

152^a DEFESA DE TESE EM ENGENHARIA INDUSTRIAL

PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA INDUSTRIAL - PEI



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Título: QUALITY, EFFICIENCY, AND SUSTAINABILITY IN HIGHER EDUCATION: A COMPARATIVE CROSS-COUNTRY ANALYSIS OF THE UNEVEN PROGRESS TOWARD SUSTAINABLE DEVELOPMENT GOAL 4.

Data: 17 de dezembro de 2025 **Horário:** 09h00min

Local: https://conferenciaweb.rnp.br/webconf/pei_epufba

Resumo:

This thesis aims to develop a comprehensive understanding of countries' progress toward SDG 4 Target 4.3 by analyzing performance typologies and estimating the efficiency with which higher education systems generate relevant outcomes. Grounded in Institutional Theory, the Resource Dependence Theory, and the Capability Approach, the research adopts a multi-level and comparative cross-country design that integrates qualitative synthesis with advanced quantitative modeling. Empirically, the study combines secondary data from the United Nations Educational, Scientific and Cultural Organization and the World Bank to analyze how national higher education systems perform and convert educational resources into outcomes aligned with SDG 4 Target 4.3. Self-Organizing Maps, a type of unsupervised neural network, are used to identify structural and institutional patterns across countries. Meanwhile, a bootstrap Data Envelopment Analysis measures their relative efficiency in transforming inputs into equitable learning outcomes. The findings reveal distinct global profiles of higher education systems, highlighting significant disparities in efficiency and inclusiveness. Countries with stronger governance, greater institutional autonomy, and robust lifelong learning policies consistently achieve higher performance and more sustainable progress toward SDG 4. However, the results also show that global progress over the last decade has been only partially convergent and largely superficial. While most regions have expanded higher education enrollment, this quantitative growth has not been matched by equivalent improvements in human capabilities such as employability, gender equity, and lifelong learning participation. A pronounced asymmetry persists between the Global North and the Global South: high-income countries tend to integrate vocational and higher education effectively, whereas many low- and middle-income nations, particularly in Latin America and Sub-Saharan Africa, exhibit institutional fragility and low efficiency in utilizing educational resources. These systemic disparities threaten the achievement of Target 4.3 by 2030 and suggest that, without structural reforms, global inequalities in access and inclusion may persist and potentially deepen. The thesis contributes conceptually by linking quality and efficiency to the institutional and capability dimensions of sustainable development, and methodologically by integrating neural network clustering and efficiency frontier modeling within a unified analytical framework. Additionally, the research provides a comprehensive and evidence-based understanding of the uneven progress toward SDG 4, offering actionable insights for policymakers seeking to enhance the equity, effectiveness, and sustainability of higher education worldwide.

Palavras-chave: Educational efficiency. Educational management. Data envelopment analysis. Higher education Systems. Post-secondary education. Quality education. Self-organizing maps. Secondary data analysis. Tertiary Education. UNESCO.