

The Paradox of Plenty: India's Engineering Unemployment Crisis

Why "80% unemployable", "71.5% employable" and "only 10% get jobs" can all be quoted about the same Indian engineering graduates: a taxonomy of engineering labour-market metrics, verified supply data, peer-reviewed evidence on skill gains, and a measurement agenda.

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ABSTRACT

Public debate about Indian engineering graduates rests on headline figures that appear to contradict each other: "more than 80% are unemployable", "71.5% are employable", and "only 10% will find jobs". This paper shows that these figures are not measuring the same thing. It proposes a taxonomy of five kinds of engineering labour-market metric (supply, test-based employability, placement, survey-based employment and job match), assigns each widely quoted figure to its category with its source and method, and shows how the apparent contradictions dissolve once the categories are kept apart. It then assembles verified evidence on each. On supply, AICTE-approved undergraduate engineering capacity peaked around 2014–15 and has since contracted; in 2021–22 one-third of 12.53 lakh sanctioned seats were vacant, which suggests that the frequently quoted figure of 1.5 million engineering graduates a year overstates degree-level output. On skills, a large peer-reviewed longitudinal study found that computer science and electrical engineering students in India, as in China and Russia, showed no measurable gains in critical thinking over four years, unlike students in the United States. On outcomes, India lacks any national tracer data on what engineering graduates do after graduation, so the most-cited employment figures are estimates from industry sources. The paper corrects several figures in circulation, proposes five testable propositions, and sets out a minimum measurement agenda, including a national engineering graduate tracer survey, without which neither the scale of the problem nor the effect of reforms can be known.

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Revision note. Version 2.0 substantially revises the May 2025 paper. The earlier version combined sourced figures with others for which no source could be found, including international employment rates for engineering graduates (95% in the United States and Singapore, 85% in China), skill-gap numbers for AI, cloud and cybersecurity, and a ₹2.8 trillion estimate of annual economic loss built from unsourced components. It also misstated the number of engineering bachelor's degrees awarded in the United States (about 134,000, not 280,000) and contained an arithmetic error in its IIT comparison. These have been removed or corrected. The embedded dashboard, which displayed the same unsourced figures, has been removed from the paper. The central observation of the earlier version, that “employability” and “employment” figures differ sharply, has been developed into the paper's main contribution.

1. Introduction

India is often described as the world's largest producer of engineers, and also as a country where most engineering graduates cannot find engineering jobs. Three figures dominate the discussion:

- “More than 80% of engineers are unemployable for any job in the knowledge economy” (Aspiring Minds, 2019).
- “71.5% of engineering graduates are employable” (Wheebox, 2024).
- “Only 10% of India's 1.5 million engineering graduates are set to secure jobs this year” (Business Standard, 2024).

Read together, these figures seem contradictory. How can most engineers be both unemployable and employable, and how can a majority be employable while only a tenth find jobs? The contradiction dissolves once one asks what each figure measures. They come from different sources, use different methods and answer different questions, yet they are routinely combined in policy debate as if they described a single quantity.

This paper makes four contributions:

1. A taxonomy of five kinds of engineering labour-market metric, with each widely quoted figure assigned to its category (Section 2).
2. Verified evidence on supply, skills and outcomes, correcting several figures in circulation (Sections 3–5).
3. Five testable propositions (Section 6).
4. A minimum measurement agenda for India (Section 7).

2. A Taxonomy of Engineering Labour-Market Metrics

Table 1. What the headline figures measure

Category	Question it answers	Example figure	Source and method	What it cannot tell us
M1. Supply	How many engineers enter the labour market?	“1.5 million graduates a year”	Widely repeated; not traceable to a single official series (see Section 3)	Quality; outcomes
M2. Test-based employability	What share of test-takers score above a threshold set for some job profile?	“>80% unemployable for the knowledge economy”; “71.5% employable”	Proprietary tests (AMCAT; Global Employability Test) with self-selected samples and different thresholds	Whether graduates are actually hired
M3. Placement	What share of graduates are hired, often through campus recruitment?	“Only 10% will secure jobs”	News and industry estimates; definitions of “job” and time window unstated	Hiring outside campus channels; later employment
M4. Survey-based employment	What share of graduates in the labour force are unemployed, by official definitions?	Graduate unemployment above 15%; 42% for graduates under 25	Periodic Labour Force Survey, as analysed by Azim Premji University (2023)	Field of study in most published tables; job quality

Category	Question it answers	Example figure	Source and method	What it cannot tell us
M5. Match	Are graduates working in jobs that use their engineering training?	Rarely measured	Would require a tracer survey or linked administrative data	Not currently available nationally

2.1 Why the figures conflict

- 80% “unemployable” and 71.5% “employable” are both M2, but from different tests, years, samples and thresholds. Aspiring Minds’ 2019 figure refers to readiness for *any job in the knowledge economy* as defined by its assessment, based on more than 170,000 graduates from over 750 colleges; the same report found only 3.84% employable in software roles at start-ups (Aspiring Minds, 2019). Wheebox’s figure comes from a different test taken by a self-selected pool of candidates (Wheebox, 2024). A threshold set for demanding software roles will classify far more graduates as “unemployable” than one set for general employability. Neither figure is wrong; they answer different questions.
- “71.5% employable” and “10% get jobs” are M2 and M3. Employability is a test-score threshold; placement is a hiring outcome within a particular channel and time window. A graduate can pass the first and not achieve the second because of weak demand, geography, institutional reputation, or because hiring happens through channels a placement figure does not count.
- None of the three is M4 or M5. India’s official labour-force surveys measure unemployment among graduates, but published tables rarely separate engineering from other degrees, and no national data show how many engineering graduates work in jobs that use their training.

The policy consequence is serious. Reforms justified by one figure are evaluated against another, so no one can tell whether they worked.

3. Supply: How Many Engineers?

3.1 The 1.5 million figure

The figure of 1.5 million engineering graduates a year is repeated widely (for example, Business Standard, 2024), but AICTE seat data suggest it overstates degree-level output. In 2021–22, AICTE-approved undergraduate engineering institutions had 12,53,337 sanctioned seats, of which 4,21,203 (33%) were vacant (Government of India, Open Government Data Platform, 2022), implying roughly 8.3 lakh admissions that year. Graduating cohorts reflect admissions four years earlier and dropout along the way. Unless the 1.5 million figure includes diploma holders or other programmes, the annual number of new B.E./B.Tech graduates is likely well below it. The AISHE out-turn series would settle the question and should be used in preference to the rounded figure.

3.2 Expansion and contraction

Engineering capacity grew rapidly in the 2000s and early 2010s and then contracted:

- Peak and decline. Total engineering seats fell from 16,94,030 in 2014–15 to 14,66,713 in 2017–18, a decline of 13.4% (Careers360, 2018).
- Persistent vacancies. Vacant seats in AICTE-approved undergraduate engineering institutions fell from 7.22 lakh in 2017–18 to 4.21 lakh in 2021–22, still one-third of capacity in the latest year (Government of India, Open Government Data Platform, 2022).
- Seat cuts. The Minister of Education told the Lok Sabha in July 2021 that more than 5.62 lakh engineering seats had been cut since 2019 (Careers360, 2021).

Large-scale vacancies are a market signal. Many students and families judged that the expected value of an engineering degree at the available institutions did not justify its cost, which is consistent with low expected placement and weak institutional reputation.

3.3 The international comparison, corrected

The earlier version of this paper compared India with about 280,000 engineering graduates a year in the United States. The American Society for Engineering Education reports 134,090 engineering bachelor's degrees awarded in its 2023 edition, including computer science degrees awarded inside and outside engineering schools (American Society for Engineering Education, 2024). Scale comparisons between countries are sensitive to what counts as an engineering degree, and should state their definitions.

4. Skills: What Engineering Education Adds

The most rigorous evidence on the quality question comes from a large longitudinal study that tested computer science and electrical engineering students in China, India, Russia and the United States with exams designed and validated to be culturally neutral and administered under standardised conditions. Loyalka et al. (2021) found that, compared with students in the United States, students in China, India and Russia showed no gains in critical thinking over four years of university. Students in India did gain academic skills in mathematics and physics during the first two years.

This finding matters for the “paradox”. Graduates who gain little in higher-order thinking during their degree may pass tests of specific knowledge (M2) yet struggle in open-ended work that employers value (M3, M5). It also suggests that the problem is not only the *number* of institutions or seats but what happens inside programmes, which seat cuts alone do not address.

The Aspiring Minds (2019) report points in the same direction. It found that only around 40% of engineering graduates had completed an internship and 36% had undertaken any project beyond their coursework, and that 37.7% could not write error-free code. These are test and survey results from a commercial assessment firm and should be read with that in mind.

5. Outcomes: What We Do and Do Not Know

5.1 What is known

- Graduate unemployment is high, especially among the young. Unemployment among graduates of all fields exceeded 15% after the pandemic and was about 42% among graduates under 25 (Azim Premji University, 2023).
- Educated youth dominate unemployment. Young people with secondary or higher education made up 65.7% of the unemployed in 2022, up from 35.2% in 2000 (ILO & IHD, 2024).
- Test-based employability differs sharply by field. The *India Skills Report 2025* ranks computer science and IT graduates above other engineering streams (Wheebox, 2024), consistent with the shift of seats toward computer science.

5.2 What is not known

- The engineering graduate unemployment rate. Published PLFS summaries do not routinely report it separately.
- Time to first job, and job match. No national data exist.
- The source of “only 10%”. The widely cited figure is an estimate reported in the press without a published methodology (Business Standard, 2024). It may be broadly right, but it cannot bear the weight policy debate puts on it.
- The economic cost. The earlier version’s ₹2.8 trillion estimate has been withdrawn because its components could not be sourced. A credible estimate requires M4 and M5 data by field, which do not yet exist.

6. Testable Propositions

- P1 (metric divergence). For the same cohort, test-based employability (M2) will exceed campus placement (M3) by a wide margin, and the gap will be largest at institutions with weak employer networks.
- P2 (vacancies as signal). Institutions with persistently high seat vacancy will have lower placement and lower graduate earnings than institutions in the same state and field with low vacancy.
- P3 (field reallocation). The shift of seats toward computer science and related fields will raise test-based employability averages without proportionally raising placement, if demand for entry-level software roles grows more slowly than supply.
- P4 (skill gains). Programmes with structured internships and substantial project work will show larger gains in critical thinking than comparable programmes without them, measured with instruments like those of Loyalka et al. (2021).

- P5 (signal value). Where degree quality is hard to observe, employers will rely more on institution name and entrance-exam rank as signals (Spence, 1973), so graduates of lower-reputation institutions will face longer job searches than their tested skills alone would predict.
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7. A Minimum Measurement Agenda

1. A national engineering graduate tracer survey. Follow a representative sample of each graduating cohort for three to five years, recording employment status, occupation, earnings, time to first job and whether the job uses engineering training. This single instrument would provide M3, M4 and M5 on a consistent basis.
 2. Field-specific PLFS tables. Publish unemployment and earnings for graduates with engineering and technology degrees separately, by age group.
 3. Institutional outcome disclosure. Require AICTE-approved institutions to publish audited placement and further-study outcomes using a common definition and time window.
 4. Official supply series. Use AISHE out-turn data by programme in place of rounded estimates when discussing the number of engineering graduates.
 5. Periodic skill-gain assessment. Measure learning gains during engineering programmes with validated, independent instruments, not only employability at exit.
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8. Policy Implications

The evidence supports several directions, with the caveat that without the measurement agenda their effects cannot be verified:

- Quality over capacity. Seat reductions have already happened at scale; the Loyalka et al. (2021) findings point to teaching practice and learning gains inside programmes as the larger lever.
 - Structured work experience. Internships and substantial projects address both skills (Section 4) and signals (P5).
 - Transparency. Standardised outcome disclosure lets students avoid low-value programmes, which the vacancy data suggest they are already trying to do with poor information.
 - Honest numbers in public debate. Policy discussion should state which category of metric (Table 1) a figure belongs to, and stop combining incompatible figures.
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9. Limitations

- Secondary sources. Several figures come from news reports of official data (seat counts) or from commercial assessments (employability) rather than from primary microdata.

- Coverage of seat data. AICTE data cover AICTE-approved institutions and do not include all engineering education in India.
 - The skills study's scope. Loyalka et al. (2021) studied computer science and electrical engineering students in samples of institutions; results may differ for other fields and for the most and least selective institutions.
 - No new data. The paper classifies and reconciles existing evidence; it does not produce new estimates of engineering unemployment.
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10. Conclusion

The “paradox of plenty” in Indian engineering is real in one sense and illusory in another. It is real in that the country built far more engineering capacity than demand or quality could sustain, a third of seats now go unfilled, and rigorous evidence shows weak gains in higher-order skills during engineering programmes. It is illusory in that the headline figures used to describe it measure different things and cannot be combined into a single story. The most important reform may therefore be the least dramatic: measuring, consistently and nationally, what happens to engineering graduates after they graduate. Until then, both the size of the problem and the success of any solution will remain matters of assertion.

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