

# Performance Profiles of the Top 100 Engineering Universities

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## Abstract:

This study compares the *Times Higher Education (THE) World University Rankings by Subject 2026* for engineering and the *Quacquarelli Symonds (QS) World University Rankings by Subject 2026: Engineering and Technology* as the two most influential global engineering rankings using a dataset of 127 universities that appear in the top 100 of at least one of the rankings, alongside bibliometric data from Elsevier's Scientific Visualization (SciVal) Benchmarking module for 2021-2025. The two rankings agree on 74 universities but diverge on 53, with the disagreement being systematic rather than random: *THE* rewards universities with strong research output, high-impact publications, and patent activity while *QS* is driven mainly by academic and employer reputation. As a result, large research universities with deep publication records tend to rank higher in *THE*, whereas institutions with strong global visibility and a clear engineering identity, such as the Indian Institutes of Technology and several European polytechnics, fare better in *QS*. National patterns also differ, with Hong Kong universities leading in citation impact and international collaboration, South Korea in industry partnerships, and China in publication volume while the United States leads in both reputation and research output. The two rankings are not interchangeable as they measure different ideas of what makes an engineering university excellent, thus their ranking choices affect differently which institutions are recognized as world-class.

## Keywords:

University Rankings, Engineering Education, Bibliometrics, *Times Higher Education World University Rankings*, *QS World University Rankings*.

## 1. Introduction

### 1.1. The rise of global university rankings

Over the past two decades, the intensification of globalization; marketization of higher education; and consolidation of a worldwide market for students, faculty, and research funding have profoundly transformed how universities are evaluated, compared, and governed. Within this changing landscape, global university rankings have emerged as one of the most influential and contested instruments for measuring institutional performance. Although international rankings capture only an estimated 2%-3% of all higher education institutions worldwide, they exert disproportionate influence over institutional reputation, student choice, faculty recruitment, and public investment decisions [1], as well as funding decisions, internationalization strategies, partnership choices, and student mobility. Reference [2] argued global rankings to have cemented the notion of a single world university market arranged along a comparative league table, generating powerful incentives toward the stratification and concentration of elite research activity. Reference [3] similarly observed the success of higher education institutions to increasingly depend on their ability to improve their position in the main global rankings that currently shape both institutional and national policy discourses on excellence.

The contemporary ranking landscape is dominated by three internationally established systems. The Academic Ranking of World Universities (ARWU, also known as the Shanghai Rankings), produced since 2003 by Shanghai Jiao Tong University and now maintained by Shanghai Ranking Consultancy, was the first ranking with an explicitly global scope [4]. Its launch was followed in 2004 by the *Times Higher Education-Quacquarelli Symonds (THE-QS)* partnership, which dissolved in 2010 into two distinct systems: the *QS World University Rankings* and the *Times Higher Education (THE) World University Rankings* [3]. Apart from these three, several other systems have proliferated in response to methodological criticisms and the demand for alternative perspectives [5-6]. Despite their differences, these systems collectively construct what [7] has described as a form of transnational policy coordination, shaping competitive behavior across national systems at the institutional level.

## 1.2. Methodological diversity and the centrality of bibliometric indicators

Although the main rankings claim to capture comparable dimensions of academic excellence, their methodologies differ markedly in indicator selection, weighting, and data sources. ARWU relies on six objective research-oriented indicators (i.e., Nobel and Fields Medal alumni and staff, highly cited researchers, publications in the journals *Nature* and *Science*, papers indexed in the Science Citations Index Expanded and the Social Sciences Citation Index, and per-capita performance, giving substantial weight to research outputs and prizes [1,4]. In contrast, QS World University Rankings allocates 40% of its score to a global academic reputation survey and an additional 10% to an employer reputation survey, with the remainder distributed across citations per faculty, student-to-staff ratios, and internationalization metrics [8]. *THE* combines 13 indicators grouped under the pillars of teaching, research, citations, knowledge transfer, and international outlook, with the first three pillars weighted at roughly 30% each [9].

Despite this methodological diversity, bibliometric indicators occupy a central role across all major systems. Reference [9] calculated the total weight of scientometric parameters to reach 60% in both *THE* and ARWU, 20% in QS, and 75% in the *U.S. News* ranking, with citation counts, publication volumes, and field-normalized citation impact emerging as the strongest predictors of rank. Meanwhile, [10] cautioned bibliometric indicators, despite being powerful when properly designed, to also be prone to numerous methodological pitfalls including language bias, database coverage limitations, and inappropriate aggregation of citation data. Van Raan also argued universities being ranked purely by bibliometric methods without sufficient technical sophistication to be able to produce misleading evaluations even at large aggregate levels. The centrality of citation-based measures has been further reinforced by physics-based analyses of ranking structures, with [11] demonstrating the rankings of the top United States engineering schools to closely mirror the rankings of universities with the largest numbers of highly cited researchers, as well as the log-log distribution of cited authors per institution to form a near-linear pattern analogous to natural hierarchical flow systems. Building on this earlier work, [12] showed higher institutional ranks to correlate strongly with the citation performance of institutions' most prolific authors rather than with simple measures of size such as student body, suggesting visibility through citations rather than scale to be the principal driver of rank.

## 1.3. Critiques, inconsistencies, and the limits of composite rankings

A substantial body of literature has documented the methodological and conceptual weaknesses of global university rankings. Reference [13] demonstrated how the major systems fail to provide adequate theoretical or empirical justification for their selection of indicators and weights, undermining their claims of validity. Reference [14] questioned whether a single composite measure can plausibly capture the multidimensional nature of university performance while [15] summarized three principal recurring categories of methodological critique in scholarly discourse (i.e., commensuration, transparency, and validity-reliability). Reference [16] argued aggregating heterogeneous indicators into an overall score to lend rankings an unjustified aura of holistic precision, encouraging their use as lazy proxies for quality. References [17-18] further demonstrated some indicator categories to be highly susceptible to manipulation, with universities engaging in gaming strategies such as recruiting highly cited researchers solely to improve ARWU performance, as well as exploiting QS's opaque survey methodologies.

One persistent finding in the comparative literature is the limited convergence among rankings despite their shared claim of measuring academic excellence. Only 35 institutions were shown to have appeared in the top 100 lists of all five major systems [6], with pairwise overlaps ranging from 49 to 75 universities. Each system was concluded to carry a bias, with EHESO being biased toward Europe, ARWU toward North America, Leiden Ranking toward emerging Asian countries, and QS and *THE* toward Anglo-Saxon institutions, thereby calling into question the notion that any single ranking can identify *the world's* top universities. Reference [5] reached similar conclusions, finding the greatest similarity among citation-based rankings and the weakest correlations between *THE*-QS and Webometrics. Although the top 50 universities from *THE*, QS, and ARWU overlap in 60-70% of cases, the similarity was observed to weaken substantially in the top 50-100 rankings [8], in which many universities ranked high in one system were not even significantly correlated with their positions in another. Reference [18] reported a correlation of only 0.43 in the citations parameter between *THE* and QS for 522 universities ranked in all three systems, which suggests methodological choices on their own to be able to produce substantial discrepancies for ostensibly identical concepts. References [19-20] added that systematic territorial and country-level biases further distort cross-ranking comparisons.

Paradoxically, however, the relative positions at the very top of the rankings remain remarkably stable, with [11] characterizing this rigidity as a natural feature of hierarchical flow systems and empirically demonstrating the 10-year patterns of U.S. engineering university rankings to have not changed in any meaningful way despite large institutional efforts to improve their positions. Reference [12] extended this argument, attributing

the permanence of top placements to the cumulative visibility of an institution's most cited authors, a property that is difficult for competing institutions to displace after being established. These inconsistencies have generated growing concern about the unintended consequences of rankings, with [7] identifying several side effects, including Matthew effects that consolidate the position of already-elite institutions, isomorphic pressures that homogenize institutional behavior, as well as institutional data being strategically adapted to fit ranking methodologies. Reference [3] noted rankings to have nonetheless demonstrated remarkable discursive resilience, persisting and even expanding despite ongoing criticism. A systematic review [21] concluded current ranking systems to have not been adequately validated as tools for improving research quality, whereas [22] provided evidence that conflicts of interest may distort the outcomes of such commercial rankings as QS.

#### **1.4. The discipline-specific gap**

One particularly important limitation of aggregate global rankings is their inability to reflect disciplinary heterogeneity. One study [23] argued universities to vary substantially in strength across academic fields, with broad categories such as science and humanities being too general to inform prospective students, faculty, or policy makers interested in more specific disciplines. Reference [4] acknowledged this limitation in their original ARWU report and proposed the future development of subject-specific rankings, an aspiration that has since been partially realized through ARWU, QS, and *THE* introducing subject-level rankings, yet this has remained under-examined in the academic literature.

Engineering disciplines occupy a strategically important position in this debate, with engineering research being highly publication- and citation-intensive, deeply intertwined with industrial innovation, and central to national policies for economic competitiveness [18,24]. Engineering also represents one of the largest discipline groups by publication volume and is a primary driver of citation flows in databases such as Scopus and Web of Science [9]. Meho [25] further demonstrated engineering to rank among the disciplines with the highest density of prestigious international awards, reflecting its prominent role in the global research enterprise. Importantly, the foundational analyses of [11-12] were themselves built on samples of engineering schools and engineering-related citation data, underscoring engineering's centrality as a testbed for ranking theory. Yet most cross-ranking comparative studies have focused on overall institutional scores rather than on discipline-specific performance, leaving a significant gap concerning how the leading engineering universities are positioned across different rankings and how their bibliometric profiles vary according to indicator choice.

This gap is consequential, as [6,9] showed how the same universities can occupy strikingly different positions depending on whether ranking algorithms emphasize size-dependent indicators that favor large institutions (e.g., those highly placed in ARWU and *U.S. News*) or size-independent measures that favor smaller, research-intensive institutions (e.g., *THE*, QS). For engineering universities, which range from large, comprehensive research universities to small, specialized institutes of technology, these methodological choices can produce particularly divergent assessments. Also within the engineering disciplines where research is intensely competitive, internationally collaborative, and tightly linked to industrial innovation, the stakes of being seen as a top-100 institution are particularly high, with one's position in subject rankings shaping doctoral candidate and academic staff recruitment, eligibility for cross-border collaboration, and how industrial investors and policymakers perceive a country's engineering capacity. Despite the weights, major engineering rankings differ in non-trivial ways. *THE* applies an 18-indicator framework grouped under its five pillars, with bibliometric measures supplied by Elsevier and a reputation survey weighted at 40.5% in the engineering recalibration. QS uses an overall framework of 10 indicators and a separate, much leaner five-indicator framework for its Engineering and Technology subject ranking that places a 70% weight on academic and employer reputation, with citations per paper, h-index, and an international research network indicator filling out the remainder. These methodological choices do not merely produce different rank ordinals but also reflect different theories of what makes an engineering university excellent. A focused, disciplinary, cross-ranking bibliometric analysis is therefore needed to clarify how performance profiles are constructed for the world's leading engineering schools.

#### **1.5. Aim, scope, and contribution**

In light of the issues outlined above, the present study undertakes a cross-ranking bibliometric analysis of the top 100 engineering universities with three principal objectives. Firstly, it seeks to identify the universities that consistently appear among the top 100 in engineering across the major international ranking systems and to quantify the overlap, divergence, and stability of these placements. Secondly, it examines the underlying bibliometric performance profiles (e.g., publication volume, citation impact, field-normalized citation indicators, highly cited researcher counts, international collaboration patterns) that drive the observed differences. Thirdly,

it explores how methodological choices, particularly the balance between size-dependent and size-independent indicators, shape the disciplinary picture of engineering excellence.

By integrating insights from the comparative ranking literature [5,6,8], the scientometric analyses of [9-10], and the physics-based perspectives on ranking permanence developed by [11-12] with a particular focus on engineering, this study contributes to three ongoing debates. The first is the gap repeatedly highlighted in recent reviews [21,26], which the study addresses by extending discussions on cross-ranking consistency, from aggregate institutional scores to a discipline-specific level. The second relates to the broader methodological critiques of rankings [13-16], which the study handles by providing empirical evidence to examine how the methodological architecture of each ranking translates into concrete disciplinary outcomes. The third involves how the existing aggregate rankings imperfectly serve stakeholder uses [3,7], seeking to resolve this by characterizing the bibliometric performance profiles of leading engineering universities and offering a base of evidence that can inform institutional benchmarking, science policy, and prospective students' decision making.

This paper asks four questions the existing literature has yet to collectively answer regarding the 2026 edition of these rankings: How closely do *THE* World University Rankings by Subject 2026 for engineering and QS World University Rankings by Subject 2026 for engineering and technology agree on which universities belong in the global top 100? Which underlying pillars and bibliometric indicators best predict each ranking, and to what extent do the two rankings respond to different signals? Do universities appearing in the top 100 of both *THE* and QS differ systematically from those that appear in only *THE* or QS (e.g., regarding citation impact, publication quality, industrial engagement, collaboration)? Lastly, how do national systems differ in their engineering research profiles, and what does this imply for the geopolitics of engineering excellence as expressed through global rankings?

By integrating the two ranking systems with 35 of Elsevier's Scientific Visualization (SciVal) indicators for the same set of 127 institutions, the paper aims to move past the customary observation that rankings disagree and to use statistical evidence to specify the dimensions on which they disagree, the universities for which the disagreement is largest, and the structural reasons rooted in their respective methodologies. The contribution is therefore both empirical through its comprehensive 2026-edition comparison drawing on Elsevier-curated bibliometric data, as well as methodological in that it isolates the predictive weight of reputation versus bibliometric quality for each ranking system.

## 2. Data and methods

### 2.1. Data sources

Five primary data sources were assembled into a single, institution-level file for analysis. The first is *THE* World University Rankings 2026 (*THE* WUR 2026) [26], which provides overall scores as well as the five pillar scores for 122 of the 127 institutions in the study. The second is *THE* Best Engineering Schools 2026 (*THE* ENG) ranking [27], which supplies subject-specific rankings. Third is the QS World University Rankings 2026 (QS WUR 2026) [28], which provides overall scores as well as the 10 constituent indicator scores (i.e., Academic Reputation, Employer Reputation, Faculty-Student Ratio, Citations per Faculty, International Faculty Ratio, International Student Ratio, International Student Diversity, International Research Network, Employment Outcomes, and Sustainability). The fourth data source is the QS World University Rankings by Subject 2026: Engineering & Technology (QS ENG) [29], which provides subject-specific rank positions and five subject-level indicator scores (i.e., Academic, Employer, Citations, h-index, International Research Network). The fifth is Elsevier's SciVal [30], which gives a 35-indicator bibliometric extract covering scholarly output and citations from 2021-2025 on all subject areas; it also includes Field-Weighted Citation Impact (FWCI), citation percentile distributions, journal quality percentiles, international and sectoral coauthorship percentages, and patent and policy uptake metrics.

The institutional sample was constructed by combining *THE* ENG's top 100 universities and the QS ENG's top 100, which actually has 101 universities due to a tie. The combination yields 127 distinct institutions comprised of the 74 universities that appear in both top 100s, the 26 that appear only in *THE* ENG's top 100, and the 27 that appear only in QS ENG's top 100. SciVal data were available for 126 of these 127 institutions, with Tecnológico de Monterrey as the missing university, which we excluded from bibliometric analyses but kept in the ranking analyses.

### 2.2. Methodological context for the two rankings

Because much of the paper deals with explaining ranking divergence in terms of methodological design, the main differences between the two systems are summarized as follows. *THE* ENG applies a fully recalibrated engineering weight in which Research Reputation (21%), Teaching Reputation (19.5%), and Citation Impact

(13.7%) are the three largest single indicators; the five Research Quality indicators jointly account for 27%, while *THE* doubled the weight of Industry (Industry Income + Patents) to 8% in *THE* ENG to reflect the discipline’s applied character. In contrast, QS ENG allocates 50% to Academic Reputation, 20% to Employer Reputation, 10% to Citations per Paper, 10% to h-index, and 10% to International Research Network. QS ENG’s subject ranking therefore embeds far more weight in expert peer perception (70%) than *THE* ENG’s subject ranking (~40.5%) while entirely excluding industry income, patent citations, teaching reputation, and faculty-student ratios from its calculations.

These design choices generate two predictions this paper will empirically test: (1) QS ENG’s ranking should be more sensitive to reputation indicators and less sensitive to bibliometric depth than *THE* ENG’s, and (2) bibliometric signals, particularly patent citations and top-10% journal publications, should have stronger structural correlations of rank for *THE* ENG than for QS ENG.

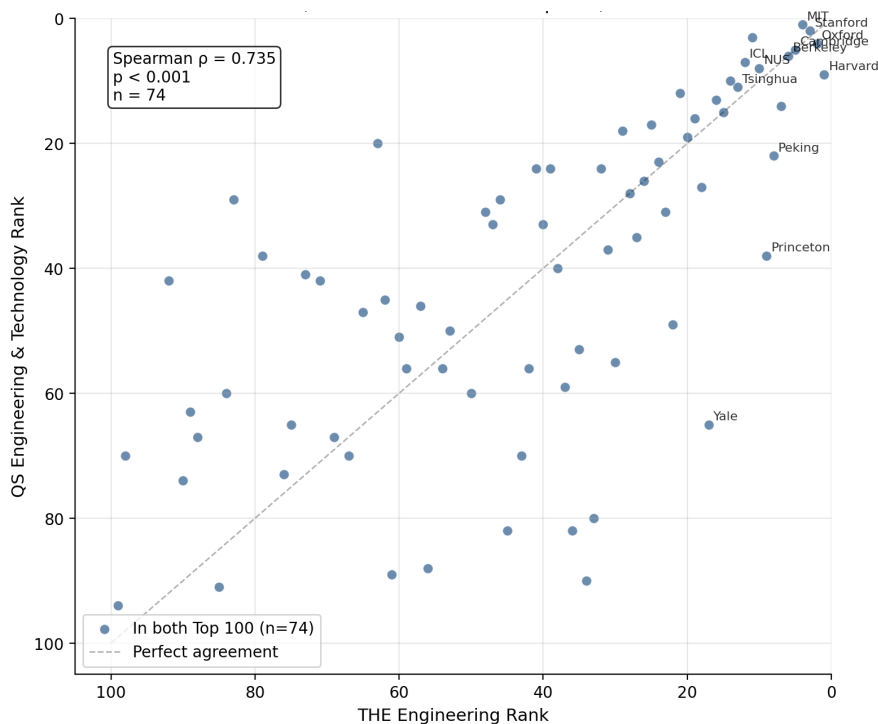
### 2.3. Analytical approach

The type of rank and bibliometric data used here have skewed, non-Gaussian distributions and contain banded ranks at the lower end for *THE* ENG (e.g., ranks 201–250 and 251–300). All correlations have therefore been reported as Spearman rank correlations ( $\rho$ ), which are robust to monotonic non-linearity and banded ordinal data. For comparisons across the three overlap categories (i.e, both *THE* ENG and QS ENG, only *THE* ENG, and only QS ENG), we have used one-way analysis of variance (ANOVA) for the mean of each bibliometric indicator, followed where relevant by Welch’s t-test for pairwise comparisons. Country-level comparisons rely on means computed across all sample universities in a given country. Because lower rank numbers indicate better performance (e.g., 1 is better than 5), the Spearman  $\rho$  between an indicator and rank is expected to have a negative value for indicators that should improve a ranking. In figures where this would be confusing, we display the absolute value ( $|\rho|$ ) so that a positive value denotes alignment between the indicator and better ranking.

## 3. Results

### 3.1. Coverage and overlap between the two engineering rankings

The 127 universities in the combined sample are unevenly distributed across the three overlap categories. Universities appearing in both top 100s form a clear central tendency ( $n = 74$ ; 58.3% of the sample), but more than 40% of the institutions credited as world-leading in engineering by one ranking fail to make the top 100 of the other. This exclusivity goes in both directions. While *THE* ENG recognizes 26 institutions that QS ENG does not, QS ENG recognizes 27 that *THE* ENG does not.



**Figure 1.** Agreement between *THE ENG* and *QS WUR 2026*: E&T rankings for the 74 universities present in both top 100s, with lower rank numbers denoting better performance and the diagonal line indicating perfect agreement (Spearman  $\rho = 0.735$ ;  $p < 0.001$ ).

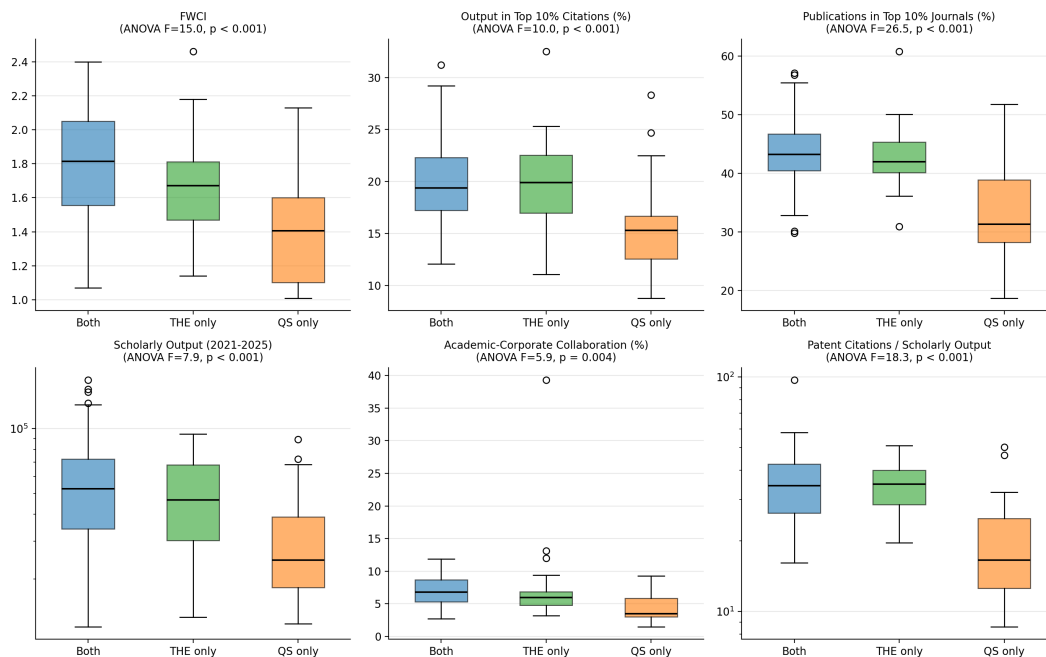
Among the 74 institutions in both top 100s, rank agreement is strong but far from perfect (Figure 1). The Spearman correlation of  $\rho = 0.735$  ( $p < 0.001$ ) is in the upper range of inter-ranking agreement reported in the bibliometric literature but leaves substantial variance unexplained at the ordinal level. Several elite institutions display large rank gaps even when both ranking systems agree they are in the top 100. *THE ENG* visibly favors Yale in 17th, Princeton in 9th, University of Pennsylvania in 34th, and Northwestern in 33rd versus *QS ENG*'s respective rankings of 65th, 38th, 90th, and 80th. Conversely, *QS ENG* favors Politecnico di Milano in 20th, Institut Polytechnique de Paris in 29th, and Technical University of Berlin in 42nd versus *THE ENG*'s respective rankings of 63, 83, and 92. Discussed further in Sections 3.6 and 4, these case-by-case discrepancies are not random noise but track the methodological skew of each ranking, with *QS WUR 2026: E&T* favoring reputation and *THE ENG* favoring bibliometric depth.

Extending the comparison to the world rankings not based on subject reveals an even stronger structural relationship, with *THE WUR 2026* and *QS WUR 2026* having a Spearman correlation of  $\rho = 0.851$  over the same sample. The rankings by subject agree less than overall rankings, which is consistent with the observation that subject-specific methodology choices add additional sources of divergence to those already present at the overall level.

### 3.2. Bibliometric discrimination with regard to overlap category

The three overlap categories (i.e., being: in both *THE ENG* and *QS ENG*, only in *THE ENG*, or only in *QS ENG*) differ systematically across nearly every bibliometric dimension *SciVal* measures. Figure 2 displays the distributions for the six core indicators.

Three findings emerge (see Table 1). The category of being in both rankings is dominant for each quality indicator (a mean FWCI of 1.80 and median FWCI of 1.82), with indicator percentages of 43.5% for top-10% journal publications, 19.9% for top-10% citations, and 35.4% for patent citations per publication and a mean scholarly annual output of 58,684 publications over the 2021-2025 window. The category of being only in the *QS ENG* ranking trails on every quality measure (median FWCI of 1.42), with indicator percentages of 33.3% for top-10% journal publications, 15.8% for top-10% citations, and 20.3% for patent citations per publication. The category of being only in *THE ENG* ranking falls between these two with regard to the quality indicators but matches the category of being in both rankings for the industry-related indicators (i.e., a mean of 7.6% for academic-corporate collaborations compared to 7.1% for the category of both and 4.5% for the category of being only in the *QS ENG* ranking. One-way ANOVA shows all differences to be statistically significant at  $p < 0.001$  except for academic-corporate collaborations ( $p = 0.004$ ) and international collaborations ( $p = 0.040$ ).



**Figure 2.** Distributions for the SciVal’s six bibliometric indicators across the three ranking-overlap categories. ANOVA *F*-statistics and *p*-values are reported above each panel.

These distributions imply *THE ENG*’s top 100 to function as a higher bibliometric-bar filter than *QS ENG*’s top 100. On average, the institutions *THE ENG* excludes and *QS ENG* includes have a substantially lower citation impact and lower journal quality concentration compared to the institutions *THE ENG* includes and *QS ENG* excludes. This is consistent with the prediction in Section 2.2 that states *QS ENG* ranking, 70% of whose weight is based on reputation should be less discriminating with regard to bibliometric measures.

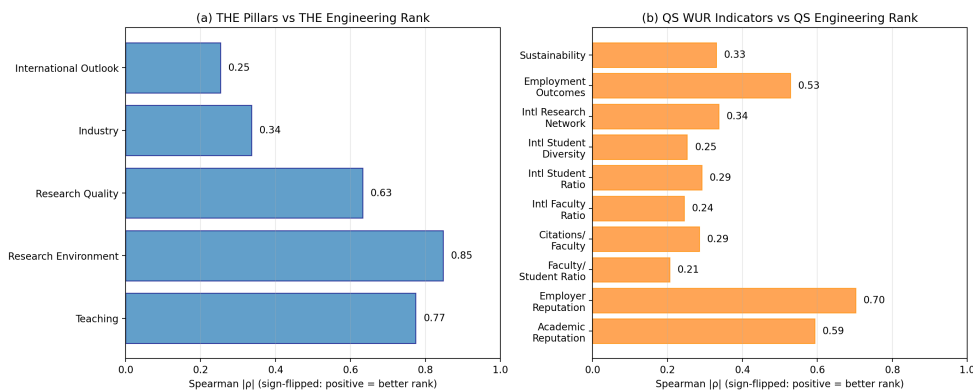
**Table 1.** Bibliometric profile by ranking-overlap category.

Indicator	In both rankings ( <i>n</i> = 74)	Only in <i>THE ENG</i> ( <i>n</i> = 26)	Only in <i>QS ENG</i> ( <i>n</i> = 27)	ANOVA <i>p</i>
Field-Weighted Citation Impact (mean)	1.80	1.68	1.42	< 0.001
Citations per Publication (mean)	17.1	16.1	13.5	< 0.001
Output in Top 10% Citations, % (mean)	19.9	19.9	15.8	< 0.001
Publications in Top-10% Journals, % (mean)	43.5	42.9	33.3	< 0.001
Scholarly Output (mean)	58,684	49,678	32,522	< 0.001
Patent Citations per Scholarly Output (mean)	35.4	34.8	20.3	< 0.001
Academic-Corporate Collaborations, % (mean)	7.1	7.6	4.5	0.004
International Collaborations, % (mean)	49.8	41.3	49.4	0.040

Note: SciVal 2021-2025 data; *n* = 126 (Tecnológico de Monterrey excluded for missing bibliometric data). ANOVA *p*-values are from one-way comparisons across the three categories.

### 3.3. What each ranking really measures: Correlations between indicators and rank

Disaggregating each ranking by its own pillars or indicators provides a direct test of which dimensions matter most for each system (Figure 3).



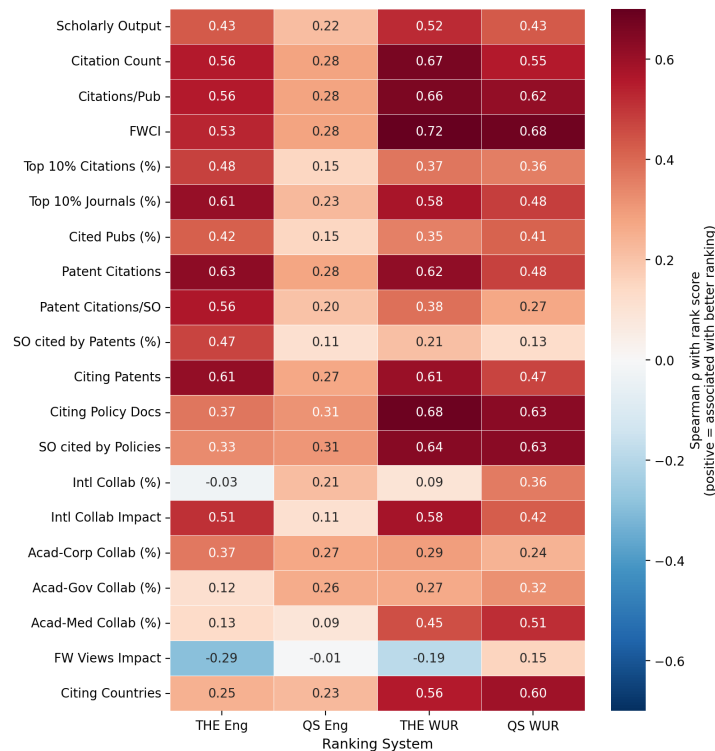
**Figure 3.** Predictive strength of each pillar/indicator for the corresponding engineering school rank (Bars show |Spearman  $\rho$ | to have absolute values indicate alignment with better rank).

For *THE ENG* rankings, the strongest correlate among the five pillars is Research Environment ( $|\rho| = 0.85$ ), followed by Teaching (0.77), Research Quality (0.63), Industry (0.34), and International Outlook (0.25). The pillar of Research Environment combines Research Reputation, Research Income, and Research Productivity, so its dominance reflects both the survey-based reputation and research-volume channels. The relatively low

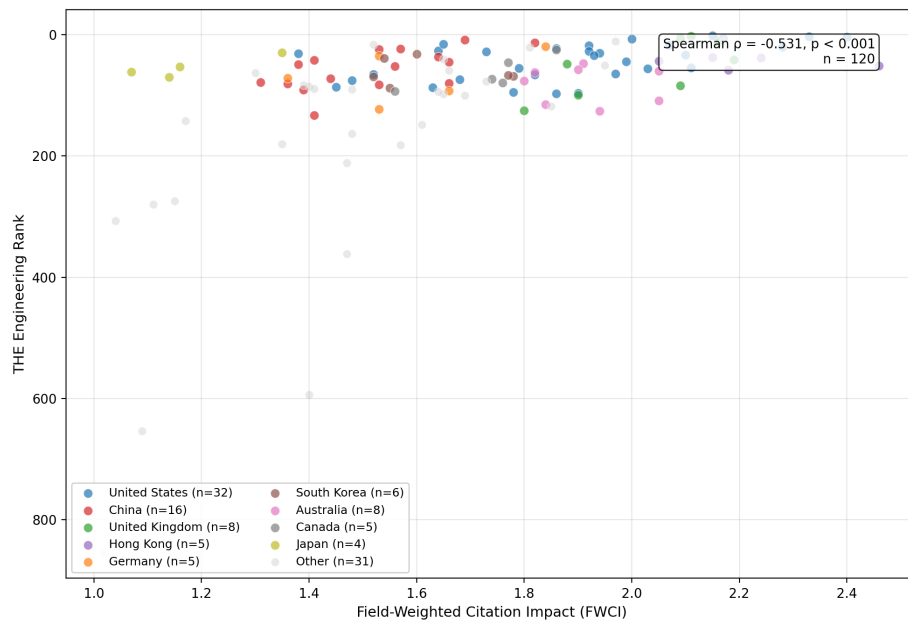
predictive strength of the pillar of Industry (which *THE ENG* weights at only 8%) suggests the variance across top-100 institutions regarding industry income and patents to be small at the higher end, so the indicator differentiates less than its design weight implies.

For QS ENG rankings, the pattern is fundamentally different. Academic Reputation ( $|\rho| = 0.59$  in QS WUR and  $|\rho| = 0.87$  in QS ENG) and Employer Reputation ( $|\rho| = 0.70$  in QS WUR and  $|\rho| = 0.78$  in QS ENG) are dominant, with Employment Outcomes a clear third ( $|\rho| = 0.53$ ). Internationalization indicators are modest ( $|\rho|$  ranging from 0.21-0.34). The Citations-per-Faculty indicator is QS WUR's only bibliometric indicator and has a weak correlation of just  $|\rho| = 0.29$  in QS ENG. This confirms the QS ENG rankings to essentially be a peer-perception ranking with secondary bibliometric input.

Figure 4 extends the analysis to the full 20-indicator SciVal panel against all four ranking systems, from which three results stand out. Firstly, every SciVal quality indicator correlates more strongly with *THE ENG* ranking than with QS ENG ranking, typically by a factor of 2:4. The single largest such gap is for the percentage of publications in the top-10% journals ( $|\rho| = 0.61$  for *THE ENG* vs.  $|\rho| = 0.23$  for QS ENG), followed by patent citations (0.63 for *THE ENG* vs 0.28 for QS ENG) and FWCI (0.53 for *THE ENG* vs 0.28 for QS ENG). Secondly, indicators of policy and patent uptake (i.e., Citing Policy Documents, Scholarly Output Cited by Policies, and Citing-Patents Count) correlate more strongly with the overall world rankings than with the engineering subject rankings, suggesting that policy and patent influence are general indicators of research stature rather than engineering-specific markers. Thirdly, two indicators display counter-intuitive negative signs against *THE ENG*'s ranking: International Collaborations (%) has a  $\rho \approx -0.03$  in *THE ENG* but a  $+0.21$  in QS ENG, and Field-Weighted Views Impact is  $-0.29$  in *THE ENG* but only  $-0.01$  in QS ENG. The results for International Collaborations reflect a particular characteristic of the *THE ENG* sample, which shows the highest-ranked US universities to have International Collaboration values ranging from 40-55%. This is lower than the top European, Hong Kong, and Australian institutions in the same top 100. Thus, having higher international collaborations within this elite stratum does not predict a better *THE ENG* ranking.



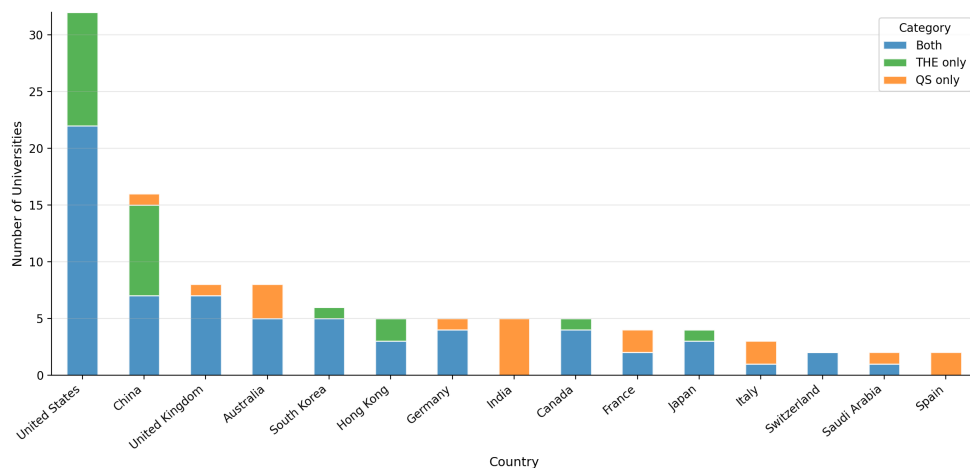
**Figure 4.** Spearman correlations between 20 SciVal bibliometric indicators and the four ranking systems (absolute values of  $\rho$  used to clearly denote association with a better rank). Darker red indicates stronger alignment between high indicator values and good rank position.



**Figure 5.** Relationship between Field-Weighted Citation Impact (FWCI) and THE ENG ranking with regard to country of institution. Spearman  $\rho = -0.531$  ( $p < 0.001$ ).

Figure 5 visualizes the FWCI-rank relationship for *THE ENG*. Two features merit comment. First, the relationship is monotonic but not deterministic: Institutions with FWCI > 2.0 occupy a wide rank range from 1st (Harvard, FWCI = 2.15) to 51st (Chinese University of Hong Kong with the sample’s highest FWCI of 2.46). Second, country clusters are visible: US institutions populate the top-left quadrant (high FWCI values, upper ranks), Chinese institutions cluster in the middle-right (moderate FWCI values, dispersed ranks), and Hong Kong institutions form an outlier cluster of very high FWCI values with only mid-tier ranks (51st-58th). This illustrates bibliometric excellence alone to not deliver elite ranks for *THE* when other pillars lag, particularly Teaching Reputation and Research Reputation.

### 3.4. National and regional patterns



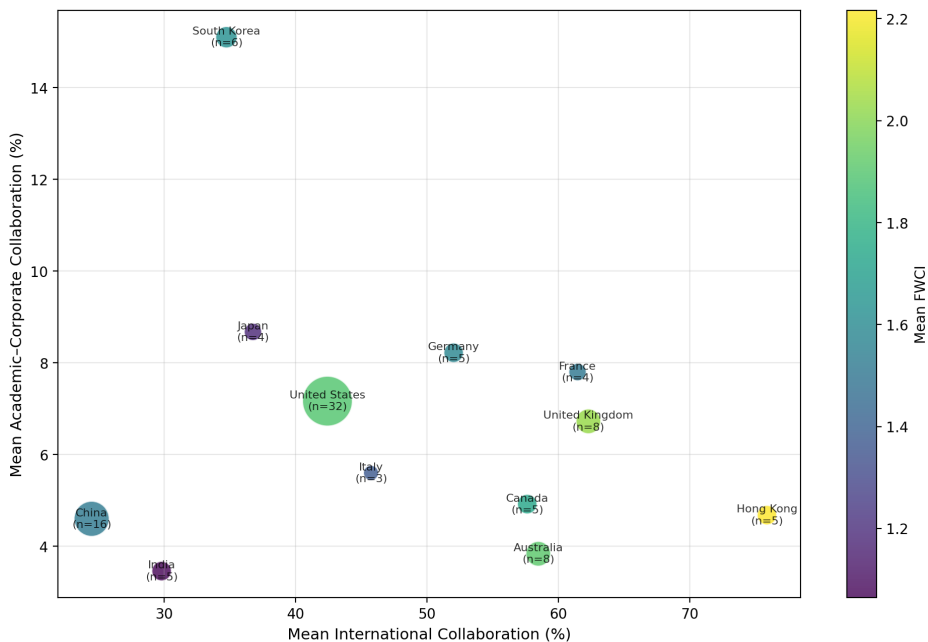
**Figure 6.** National distribution of universities in the 127-institution sample broken down by ranking-overlap category and showing the top 15 countries.

Figure 6 shows the geography of universities in the top-100 engineering ranks to be dominated by the United States (32), followed by China (16), Australia (8), the United Kingdom (8), South Korea (6), Hong Kong (5), Germany (5), Canada (5), and India (5). National systems have striking effects on the rankings. The United States contributes 22 of the 32 institutions for the category of being in both ranks, as well as 10 of the 26 institutions for the category of being only in *THE ENG*, meaning a third of the US universities that are

recognized in these first two categories are absent from the category of institutions only in QS ENG. This pattern reflects QS's reputation-driven design, where large US research universities have strong bibliometric profiles but receive fewer reputation votes for engineering, specifically in comparison to the subjects of medicine, life sciences, and general academic excellence.

China shows the opposite distribution, with eight of its 16 universities present for the category of being only in *THE* ENG, and only seven of its 16 universities present for the category of being in both top 100s. The eight Chinese institutions that are only in *THE* ENG all post strong bibliometric performances. For example, Huazhong University of Science and Technology has 94,305 publications and 4,208 patent citations over SciVal's 2021-2025 period but receives comparatively fewer QS reputation votes outside its immediate region. India's distinctive position is the most extreme, with all five Indian Institutes of Technology (IIT) in the sample appearing in QS WUR and having QS ENG ranks ranging from 36th (IIT Delhi) to 86th (IIT Kanpur), yet none appear on *THE* ENG's top 100. The five IITs also do not appear on *THE* WUR at all due to a long-standing decision not to participate in *THE*'s data submission process, which mechanically excludes them from *THE* subject ranking.

Figure 7 plots national engineering systems along the axes of mean percentages of international collaboration and academic–corporate collaboration. Four archetypes become apparent. The first is that the Anglo-Saxon liberal universities (i.e., UK, Australia, Canada) are clustered at high international collaboration (55-63%) and moderate corporate collaboration (4-7%). The second is the East Asian developmental cluster (i.e., South Korea, Japan), which has moderate international collaboration (35-37%) and the highest academic-corporate collaboration values in the sample (South Korea 15%, Japan 9%). This is consistent with the long-standing industrial-policy integration of universities and conglomerates such as Samsung (Sungkyunkwan's primary industrial partner). The third is that China and India have low international collaboration (24-30%) as well as low academic-corporate collaboration (3.5-5%), reflecting both the scale of domestic research bases that reduce the need for cross-border partnership and the structural characteristics of state-driven research funding. The fourth is that Hong Kong is an outlier: It has extremely high international collaboration (76%) combined with the highest mean FWCI (2.22; see Table 2) of any national group, reflecting Hong Kong universities' positioning as bilingual, internationally networked, English-language research hubs serving both mainland and global audiences.



**Figure 7.** National profiles on the axes of international-collaboration and academic-corporate collaboration for countries with  $n \geq 3$  universities in the sample. Bubble size = number of universities; bubble color = mean FWCI.

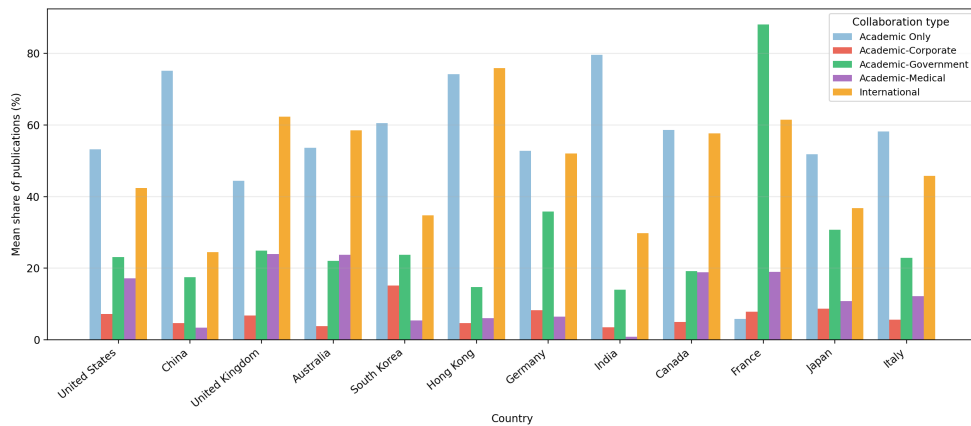
**Table 2.** National engineering research profiles for the top 12 countries by number of universities in the sample.

Country	<i>n</i>	<i>n</i> in both rankings	Mean FWCI	Top 10%	International Collaboration	Academic–Corporate Collaboration	Total Scholarly Output (2021-2025)
US	32	22	1.89	18.9%	42.4%	7.2%	1,783,303
China	16	7	1.52	22.7%	24.5%	4.6%	1,463,555
UK	8	7	2.03	20.2%	62.3%	6.7%	510,737
Australia	8	5	1.91	19.7%	58.5%	3.8%	430,038
South Korea	6	5	1.63	20.1%	34.7%	15.1%	213,574
Hong Kong	5	3	2.22	28.8%	75.9%	4.7%	197,649
Germany	5	4	1.58	16.6%	52.0%	8.2%	172,717
Canada	5	4	1.74	17.3%	57.6%	4.9%	315,103
India	5	0	1.06	13.1%	29.8%	3.5%	87,405
Japan	4	3	1.18	12.3%	36.8%	8.7%	183,045
France	4	2	1.51	15.8%	61.4%	7.8%	214,049
Italy	3	1	1.37	14.8%	45.7%	5.6%	113,966

Note: Means are unweighted across all universities in the country present in the 127-institution union sample.

### 3.5. Collaboration profiles

Disaggregating collaboration by partner type (Figure 8) reveals national specialization patterns that are not visible in aggregate metrics. France stands out with an exceptional 88% academic-government collaboration percentage, a statistical artifact of the French research system that classifies *Centre national de la recherche scientifique* (CNRS) as a government research organization and which appears as a coauthor in a very large percentage of French university publications. Hong Kong (76%) and the UK (62%) have the highest international collaboration percentages. The US and Germany combine moderate international and moderate corporate collaboration. India, China, and Japan have very high academician-only coauthorship percentages (75-80%), implying that publications produced by their top engineering universities are predominantly intra-academician rather than cross-sectoral.



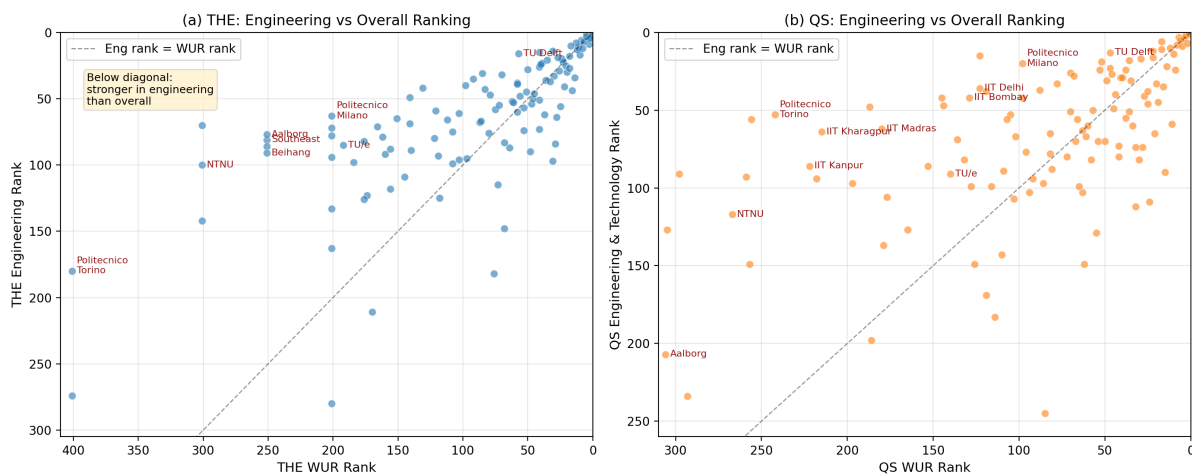
**Figure 8.** Collaboration profile decomposition by country. Bars show the mean percentage of an institution’s publications that involve each type of partner. Categories overlap (e.g., a single paper may be both academic–corporate and international), so the bars do not add up to 100%.

These differences are related to policy. The academic-corporate collaboration percentage is the most direct bibliometric proxy for the industry linkage *THE* attempts to capture in its Industry pillar, but for which it uses a different operationalization (i.e., research income from industry and patent counts). The cross-country variation

in academic-corporate collaboration percentages that range four-fold from 3.5% for India to 15.1% for South Korea is much larger than the cross-country variations for any other bibliometric indicator examined here, which suggests industrial integration to be the most nationally distinct dimension of engineering research.

### 3.6. Engineering specialization: Subject versus overall rank

An insightful way to identify universities whose strategic identity is built on engineering is to compare their subject rank to their overall world rank (see Figure 9). In *THE*'s ranking system, the most extreme rank differences for engineering-specialist universities' *THE* ENG rank relative to their *THE* WUR rank occur with Technical University of Madrid (654th vs 1001st,  $\Delta = 347$ ), Polytechnic University of Catalonia (361st vs 601st,  $\Delta = 240$ ), the Institute of Science Tokyo (70th vs 301st,  $\Delta = 231$ ), Politecnico di Torino (180th vs 401st,  $\Delta = 221$ ), Norwegian University of Science and Technology (100th vs 301st,  $\Delta = 201$ ), and Istanbul Technical University (307th vs 501st,  $\Delta = 194$ ), with Aalborg, Southeast, Virginia Tech, Beihang, TU Wien, Politecnico di Milano, Xi'an Jiaotong, and Tianjin also all ranking at least 100 places higher on *THE* ENG than on *THE* WUR. All but the East Asian institutions on this list explicitly state their mission as technical, polytechnic, or engineering universities, confirming the engineering-specialist label to involve a strategic positioning that is visible in the name as well as rank.



**Figure 9.** Engineering specialization index: Subject rank versus overall world university rank for *THE* (left) and *QS* (right). Institutions below the diagonal perform better in engineering compared to the overall rank. These are the engineering specialists, and the selected institutions are labeled.

In the *QS* system, the engineering-specialist phenomenon is even more pronounced because of *QS*'s lower thresholds for subject participation. *KAUST* jumps from no *QS* WUR rank to 78th on *QS* ENG. The five *IIT*s all sit in the global Top 100 on *QS* ENG despite having *QS* WUR ranks between 123-222. Politecnico di Milano (98th on *QS* WUR vs 20th on *QS* ENG) and Politecnico di Torino (242nd on *QS* WUR vs 53rd on *QS* ENG) follow a similar pattern. The *QS* ENG ranking is therefore both more generous to engineering-specialized institutions and specifically more responsive to national reputation in engineering, both as consequences of *QS* ENG's 70% reputation weighting.

## 4. Discussion

The results of this study can be condensed into three propositions regarding the contemporary ecology of global engineering rankings. First, *THE* ENG and *QS* ENG rankings are not interchangeable measurements of the same construct. Although their agreement on the identity of approximately 74 elite engineering universities shows a substantial convergent core, they disagree on roughly 53 institutions at the periphery, and this disagreement is structured rather than random. *THE* preferentially recognizes institutions with strong bibliometric depth (i.e., high *FWCI*, high percentage of top-10% journal publications, high patent citation intensity), while those with moderate reputations exceed their region, exemplified by Johns Hopkins, the Chinese University of Hong Kong, City University of Hong Kong, and the second-tier Chinese research universities. *QS* preferentially recognizes institutions with strong reputational reach and clear sector identity despite lower bibliometric depth, exemplified by the *IIT*s; the polytechnic universities of Milan, Turin, Madrid, and Catalonia; and South Korea's Korea Advanced Institute of Science and Technology (*KAIST*) and Pohang University of Science and Technology (*POSTECH*) having higher reputations compared to their bibliometrics.

Second, the rankings respond to their own indicator weights in predictable ways. *THE ENG*'s ranking is most strongly explained by Research Environment ( $|\rho| = 0.85$ ), with bibliometric indicators such as Patent Citations ( $|\rho| = 0.63$ ), Percentage of Publications in Top-10% Journals ( $|\rho| = 0.61$ ), Citation Count ( $|\rho| = 0.56$ ), FWCI ( $|\rho| = 0.53$ ), and Patent Citations per Scholarly Output ( $|\rho| = 0.56$ ) offering powerful secondary explanations. QS ENG's ranking is overwhelmingly explained by reputation indicators ( $|\rho| = 0.87$  for Academic Reputation,  $|\rho| = 0.78$  for Employer Reputation). The empirical magnitude of these correlations matches the theoretical weighting given to the underlying indicators in each ranking system's methodology, providing internally consistent evidence that both ranking systems actually implement their stated designs. The substantive question is therefore not whether one ranking is more rigorous than the other, as both are internally consistent, but rather which construct of engineering excellence does the ranking system wish to use? *THE* prefers a bibliometric-dense research-production focus, while QS prefers focusing on prestige as perceived by peers and employers.

Third, the national geography of engineering excellence is currently multipolar but profoundly uneven across the two ranking systems. The US retains numerical dominance (32 universities in both top 100 rankings) but is structurally over-represented in *THE ENG* compared to QS ENG, with 10 of its 32 institutions appearing only in *THE ENG*. China has the second-largest national presence (16 universities) and is structurally under-represented in QS, with half of its institutions in the sample appearing only in *THE ENG*. India and the southern European technical universities are mirror images of this pattern, enjoying substantial visibility on QS ENG and negligible visibility on *THE ENG*. Hong Kong and Singapore (additionally Swiss Federal Technology Institute of Lausanne and ETH Zürich) emerge as the highest-impact small-country systems: Hong Kong's mean FWCI of 2.22 and an international-collaboration percentage of 76% are unrivalled in the sample, illustrating small, English-language, internationally-networked higher education systems to be able to outperform the bibliometric averages of much larger national systems.

These findings have three implications. For those who use the rankings (e.g., prospective students, internationalization officers, funding agencies), the choice between *THE ENG* and QS ENG should be informed by what dimension of excellence is being sought. If the question is which engineering schools produce the most influential research, *THE ENG* is better. If the question is which engineering schools are most highly regarded by global academic and employer communities, then QS is the more direct measure. In addition, the not uncommon practice of averaging or combining the two rankings into composite scores obscures rather than clarifies these distinct constructs.

For universities as the subjects of these ranking systems, the findings highlight that strategic positioning matters. Institutions with strong bibliometric profiles but weak global reach reputationally (e.g., the second-tier Chinese cluster, much of the US R1 universities outside the absolute elite) can raise their QS visibility through targeted reputation-building activities. Meanwhile, institutions with strong reputational visibility but weaker bibliometric depth (e.g., the IITs, southern European polytechnics) can use interventions that strengthen bibliometrics (e.g., targeted hiring, open-access publishing, and increased participation in international collaborative networks) in order to raise their *THE ENG* visibility.

With regard to ranking methodology, the very high concentration of QS ENG's explanatory variance in just two indicators, where Academic and Employer reputation jointly explain the bulk of the rank order, raises legitimate questions about the QS rank system's indicator diversity. When compared with *THE*'s five pillars that each contribute non-trivial variance, this suggests QS ENG's ranking to be able to benefit from a methodological recalibration that increases the weight of bibliometric measures, particularly when considering that QS WUR has itself moved in this direction in recent years by introducing the indicators of International Research Network and Sustainability.

## 5. Conclusion

This paper has compared the *Times Higher Education World University Rankings 2026: Best Engineering Schools (THE ENG)* and *QS World University Rankings 2026: Engineering & Technology (QS ENG)* rankings by subject against each other and against a 35-indicator bibliometric portrait drawn from Elsevier's Scientific Visualization (SciVal) for the 127 universities that emerged when combining the two top 100 rankings. The main findings are that the two ranking systems show strong but partial agreement (Spearman  $\rho = 0.735$  within the 74 jointly-recognized institutions), that they respond to fundamentally different signals (bibliometric depth in *THE ENG*, reputation reach in QS ENG) consistent with their published methodologies, that the bibliometric profile of institutions under the category of being in both *THE ENG*'s and QS ENG's top 100 lists is significantly stronger on every measured quality dimension than those in the categories of being just in *THE ENG*'s top 100 or just in QS ENG's top 100, and that national systems differ sharply regarding the dimensions on which their engineering universities perform (e.g., Hong Kong on impact and internationalization, South Korea on industrial

integration, China on volume, the US on both impact and reputation as the elite dimensions, and India entirely through the QS reputation channel).

The substantive conclusion is that engineering rankings are not a single league table but a layered evaluation system in which different ranking systems reward different forms of engineering excellence. For users, this means that which ranking system to choose is itself a methodological decision. For institutions, this means that strategic responses to ranking performance should be calibrated toward which ranking system matters in the institutional context. For policy-makers, this means that an evidence-based national engineering strategy should, rather than treating any single ordinal position as a sufficient statistic, look at both ranking systems simultaneously alongside the bibliometric indicators that underpin them.

Future work could usefully extend the analysis longitudinally (e.g., tracking 2024-2026 movement at the institution level), incorporate engineering-only bibliometric data where available, and apply multivariate regression analysis to formally partition the variance explained by each ranking system's pillars or indicators. The dataset assembled for this paper covering 127 universities, four ranking systems, and 35 bibliometric indicators has been made available as a supplementary file to facilitate such extensions.

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