enhance legitimacy and effectiveness.

The future of quality assurance in HEIs lies in dynamic, context-aware, and evidence-based systems. Through thoughtful adaptation and continuous refinement of performance indicator frameworks, institutions can better navigate complexity, demonstrate value, and fulfill their missions in an evolving educational landscape.

Further work will explore the implementation of these mappings in practice, including their use in accreditation processes, strategic planning and international benchmarking in the context of the University of Minho. This doctoral research focuses on extending the proposed indicator framework through the development of research and institutional-level dashboards, complemented by the integration of emerging technologies such as artificial intelligence and predictive analytics. This future line of work aims to broaden empirical validation across different institutional contexts, reinforcing the transformative potential of quality assurance systems in higher education.

Acknowledgements

The authors would like to thank the SMART-QUAL ERASMUS+ Strategic partnership in Higher Education - Projet 2020-1-BE01-KA203-074900 project consortium, co-funded by the Erasmus+ Programme of the European Union, for providing the conceptual and methodological foundation for this research.

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