

Mathematical Analysis of the Present Status and Challenges of Higher Education in Nepal: A Case Study of Selected Universities

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Abstract

Higher education supports human capital formation, innovation, and socioeconomic development, yet Nepal's tertiary education system faces persistent structural challenges amid expanding enrolment. This study aims to assess the status and challenges of higher education in Nepal through mathematical and statistical analysis of five universities: Tribhuvan University, Kathmandu University, Purbanchal University, Pokhara University, and Rajarshi Janak University. A quantitative case study approach was employed using secondary time-series data on enrolment, faculty numbers, and public funding for 2016/17–2023/24, obtained from the University Grants Commission's Education Management Information System and related sources. Data were analyzed using compound annual growth rates, exponential growth projections, correlation, and regression analysis. A weighted Challenge Severity Index was also constructed to prioritize institutional constraints. The findings indicate that enrolment grew at a compound annual rate of 7.93%, compared with faculty growth of 3.81%, suggesting increasing pressure on teaching capacity. Growth projections indicated that the student–faculty ratio could rise from approximately 40:1 in 2016/17 toward 59:1. The gross enrolment ratio increased from 9% in 2008/09 to 20.05% in 2021/22, remaining below the reported comparison rates for India (26.9%), Malaysia (41.9%), and China (51%). Across the five universities, institutional size was negatively correlated with public funding per student ($r = -.75$). The severity index identified faculty shortages, underfunding, and gaps in quality assurance as the most pressing challenges. These findings highlight the need to align

institutional expansion with staffing, funding, and quality assurance capacity. The study recommends faculty recruitment planning informed by enrolment projections, differentiated funding formulas, and quality assurance reform to support more balanced and sustainable development of Nepalese higher education.

Keywords: Higher Education; Nepal; Student–Faculty Ratio; Public Funding; Quality Assurance

INTRODUCTION

Education, and higher education in particular, is widely recognised as the single most powerful lever for national development, providing the skilled workforce, research capacity, and innovation base on which a modern economy depends. In Nepal, higher education has undergone a remarkable structural transformation over the last three decades: from a single-university system centred on Tribhuvan University (TU, established 1959) to a diversified network of eleven universities, several medical academies, and thousands of constituent, community, and privately affiliated campuses operating under the coordination of the University Grants Commission (UGC), established in 1993 (UGC Nepal, 2024).

Despite this quantitative expansion, qualitative concerns have intensified. Enrolment growth has consistently outstripped the growth of full-time faculty and quality infrastructure, funding remains concentrated in a handful of long-established institutions, and newer provincial universities — created in the wake of Nepal's 2015 transition to federalism — continue to operate with thin faculties, limited research output, and constrained budgets relative to their mandate. Rajarshi Janak University (RJU), established in 2017 in Janakpurdham to serve Madhesh Province, exemplifies both the promise and the resource constraints of this second generation of Nepali universities.

This paper is motivated by the observation that most existing commentary on Nepal's higher-education challenges is descriptive rather than quantitative. We therefore apply elementary but rigorous mathematical tools — growth-rate modelling, ratio analysis, correlation, and regression — to publicly available UGC and institutional data, so that the scale and trajectory of the sector's challenges can be expressed numerically rather than only narratively. The paper uses a case-study approach across five universities chosen to

represent the range of institutional types found in Nepal: the oldest and largest public university (TU), an autonomous semi-private model (KU), two second-generation multi-campus public universities (PU and PoU), and a newly established provincial university (RJU).

Institutional Growth of the University System

Nepal's university system has grown from a single institution in 1959 to twelve UGC-recognised federal universities by 2024, alongside six further provincial universities established since 2019 following the 2015 constitutional transition to federalism (UGC Nepal, 2024; List of Universities in Nepal). Figure 1 traces this institutional growth.

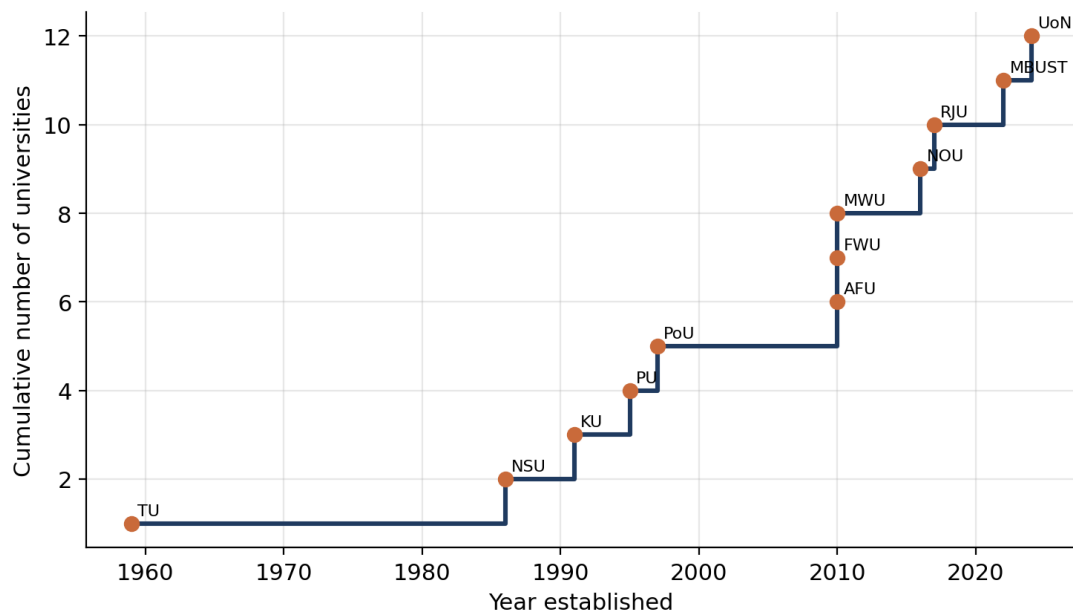


Fig. 1: Cumulative growth in the number of UGC-recognised federal universities in Nepal, 1959–2024.

Table 1: The twelve UGC-recognised federal universities of Nepal by year of establishment (excludes six additional provincial universities established since 2019).

#	University	Acronym	Established	Location
1	Tribhuvan University	TU	1959	Kirtipur, Kathmandu
2	Nepal Sanskrit University	NSU	1986	Tulsipur, Dang
3	Kathmandu University	KU	1991	Dhulikhel, Kavre
4	Purbanchal University	PU	1995	Biratnagar/Morang
5	Pokhara University	PoU	1997	Pokhara, Kaski
6	Agriculture and Forestry University	AFU	2010	Bharatpur/Rampur
7	Far Western University	FWU	2010	Bhimdatta, Kanchanpur

#	University	Acronym	Established	Location
8	Mid-Western University	MWU	2010	Birendranagar, Surkhet
9	Nepal Open University	NOU	2016	Lalitpur
10	Rajarshi Janak University	RJU	2017	Janakpurdham, Dhanusha
11	Madan Bhandari Univ. of Sci. & Tech.	MBUST	2022	Bhaktapur
12	University of Nepal	UoN	2024	Kathmandu

Review of Literature

A substantial body of policy literature documents the expansion and strain of Nepal's higher-education system. The UGC's Education Management Information System (EMIS) reports for 2021/22 and 2023/24 provide the most authoritative enrolment, faculty, and funding statistics, showing enrolment growth alongside comparatively slower growth in the full-time teaching cadre (UGC Nepal, EMIS 2023/24). Commentary in the national press has drawn attention to the resulting strain on constituent campuses, noting that public funding increases have been directed disproportionately toward infrastructure and block grants rather than faculty recruitment (Kathmandu Post, 2026).

The World Bank-supported Higher Education Reform Program's Operations Manual situates Nepal's Gross Enrolment Ratio within a regional context, showing that Nepal's GER of approximately 20% in 2021/22 trails Sri Lanka, India, Malaysia, Thailand, and China, and sets national policy targets of 25% GER by 2030 and 40% by 2043 (UGC/World Bank, Higher Education Reform Program Operations Manual). Studies of enrolment trends at the campus level, including analyses published in national academic journals, have highlighted declining enrolment in some faculties and persistent regional and gender disparities, particularly in provinces distant from the Kathmandu Valley (Comprehensive Analysis of Students' Enrolment Trends in Tertiary Education, 2024).

A recurring theme across this literature is the mismatch between the pace of institutional expansion — measured in the number of new universities, campuses, and academic programmes — and the pace of investment in the human and physical infrastructure needed to sustain quality. However, few of these studies apply formal quantitative growth models or cross-institutional regression analysis; most rely on descriptive year-on-year comparison. This paper seeks to extend that literature by applying

compound-growth and regression techniques explicitly, and by benchmarking a purposively selected set of case-study universities against one another and against international ratios.

A second strand of literature addresses quality assurance and institutional accreditation. UGC's Quality Assurance and Accreditation (QAA) framework, introduced to bring Nepali higher education closer to international standards, has to date accredited only a minority of eligible campuses nationally, with accreditation activity concentrated among older, larger institutions with the administrative capacity to prepare self-study reports. Newer provincial universities, still building basic academic infrastructure, have generally not yet entered the accreditation pipeline. A third strand documents persistent gender and regional disparities in access: enrolment shares vary considerably by province and by faculty, with some western and provincial universities reporting female enrolment shares above 60% in particular programmes, even as national leadership and senior academic positions remain male-dominated (Comprehensive Analysis of Students' Enrollment Trends in Tertiary Education, 2024). These two strands — quality assurance and equity of access — together with the funding and staffing literature discussed above, motivate the eight-dimension Challenge Severity Index constructed in Section 8 of this paper.

Previous studies have highlighted the importance of using mathematical models, numerical techniques, and machine learning approaches to address complex real-world problems. Sah et al. (2024) discussed the major challenges in Nepal's education system and emphasized the need for improved policies and technological advancement. Similarly, Sahani and colleagues explored the use of numerical modelling to understand cultural, educational, and social issues.

Recent research by Sahani et al. (2026) further extended these approaches by integrating artificial intelligence with mathematical frameworks for better risk analysis, prediction, and decision-making. These studies show that combining computational methods with data-driven techniques can provide effective solutions for complex problems in education, society, and management systems.

Statement of the Problem

Nepal's higher-education system faces a structural paradox: enrolment has grown rapidly in absolute terms, yet the capacity of the system — faculty numbers, research infrastructure, and quality-assurance mechanisms — has not grown proportionately. This

creates rising student-faculty ratios, uneven funding distribution across institutions of different vintage and size, and a widening gap between national policy targets (such as the 2030 and 2043 GER targets) and the trajectory implied by current growth rates. Newer provincial universities such as Rajarshi Janak University, created to extend access beyond the Kathmandu Valley, must expand access while simultaneously building institutional capacity from a very small base, a dual burden not faced by long-established universities.

The central problem addressed in this paper is therefore twofold: (i) to quantify, using appropriate mathematical models, the actual trajectory of enrolment, faculty, funding, and access indicators in Nepal's higher-education system; and (ii) to determine, through comparative case-study analysis of five universities, whether the pattern of resource allocation is consistent with the goal of equitable and sustainable quality expansion, or whether it is reproducing structural disadvantage for smaller and newer institutions.

Objectives of the Study

1. To analyse the growth trend of student enrolment, faculty strength, and public funding in Nepal's higher-education system between 2016/17 and 2023/24 using compound annual growth rate (CAGR) and exponential growth models.
2. To project the trajectory of the national student-faculty ratio and compare it against international planning benchmarks.
3. To examine Nepal's Gross Enrolment Ratio (GER) in relation to historical trend, national policy targets, and regional/Asian comparators.
4. To compare enrolment, staffing, and funding indicators across five selected case-study universities (TU, KU, PU, PoU, and RJU) and to model the statistical relationship between institutional size and per-student public funding.
5. To construct a quantitative, weighted Challenge Severity Index that ranks the major challenges confronting Nepal's higher-education system.
6. To recommend evidence-based policy measures for faculty planning, funding allocation, and quality assurance.

METHODOLOGY

Research Design and Data Sources

This study adopts a quantitative, descriptive-analytical case-study design. Secondary data were compiled from the University Grants Commission (UGC) Nepal's Education Management Information System (EMIS) reports for 2021/22 and 2023/24, the UGC/World Bank Higher Education Reform Program Operations Manual, published national news analysis of UGC data (Kathmandu Post, 2026), and institutional profile data for the five case-study universities (official university web pages and publicly compiled university-profile records). Five universities were purposively selected to represent the diversity of Nepal's higher-education landscape by age, governance model, and scale: Tribhuvan University (1959), Kathmandu University (1991), Purbanchal University (1995), Pokhara University (1997), and Rajarshi Janak University (2017).

Mathematical and Statistical Tools

Four classes of mathematical technique are applied:

- Compound Annual Growth Rate (CAGR): used to express multi-year change in enrolment, faculty, and funding as a single annualised percentage.
- Exponential growth projection: used to model future enrolment and the student-faculty ratio under the assumption that recent growth rates persist.
- Correlation and log-log (power-law) regression: used to test the statistical relationship between institutional enrolment size and per-student public funding across the case-study universities.
- Weighted composite scoring (a simple multi-criteria decision model): used to convert qualitative expert/literature judgements about the severity of different challenges into a ranked, numerical Challenge Severity Index.

The CAGR is computed as:

$$CAGR = (V_n / V_0)^{(1/n)} - 1$$

where V_0 and V_n are the values of the variable of interest (enrolment, faculty, or funding) at the beginning and end of an n -year period, respectively. Exponential projection uses the model $V(t) = V_0(1 + r)^t$, where r is the CAGR computed above. The ratio of two

exponentially growing quantities — for example, students $E(t)$ and faculty $F(t)$ — is itself exponential:

$$R(t) = E(t)/F(t) = R_0 \cdot [(1+rE)/(1+rF)]^t$$

This closed-form expression is used in Section 7.3 to project the student-faculty ratio forward in time. The strength of linear association between two variables X and Y is measured using the Pearson correlation coefficient,

$$r = \Sigma(X_i - \bar{X})(Y_i - \bar{Y}) / \sqrt{[\Sigma(X_i - \bar{X})^2 \cdot \Sigma(Y_i - \bar{Y})^2]}$$

and, because enrolment sizes across the case-study universities span more than two orders of magnitude (from about 2,200 to over 460,000 students), a log-log (power-law) regression of the form $\log(Y) = \log(a) + b \cdot \log(X)$, equivalently $Y = a \cdot X^b$, is additionally fitted to examine whether per-student funding scales systematically with institutional size.

For the Challenge Severity Index (CSI), each of the eight challenges identified from the literature review and case-study evidence (Section 8) is assigned a normalised weight w_i ($\Sigma w_i = 1$) reflecting its relative national policy importance as documented in UGC and World Bank programme materials, and a severity score s_i (on a 0–10 scale) based on the quantitative evidence assembled in Section 7. The composite index is then

$$CSI = \Sigma(w_i \cdot s_i), \quad i = 1 \dots 8$$

This provides an ordinal ranking of challenges that is more transparent and reproducible than an unweighted qualitative SWOT listing, although — as discussed in the limitations (Section 12) — the weights themselves necessarily involve a degree of expert judgement.

Study Area: Profile of the Selected Universities

Table 2 summarises the institutional profile of the five case-study universities, drawing on the most recently available official figures (2023/24–2025/26). The universities differ by roughly two orders of magnitude in scale, from Rajarshi Janak University's 2,227 students to Tribhuvan University's 460,632, providing a natural test-bed for examining whether funding and staffing scale proportionately with enrolment.

Table 2: Profile of the five selected case-study universities (Sources: UGC Nepal; institutional records, 2023/24–2025/26).

University	Established	Students	Teaching Staff	Annual Budget (NPR)	Type
Tribhuvan University (TU)	1959	460,632	7,838	26.169 billion	Public, multi-campus
Kathmandu University (KU)	1991	21,000+	544	Not publicly disclosed	Public, autonomous
Purbanchal University (PU)	1995	26,128	~100 (core)	1.70 billion	Public, multi-campus
Pokhara University (PoU)	1997	34,151	~257	1.54 billion	Public, multi-campus
Rajarshi Janak University (RJU)	2017	2,227+	Not centrally published	0.379 billion	Public, provincial

Tribhuvan University remains, by a wide margin, the dominant institution in the system, historically enrolling well over three-quarters of Nepal's tertiary students through its extensive network of constituent and affiliated campuses. Kathmandu University operates a more selective, autonomous model with comparatively favourable staffing ratios. Purbanchal and Pokhara Universities extend access through large networks of affiliated colleges but report comparatively small core teaching establishments relative to total enrolment — a data-transparency issue discussed further in Section 9. Rajarshi Janak University, the youngest of the five, is still in the capacity-building phase typical of Nepal's post-2015 provincial universities.

RESULTS

Growth of Enrolment (2016/17–2023/24)

National higher-education enrolment rose from approximately 371,000 students in 2016/17 to 633,053 in 2023/24 (UGC EMIS, 2023/24; Kathmandu Post, 2026), a cumulative increase of 70.6% over seven years. Applying the CAGR formula from Section 5.2:

$$CAGR(enrolment) = (633,053/371,000)^{(1/7)} - 1 = 0.0793 \approx 7.93\% \text{ per annum}$$

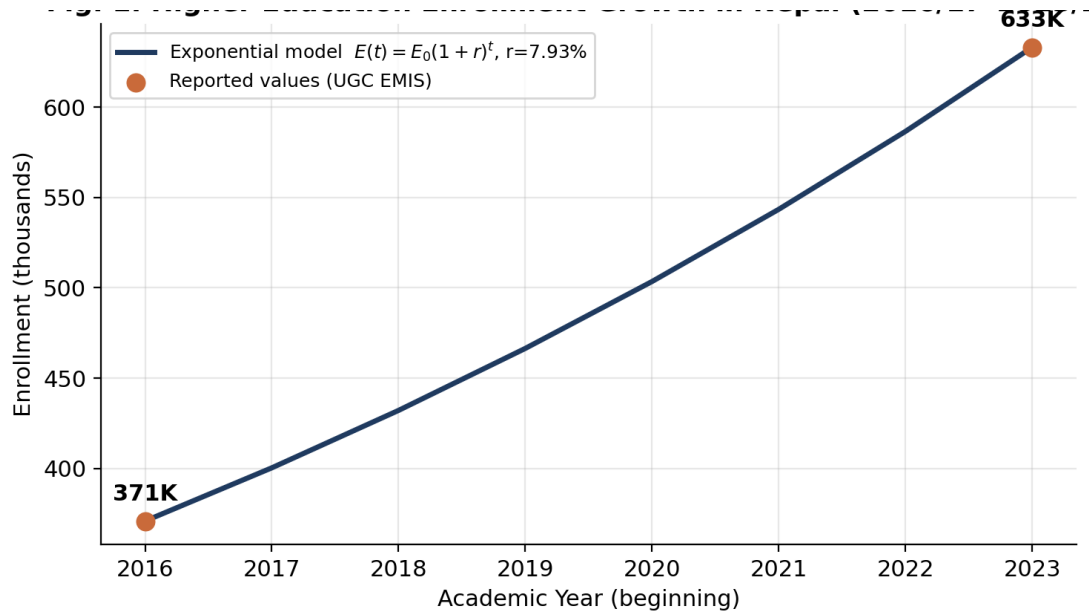


Fig. 2: Higher education enrolment growth in Nepal, 2016/17–2023/24, fitted to an exponential model with $r = 7.93\%$ per annum.

The Enrolment–Faculty–Funding Growth Mismatch

Over the same seven-year period, the number of full-time faculty in constituent campuses rose only from 9,299 to 12,082 — a cumulative increase of 29.9%, corresponding to a CAGR of only 3.81% per annum. Public funding for higher education rose from NPR 9.3 billion (2017/18) to NPR 17.5 billion (2023/24), a cumulative increase of 88.2% over six years (CAGR $\approx 11.11\%$ per annum). The comparison in Figure 3 makes the imbalance explicit: funding grew fastest in nominal terms, but this growth has been directed predominantly toward infrastructure and block grants rather than faculty recruitment (Kathmandu Post, 2026), so that faculty growth (3.81% p.a.) lags far behind both enrolment growth (7.93% p.a.) and nominal funding growth (11.11% p.a.).

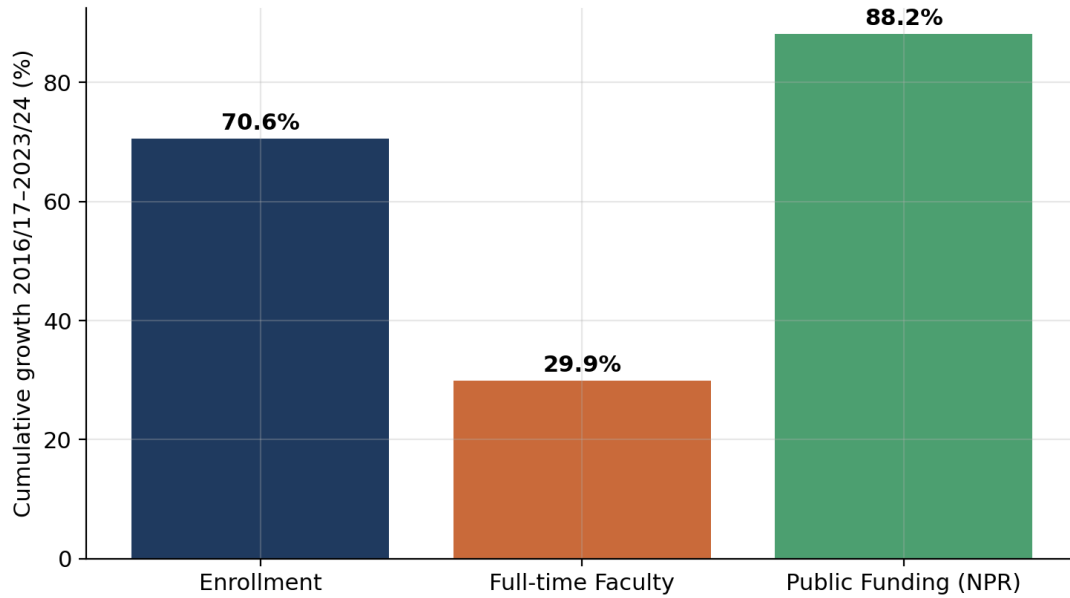


Fig. 3: Cumulative growth (2016/17–2023/24) in enrolment, full-time faculty, and public funding, showing the disproportionate lag in faculty recruitment.

Projected Student–Faculty Ratio

Using the closed-form ratio-projection model of Section 5.2 with $r_E = 7.93\%$ and $r_F = 3.81\%$, the implied annual growth factor of the student-faculty ratio is $(1.0793/1.0381) \approx 1.0397$, i.e. the ratio itself grows by approximately 3.97% every year that current trends persist. Starting from $R_0 = 371,000/9,299 \approx 39.9$ in 2016/17, the model projects a ratio of approximately 52.4 by 2023/24 and, if unchanged, nearly 58.9 by 2026/27 ($t = 10$). This is consistent with the substantially higher ratios observed directly at several case-study universities (Section 7.7) and lies well outside the internationally cited planning range of 10:1 to 20:1 (Kathmandu Post, 2026).

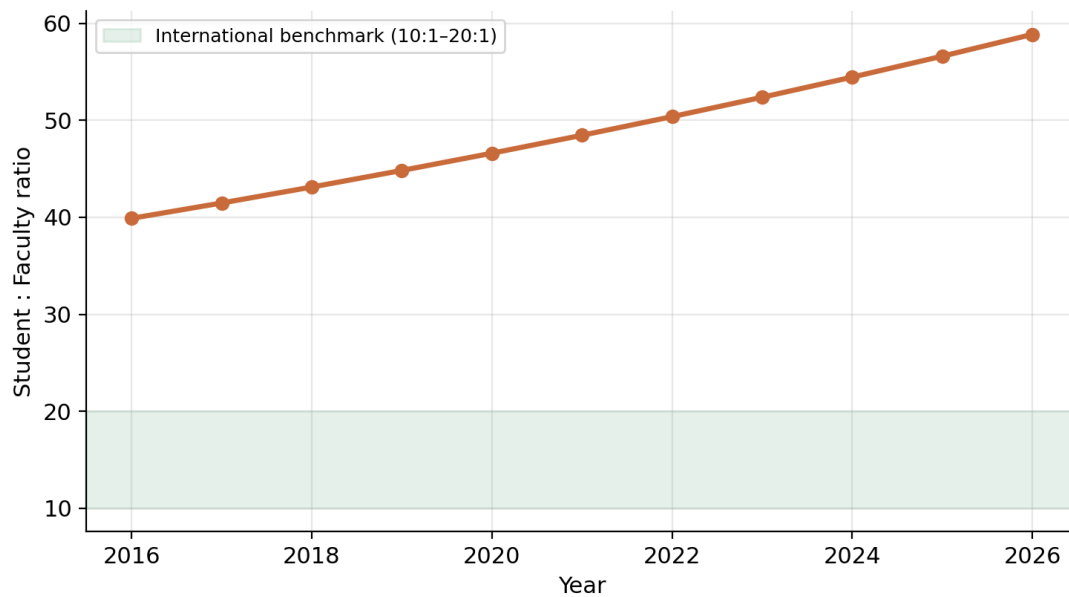


Fig. 4: Projected national student–faculty ratio under current differential growth rates, against the international benchmark band of 10:1–20:1.

Gross Enrolment Ratio: Trend and Policy Targets

Nepal's Gross Enrolment Ratio in tertiary education rose from 9% in 2008/09 to 20.05% in 2021/22 (UGC/World Bank Operations Manual), a historical CAGR of 6.36% per annum. The national Higher Education Reform Program sets policy targets of 25% GER by 2030 and 40% by 2043. Using the CAGR framework, the growth rate required to reach the 2030 target from the 2021/22 base is only 2.80% per annum, and 3.34% per annum is required to reach the 2043 target — both considerably below the 6.36% per annum historical growth rate. This is an encouraging mathematical finding: if the historical pace of GER improvement is sustained, Nepal's stated 2030 and 2043 targets are numerically achievable, provided the quality and capacity constraints documented in Sections 7.2–7.3 do not act as a binding constraint on further access expansion.

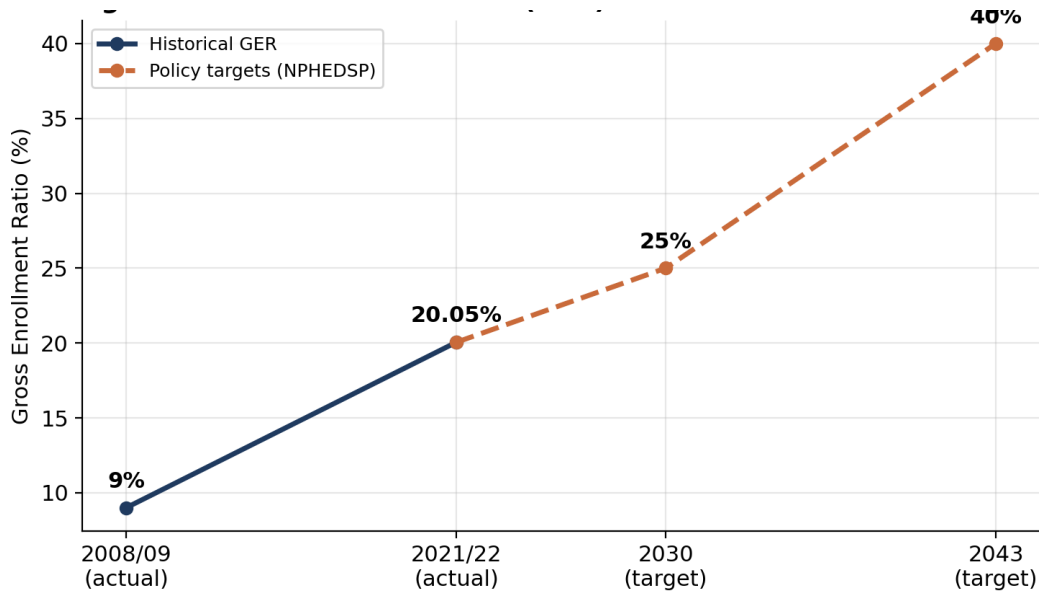


Fig. 5: Gross Enrolment Ratio — historical trend (2008/09–2021/22) and national policy targets for 2030 and 2043.

Gross Enrolment Ratio in Regional Comparison

Despite this positive trajectory, Nepal's GER of approximately 20% remains the lowest among major regional comparators for which data are available: Sri Lanka (21%), India (26.9%), Malaysia (41.9%), Thailand (49.3%), and China (51%) (UGC/World Bank Operations Manual). Nepal would need to more than double its current GER to converge with the Southeast and East Asian comparators shown in Figure 6, underscoring that, notwithstanding recent progress, higher-education access in Nepal remains comparatively limited.

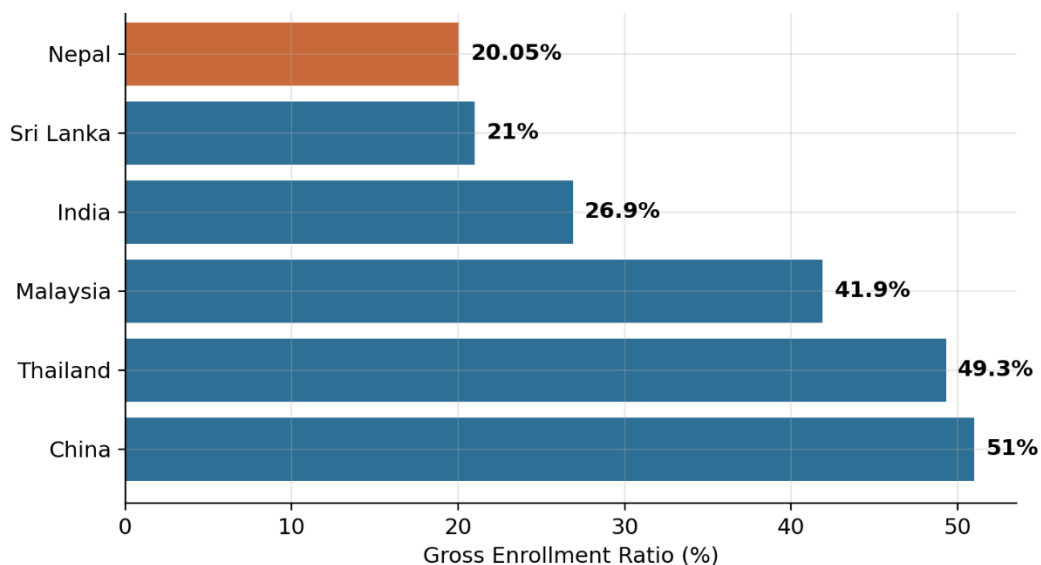


Fig. 6: Nepal's Gross Enrolment Ratio compared with selected Asian countries (2021/22 or latest available year).

Enrolment Across the Case-Study Universities

Figure 7 presents enrolment across the five case-study universities on a logarithmic scale, reflecting the roughly 200-fold difference in scale between Rajarshi Janak University and Tribhuvan University. This disparity is central to the funding-scale analysis in Section 7.8.

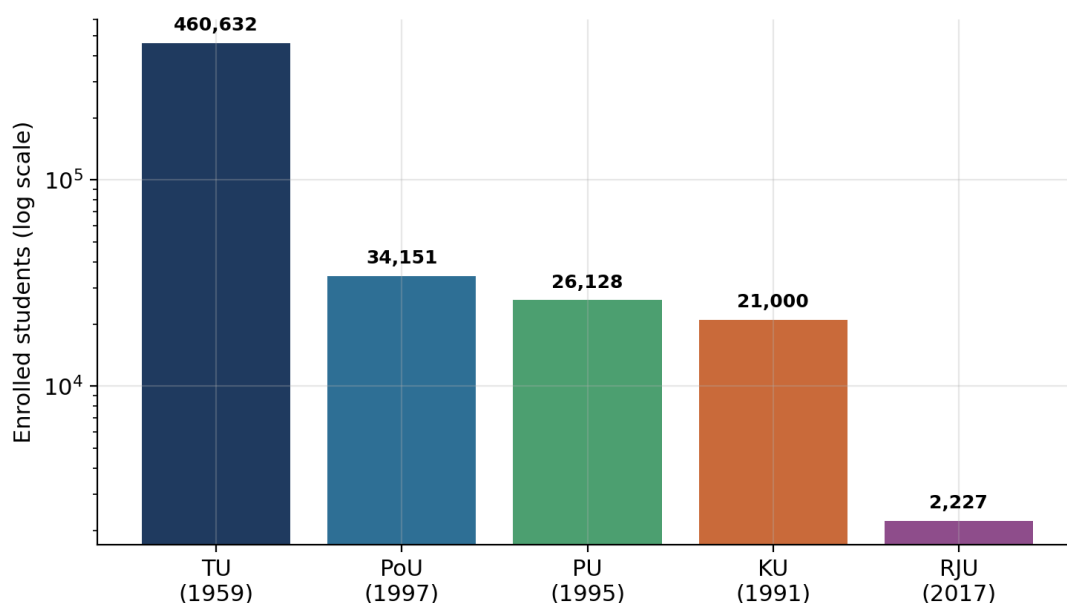


Fig. 7: Enrolment across the five case-study universities (logarithmic scale)

Student–Faculty Ratio Across Case-Study Universities

Reported student-faculty ratios, computed as total enrolment divided by reported teaching staff, are 38.6:1 for Kathmandu University, 58.8:1 for Tribhuvan University, 132.9:1 for Pokhara University, and 261.3:1 for Purbanchal University (Figure 8). All four exceed the upper international benchmark of 20:1, and the two ratios above 100:1 should be interpreted with caution: they likely reflect the fact that officially reported 'teaching staff' figures for multi-campus universities such as PU and PoU cover only core/constituent-campus faculty, while the great majority of their enrolled students are taught through affiliated colleges whose faculty are not centrally reported in the same statistic. This is itself a significant data-transparency finding, discussed further in Section 9.

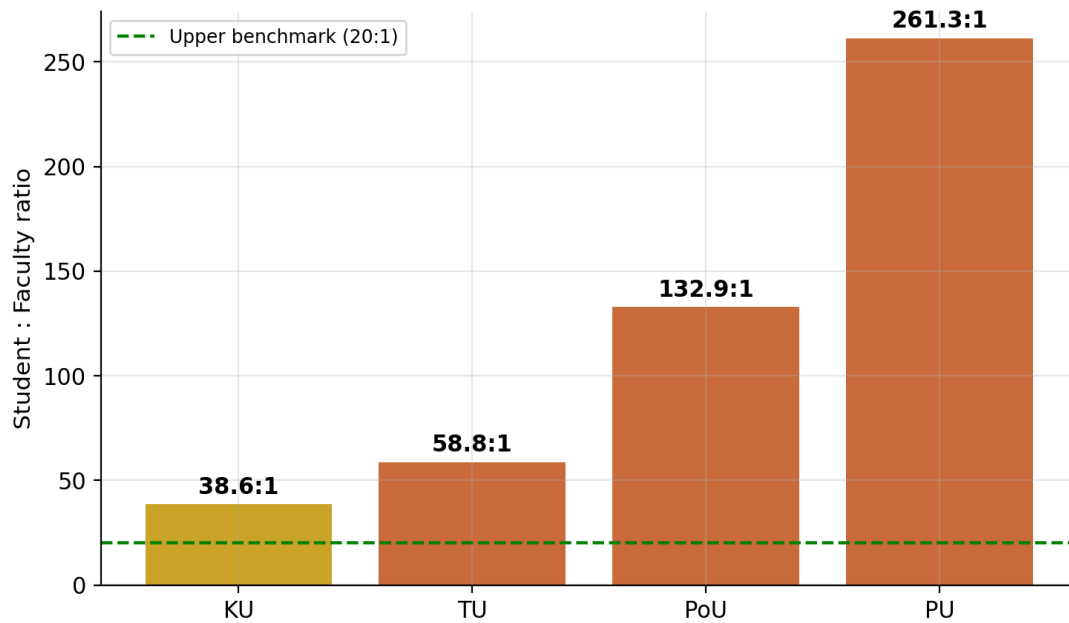


Fig. 8: Reported student-faculty ratio for four case-study universities against the international upper benchmark of 20:1.

Regression Analysis: Institutional Size and Per-Student Funding

To test whether public funding scales proportionately with institutional size, per-student annual budget (total budget divided by total enrolment) was computed for the five case-study universities for which budget figures are publicly available (TU, PU, PoU, RJU, and Far-Western University, included here as a supplementary reference point of comparable small scale). Per-student funding ranges from NPR 45,094 at Pokhara University to NPR 187,736 at the smallest institution, indicating that smaller universities receive substantially higher per-student allocations in absolute terms — a pattern consistent with the fixed costs of maintaining a university's core administrative and academic structure regardless of enrolment size.

A linear Pearson correlation between raw enrolment size and per-student funding gives $r = -0.45$, while a log-log (power-law) regression — appropriate given the wide range of institutional scale — gives a markedly stronger fit:

$$\text{Per-student funding (NPR)} \approx 1,109,824 \cdot (\text{Enrolment})^{(-0.251)}, \quad \log\text{-log } r = -0.75$$

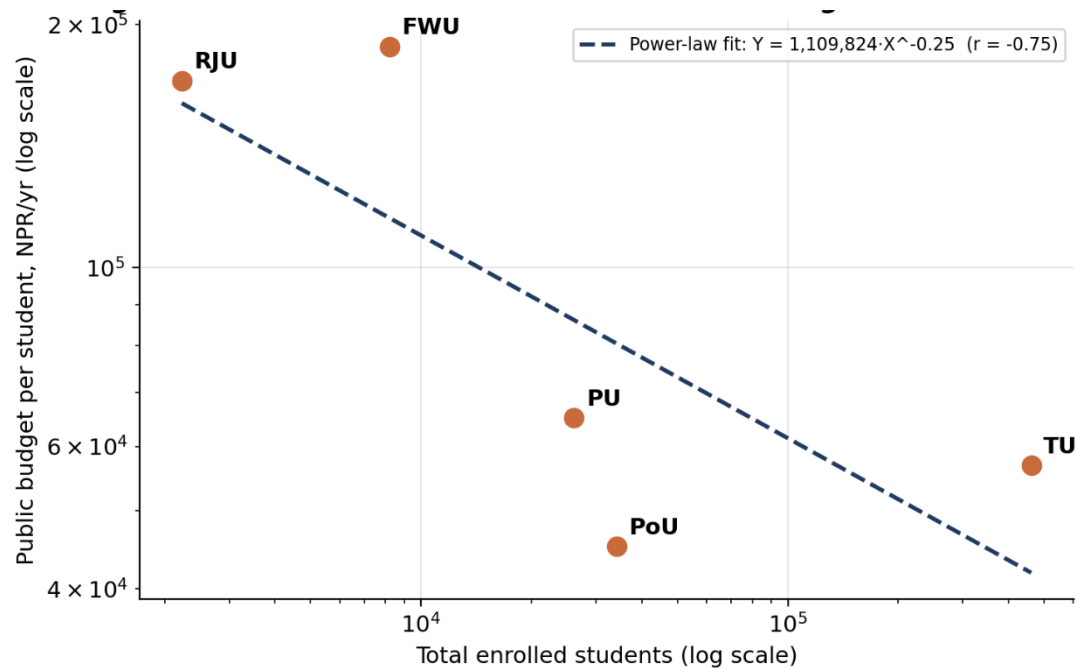


Fig. 9: Log-log regression of per-student public funding against institutional enrolment size, showing pronounced economies-of-scale effects.

The negative exponent (-0.251) confirms a clear economies-of-scale pattern: each doubling of enrolment is associated with an approximate 16.5% reduction in per-student funding (since $2^{(-0.251)} \approx 0.839$). While this partly reflects legitimate fixed-cost economics, it also implies that small, newly established universities such as RJU depend on comparatively generous per-student nominal allocations simply to remain operationally viable — allocations that nonetheless remain small in absolute terms and are frequently insufficient to fund the faculty recruitment, laboratories, and library infrastructure needed to reach parity in educational quality with older, larger institutions.

Quantitative Assessment of Challenges: A Weighted Severity Index

Building on the quantitative evidence in Section 7 and the qualitative literature reviewed in Section 2, eight major challenges facing Nepal's higher-education system were identified. Each was assigned a policy-importance weight (w_i , normalised to sum to 1) and a severity score (s_i , 0–10) based on the magnitude of the quantitative gap documented above. The Challenge Severity Index (CSI) for each challenge is the product $w_i \cdot s_i$, and challenges are ranked by this contribution.

Table 3: Weighted Challenge Severity Index for Nepal's higher-education system (weights derived from policy-document emphasis; severity scores derived from Section 7 quantitative findings).

Challenge	Weight (w_i)	Severity (s_i , 0–10)	CSI ($w_i \cdot s_i$)	Rank
Faculty shortage / high student-faculty ratio	0.20	8.5	1.70	1
Underfunding & fund-allocation inefficiency	0.18	7.5	1.35	2
Quality assurance & accreditation gaps	0.15	7.0	1.05	3
Research output & innovation deficit	0.12	7.0	0.84	4
Regional & gender access disparities	0.12	6.0	0.72	5
Curriculum–industry / employability mismatch	0.10	6.5	0.65	6
Governance & political interference	0.08	6.5	0.52	7
Federalism transition / provincial coordination	0.05	6.0	0.30	8

The aggregate Challenge Severity Index (sum of all $w_i \cdot s_i$ contributions) is 7.13 out of a maximum possible 10, indicating that the sector faces a substantial and multi-dimensional set of constraints. Faculty shortage receives the highest weighted score, directly reflecting the quantitative finding in Sections 7.2–7.3 that faculty growth (3.81% p.a.) has lagged enrolment growth (7.93% p.a.) by more than a factor of two, and that reported student-faculty ratios at several case-study universities exceed 100:1. Underfunding and allocation inefficiency ranks second, reflecting the finding in Section 7.8 that funding does not scale in proportion to institutional need, and that most incremental national funding has been directed to infrastructure and block grants rather than academic staffing (Kathmandu Post, 2026).

Gender and Regional Access Disparities

Beyond the faculty and funding indicators quantified above, access to higher education in Nepal remains uneven across gender and geography. Provincial universities located outside the Kathmandu Valley report widely varying female-enrolment shares — for instance, Far Western University reports a female-student share of 61.65%, indicating strong female participation in that particular provincial context, even as national academic leadership positions remain predominantly male (Comprehensive Analysis of Students'

Enrollment Trends in Tertiary Education, 2024). Enrolment also remains heavily concentrated in Bagmati Province, home to the Kathmandu Valley, while provinces such as Madhesh — served primarily by Rajarshi Janak University — and Karnali continue to show comparatively lower per-capita tertiary enrolment. This spatial concentration reinforces the funding-scale findings of Section 7.8: universities located outside the Kathmandu Valley must simultaneously expand access and build capacity with a smaller resource base, a structural disadvantage captured in the 'regional and gender access disparities' row of Table 3.

DISCUSSION

Three broad conclusions emerge from the mathematical analysis. First, Nepal's higher-education system exhibits classic symptoms of access-quality trade-off: rapid, policy-encouraged expansion of enrolment (7.93% CAGR) has not been matched by proportionate investment in the human capital — faculty — required to preserve teaching quality, producing a mathematically demonstrable and worsening student-faculty ratio. Second, at the level of the Gross Enrolment Ratio, Nepal's national trajectory is broadly consistent with its own stated 2030 and 2043 policy targets, since the historical GER growth rate (6.36% p.a.) exceeds the growth rate required to hit those targets (2.80–3.34% p.a.); the risk to those targets lies less in raw access expansion than in whether that expansion can be achieved without a further deterioration in the capacity indicators analysed in Section 7.2–7.3.

Third, the case-study regression analysis reveals a pronounced size-based inequality in per-student public funding, with small and newly established institutions such as Rajarshi Janak University receiving several times more funding per student in nominal terms than large institutions such as Tribhuvan University, yet still operating with an absolute resource base far too small to build the faculty depth, laboratories, and research infrastructure that older universities have accumulated over decades. This suggests that Nepal's higher-education funding model, while not entirely regressive, has not yet developed a differentiated formula that explicitly compensates newer provincial universities for the fixed costs of institution-building, a gap consistent with the federalism-transition challenge identified in Table 3.

A further, more methodological finding deserves emphasis: the officially reported 'teaching staff' figures for multi-campus universities such as Purbanchal and Pokhara appear to understate the true scale of the teaching workforce actually delivering instruction, because they typically exclude faculty employed directly by affiliated private and community colleges. This data-transparency gap — also noted at the national level with respect to community and private affiliated campuses (Kathmandu Post, 2026) — limits the precision of any student-faculty ratio calculated from currently published aggregate statistics and should be treated as a priority area for improved EMIS reporting.

Recommendations

1. Faculty recruitment planning tied to enrolment forecasting: UGC and individual universities should adopt the CAGR-based projection method demonstrated in Section 7.3 to set annual faculty-recruitment targets that keep the projected student-faculty ratio within the international benchmark band of 10:1–20:1, rather than allowing faculty hiring to lag enrolment growth passively.
2. Differentiated, needs-based funding formula: Given the economies-of-scale pattern identified in Section 7.8, the funding formula for new and small provincial universities such as RJU should include an explicit institution-building supplement — separate from enrolment-based block grants — earmarked for core faculty recruitment, laboratory establishment, and library development during the first 10–15 years of operation.
3. Improved EMIS disaggregation: UGC's EMIS should be expanded to require full-time and part-time faculty reporting from community and private affiliated campuses, not only constituent campuses, so that national and institutional student-faculty ratios reflect the actual teaching workforce.
4. Quality assurance and accreditation acceleration: Given the second-highest weighted severity score in Table 3, the national Quality Assurance and Accreditation Committee's coverage should be extended, with priority given to newer provincial universities that have not yet undergone institutional accreditation.
5. Research capacity building at provincial universities: Targeted competitive research grants, ring-fenced for universities established after 2010, would help narrow the research-output gap identified in Section 8 without requiring these institutions to compete directly against long-established research infrastructure at TU and KU.

6. Monitoring GER against capacity indicators jointly: Because access expansion (GER) and capacity (student-faculty ratio, funding per student) move in partial tension, the National Planning Commission and UGC should report GER progress alongside the capacity indicators modelled in this paper, so that policy does not treat the 2030/2043 GER targets as achieved if quality indicators simultaneously deteriorate.

Limitations of the Study

This study relies on secondary, publicly available aggregate data; disaggregated, campus-level micro-data were not accessible for most institutions, particularly regarding actual faculty employed at affiliated colleges. The Challenge Severity Index in Section 8 necessarily involves an element of expert judgement in assigning weights, and while these weights are grounded in the emphasis given to each issue in UGC and World Bank programme documents, a formal Delphi or AHP (Analytic Hierarchy Process) elicitation with a larger panel of higher-education stakeholders would strengthen the robustness of the ranking. The regression analysis in Section 7.8 is based on only five case-study institutions; while the log-log relationship is strong ($r = -0.75$), a larger sample across all Nepali universities would allow more confident statistical inference, including formal significance testing. Finally, budget figures for Kathmandu University were not publicly disclosed at the time of writing and were therefore excluded from the funding-regression analysis, which may understate the true diversity of funding models represented among Nepal's universities.

CONCLUSION

This paper has applied compound-growth modelling, ratio projection, correlation and log-log regression, and a weighted composite index to quantify the present status and structural challenges of higher education in Nepal, using five case-study universities spanning nearly two centuries of combined institutional history and two orders of magnitude in scale. The results confirm, in numerical terms, what qualitative commentary has long suggested: Nepal's higher-education system has expanded access faster than it has expanded the faculty and funding capacity required to sustain quality, producing student-faculty ratios that exceed international benchmarks at several of the case-study institutions and a funding model that leaves small, newly established provincial universities such as Rajarshi Janak University structurally under-resourced in absolute terms even as their per-

student allocation appears comparatively generous. At the same time, Nepal's Gross Enrolment Ratio trajectory is, on current historical growth rates, mathematically consistent with the national 2030 and 2043 targets. The central policy challenge, therefore, is not primarily whether Nepal can continue to expand access, but whether it can do so while simultaneously closing the faculty, funding, and quality-assurance gaps identified in this analysis — a challenge that will require the kind of quantitative, forecasting-based planning tools demonstrated in this paper to be embedded routinely in UGC and university decision-making.

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Appendix: Glossary of Abbreviations

Abbreviation	Full Form
UGC	University Grants Commission, Nepal
EMIS	Education Management Information System
GER	Gross Enrolment Ratio
GPI	Gender Parity Index
CAGR	Compound Annual Growth Rate
CSI	Challenge Severity Index
TU	Tribhuvan University
KU	Kathmandu University
PU	Purbanchal University
PoU	Pokhara University
RJU	Rajarshi Janak University
FWU	Far Western University
QAA	Quality Assurance and Accreditation
NPHEHSP	National Higher Education Development Strategic Plan
NPR	Nepalese Rupee