Institutional Age, Size, Ownership and Ratings: An Empirical Study of Indian Higher Education Institutions

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ABSTRACT

Multiple factors influence the ratings of educational institutions, yet limited research has examined how structural institutional characteristics relate to these ratings, particularly in emerging economies. This study examines whether institutional ratings differ between government-run and privately managed engineering institutes, and whether campus size and institutional age are significant predictors of these ratings. Understanding these relationships is important for institutions seeking to enhance their perceived quality and for students making informed choices. To ground the inquiry, we conducted a preliminary research audit through interviews with two engineering aspirants and one industry expert, which revealed strong perceptions about the role of ownership, infrastructure, and legacy in shaping ratings. We then analysed secondary data from Career360.com, covering 299 engineering institutes across India. Using one-way ANOVA, we tested whether ownership is associated with significant differences in ratings. Regression analysis was employed to assess the predictive influence of campus size and institutional age. The results indicate that ratings do not significantly differ between government and private institutions, despite prevailing assumptions to the contrary. However, both campus size and institutional age significantly predict institutional ratings. These findings contribute to the literature on higher education rankings in the Indian context and offer actionable insights for academic administrators, policymakers, and prospective students. Future studies can extend this work by incorporating additional institutional and performance-related variables across disciplines and over time.

Keywords: Rankings, Institutional factors, Ownership, Campus size, Institutional age

1. Introduction

"*Education is the best friend. An educated person is respected everywhere. Education beats the beauty and the youth*." - Chanakya.

Education has long been regarded as a fundamental pillar of societal progress. The above quote by Chanakya, an ancient Indian philosopher and strategist, encapsulates the transformative power of education. A strong education system not only fosters intellectual growth but also serves as the foundation for a nation's economic and social development. (Tvaronavičienė et al., 2017). As technology advances at an unprecedented pace, education has undergone remarkable transformations, with new methodologies, disciplines, and evaluation systems shaping how knowledge is imparted. Across the globe, governments and educational institutions are working to make education more accessible, recognizing its critical role in equipping individuals with the skills necessary for personal and professional growth. A well-developed education sector yields both micro-level (individual growth) and macro-level (national development) benefits, reinforcing the idea that education is truly the best friend of humankind. As education systems evolve to meet modern challenges, the ways in which institutions are assessed and compared, particularly through global and national ranking systems, have gained increasing prominence, shaping both perception and policy in higher education.

In recent years, institutional rankings have emerged as a key force shaping the higher education landscape, influencing how universities position themselves, how students and parents make decisions, and how governments and academic bodies allocate resources (S. Arupiciute & Druteikiene, 2019). Rankings are no longer merely performance indicators but strategic tools, with many universities, especially those in the top tiers, integrating them into their planning processes. This is particularly true in the domain of STEM education, where rankings have driven institutions to emphasize interdisciplinary learning, 21st-century skills, and international competitiveness (Hawkins et al., 2018; Rodionov et al., 2014). Despite their growing significance, the underlying institutional factors that shape these rankings remain insufficiently understood, especially in emerging economies.

India, as one of the world's largest producers of STEM graduates and a recognized global hub for technical education, offers a compelling setting to examine these dynamics. Engineering education, in particular, holds a dominant position in the Indian academic landscape, with approximately 1.5 million engineering graduates produced annually (The Times of India, 2020). However, little empirical research has explored how institutional characteristics such as campus size and age influence the rankings of engineering institutions (Fauzi et al., 2020). This lack of clarity may perpetuate assumptions such as the presumed superiority of private institutions or the importance of infrastructure without robust evidence. As rankings continue to shape institutional reputation, student choices, and policy direction, it becomes crucial to understand how these structural factors interact with perceptions and outcomes in the Indian engineering education context. Given the centrality of engineering education, it is essential to understand the factors that shape how these institutions are perceived and evaluated, particularly through institutional rankings, which serve as a key reference point for various stakeholders.

Institutional rankings play a crucial role in shaping student decisions, institutional reputation, and policy interventions in higher education (Soysal et al., 2024). However, the determinants of these rankings remain unclear, particularly in emerging economies like India, where higher education structures differ significantly from Western contexts (Johnes et al., 2022). Existing research primarily focuses on faculty quality, research output, and funding. Still, the impact of institutional characteristics such as ownership (public vs. private), campus size, and institutional age on rankings has not been empirically examined (Buckner & Zapp, 2021; Valmorbida & Ensslin, 2017; Vernon et al., 2018). This lack of clarity leads to misconceptions among students and institutional leaders regarding what truly influences rankings. Understanding these institutional factors is essential for both prospective students making enrolment decisions and administrators striving to enhance institutional reputation. Thus, this study aims to address this gap by empirically analyzing how these three institutional factors impact ratings in Indian engineering education.

The problem is critical because institutional rankings significantly influence student decision-making processes, institutional reputation, and resource allocation (Dowling-Hetherington, 2020; Sułkowski et al., 2020); however, the underlying determinants of these rankings remain unclear. Students and policymakers often assume that private institutions inherently perform better in rankings due to perceived advantages in resources, infrastructure, and marketing (Gupta & Kumar, 2020). This study challenges the assumption and seeks to uncover whether there is a significant difference between the ratings of government-run and private institutes, and whether institutional age and campus size are significant predictors of ratings, thereby providing a clearer picture of how these factors influence perceptions and rankings in India's engineering education sector.

The primary objective of this study is to examine the impact of institutional factors, i.e., campus size and institutional age, on the ratings of engineering institutes in India. Specifically, this study aims to empirically test whether private institutes' rating significantly differs from that of government-run institutes, determine whether campus size contributes to higher institutional ratings as a signal of infrastructure and resource availability, assess whether institutional age affects rankings given its role in reputation-building and legitimacy, and compare student perceptions with empirical findings to uncover possible misconceptions regarding ranking determinants (Fauzi et al., 2020). To achieve these objectives, the study employs a mixed-method approach: a preliminary research problem audit involving interviews with engineering aspirants and an industry expert to capture perception-based insights, followed by a quantitative analysis of secondary data from Career360.com covering 299 engineering institutions, using ANOVA and regression analysis to test the formulated hypotheses.

This study aims to fill three significant gaps in the existing literature: First, the gap in empirical research on institutional factors in India, as while numerous studies focus on faculty quality, research output, and financial resources (Gupta et al., 2025; N.K. et al., 2018; Nassa et al., 2023; Thomas, 2025), however the impact of institutional characteristics such as age and campus size on rankings has not been extensively studied in the context of Indian engineering institutions. Second, the gap in understanding the public versus private debate remains, as there is limited empirical research testing whether public or private institutes in India have different ratings (Jaiswal, 2019; Sharma & Sharma, 2022). Third, the gap in understanding the relative importance of infrastructural factors, such as campus size and institutional age, is often presumed to influence rankings; however, there is limited scholarly work that compares how these factors specifically impact

institutional ratings in India (Kumar et al., 2022). By addressing these gaps, this study contributes to a more nuanced understanding of the structural determinants of institutional rankings in Indian engineering education, offering evidence-based insights for students, policymakers, and institutional leaders.

2. Motivation for the study

Our experience in the education sector has provided us with valuable opportunities to interact with a diverse range of stakeholders, including students, educators, and parents. Through these interactions, we developed a keen interest in understanding how aspirants perceive academic institutions and the factors that shape these perceptions. One of the most striking observations was that, despite the availability of multiple institutional rating agencies, students often rely on personal perceptions and anecdotal information rather than objective comparative ratings when making critical career decisions. This raised a fundamental question: How accurately do these perceptions align with empirical data on institutional ratings?

Higher education rankings play a pivotal role in shaping the reputation of institutions and guiding student choices. In India, where engineering remains one of the most sought-after career paths, the decision-making process for students and parents is often influenced by institutional ratings (Srivastava & Dhamija, 2022). However, the factors contributing to these ratings remain ambiguous. While students and parents tend to associate high rankings with private ownership, modern infrastructure, and perceived reputation, it remains unclear which institutional characteristics actually impact these ratings (Thomas, 2025). This study is motivated by the need to critically examine these perceptions and empirically evaluate the institutional factors that influence the ratings of engineering institutes in India.

To gain deeper insights into this issue, we conducted a preliminary research audit by interviewing two engineering aspirants and one industry expert. Their responses revealed a set of common beliefs regarding how institutional characteristics impact rankings. Notably, students perceived that privately owned institutions generally receive higher ratings than government-run institutions. At the same time, factors such as campus size and institutional age were believed to play a crucial role in determining rankings. Interestingly, the industry expert highlighted that while older institutions tend to have stronger reputations and better industry connections, ownership itself may not be a decisive factor in rating outcomes. These insights further strengthened our motivation to explore whether these widely held perceptions are supported by empirical evidence.

Based on our motivation to bridge this perception-reality gap, we formulated the following research questions to guide our investigation:

> **RQ1:** Are the ratings of government-run and privately owned engineering institutes significantly different?
>
> **RQ2:** What is the impact of institutional factors such as age and campus size on the ratings of engineering institutes in India?

This study aims to address an existing research gap by providing empirical evidence on how institutional characteristics influence rankings in the Indian engineering education sector. By integrating student perceptions with objective data analysis, we seek to contribute to the ongoing

discourse on higher education rankings and their underlying determinants. The findings of this study will provide valuable insights for students, academic institutions, and policymakers, enabling them to make more informed decisions about higher education institutions and their ranking methodologies.

3. Literature Background and Hypotheses Building

This article draws on multiple theoretical perspectives to understand how institutional characteristics influence institutional ratings in higher education, with a particular focus on engineering institutes in India. The primary framework guiding this study is **Institutional Theory**, which explains how organizational structures and practices are shaped by external regulatory environments, cultural norms, and social expectations (Scott, 2001; Meyer & Rowan, 1977; DiMaggio & Powell, 1983). Within this framework, organizations seek legitimacy through three main mechanisms:

1. **Regulative Pressures (Coercive Isomorphism):** Institutions conform to rules, laws, and accreditation requirements to gain legitimacy, especially government-run colleges that must align with state regulations (Scott, 2008).
2. **Normative Pressures (Normative Isomorphism):** Institutions adopt practices aligned with professional norms, such as hiring qualified faculty and focusing on research, to gain credibility in academic circles (DiMaggio & Powell, 1983).
3. **Cultural-Cognitive Pressures (Mimetic Isomorphism):** Institutions imitate more successful peers, such as expanding campuses or emulating ranking-focused strategies to remain competitive in a legitimizing field.

In addition, the study incorporates Signaling Theory**,** which suggests that institutions use observable attributes, such as campus size and age, as cues to signal quality and credibility to external stakeholders (Spence, 1973). For instance, older institutions or those with large campuses may be perceived as more stable, better resourced, or prestigious.

To further enhance the theoretical foundation, the study integrates Path Dependency Theory**,** which posits that early institutional advantages (e.g., funding, historical recognition, policy alignment) create trajectories that reinforce long-term status and outcomes (Pierson, 2000). Older institutions often benefit from accumulated legitimacy, extensive alumni networks, and favourable government relations, making them more likely to be perceived positively in rating systems.

Lastly, drawing from the Resource-Based View (RBV) (Barney, 1991), we treat campus size and institutional age as strategic resources that are valuable, rare, and inimitable. These resources can enhance an institution's ability to achieve competitive advantage through better visibility, reputation, and student perception, all of which influence ratings.

Through this multi-theoretical lens, Institutional Theory, Signalling Theory, Path Dependency Theory, and RBV, this study theorizes and tests the influence of three institutional characteristics: ownership, campus size**,** and institutional age, on institutional ratings.

3.1. STEM Instruction and Institutional Attributes

Growing attention to STEM (Science, Technology, Engineering, and Mathematics) education has led to a significant allocation of financial resources to educational institutions worldwide. STEM is not just about training students in technical areas; it involves developing the ability to solve problems, innovate, and work beyond disciplinary boundaries, shaping people who are qualified for today's workforce (Shaughnessy, 2013; California Department of Education, 2014). In developing countries such as India, STEM education is recognized as crucial for economic growth, technological advancement, and industrial competitiveness (Kennedy & Odell, 2014).

Unfortunately, there is scant research available on how institutional traits impact the rankings of STEM education, specifically in the context of India. Although other studies have focused on faculty quality, facilities, and research productivity, structural factors such as campus size and institutional age have received little attention, and there is a lack of empirical research on the relationship between campus size, in particular, and rankings. Because students and parents often use rankings to make enrollment decisions, it is essential to determine whether apparent ranking criteria align with the actual rating stimuli.

This research gap is what this analysis aims to address by examining the impact of institutional characteristics, including campus size and institutional age, on the ratings of engineering institutes. In doing so, it contributes to the flow of literature addressing education rankings and offers empirically based insights into the choice criteria of engineering applicants.

3.2. Influence of Institutional Aspects in Schools

Instructional factors have been extensively researched in the educational sector; however, there has been very little research on their influence on institutional rankings. Previous studies have been conducted on different institutional factors that influence students' learning outcomes and institutional performance such as: faculty: student ratio: and teaching quality (which have a significant effect on student performance; Bassi,2001; Rivera-Batiz & Marti, 1995;) institutional culture, leadership, and policy (affects faculty motivation and over-all academic performance; Ismail, 2024); infrastructure: library facilities: and tech; no logical resources (enhances student engagement, and academic outcomes; Mishra et al., 2021; Aboobaker& KA, 2021). Although these studies offer valuable insights, they overlook the impact of institutional characteristics, such as campus size and the institution's age, on institutional rankings. In addition, the existing literature is predominantly dominated by Western educational systems, which presents a challenge to generalizing the results to Indian higher education institutions.

The existence of this literature gap provides impetus for our study on the impact of institutional factors on the rankings of engineering institutes in India. Specifically, we examine the impact of campus size and institutional age on the institutional score.

3.3. Institutional Classifications and Determinants

Academic ranking has been widely explored in the Western world, particularly in the United States (e.g., Arzt, 2018; Duggan, 2009; Walker II, 2016). These efforts highlight the fact that institutional

reputation, faculty qualifications, research productivity, and funding sources have a significant influence on rankings (Meredith, 2004). Yet little is known about whether these factors are also important in countries of the global South, such as India. Furthermore, there is often a debate between the public and private. Private ownership in the context of rankings conversations. Chirikov (2023) believes that private institutions have a good faculty enrollment and better resources. Klemenčič and Zgaga (2014) argue that government institutions have regulatory assistance and institutional heritage. These contrasting views highlight the need for empirical validation to determine whether there is a significant difference between the ratings of public and private institutions.

In the same vein, although infrastructure and campus facilities have been considered distinctive factors for institutions (Hajrasouliha, 2017), their specific impact on institutional rankings remains unclear. The relationship between (large) size and prestige is often taken for granted, even though this may not hold for the market for Indian education. Institutional age, third, is associated with strength and repose in academia. Older institutions tend to be well-connected to industry, have qualified faculty, and a strong networking base among their alumni, all of which could lead to higher rankings (Dextre-Chacón et al., 2021). Yet, its association has not been empirically tested in the context of Indian engineering education.

3.4. Implications for (Others)Applying Theory to Institutional Concepts

3.4.1. Institutional Ownership and External Legitimacy

Ownership (governmental vs. private) is an institutional feature that determines the level of public scrutiny, financial support, and operational autonomy afforded to the sponsor. Public institutions are more likely to be affected by a range of official pricing and other policies than private ones, which modify their pricing and trade practices in pursuit of competitive student recruitment and prestige (Andrabi et al., 2017). According to Institutional Theory, public institutions gain legitimacy from state support, whereas private institutions must build their legitimacy through branding, partnerships, and student engagement activities (Klemenčič & Zgaga, 2014).

Both public and private organizations must adhere to accreditation standards and educational goals, from a regulatory and normative standpoint. However, their tactical reactions to these pressures are not identical, which could leave rankings by institutional ownership prone to variation. We examine whether rankings differ based on ownership or if other organizational forces are more operative.

3.4.2 Campus and Institutional Size and Prestige

Institutional Theory places significance on mimetic isomorphism, which refers to the mimicry of strategies by successful peers for legitimization. 23 In the sector of higher education, larger campuses with developed infrastructure and modern facilities are also considered a sign of institutional prestige and quality (Hajrasouliha, 2017). Extensive amounts of campus space, research facilities, and student amenities are often associated with higher institutional rankings, as these facilities attract students, faculty, and funding (Wilkins et al., 2024).

From an institutional legitimacy perspective, as well as with the support of Signaling Theory, the size of the campus is viewed as a measure of stability, resource availability, and institutional assurance of a high-quality education. However, the question of whether the size of the campus has a direct influence on ratings remains empirically open, especially in the context of developing countries such as India, where the allocation of resources and policies for land procurement varies widely among institutions.

3.4.3 **Institutional age and reputation:**

Institutions established relatively longer ago are generally more reputable and credible due to their long-standing histories, established networks, and academic traditions (Dextre-Chacón et al., 2021). Institutional Theory predicts that age confers depth to organizational norms and culture, industry connections, and alumni networks, which, when combined, bolster rankings and sustained visibility (Vernon et al., 2018).

From an institutional legitimacy perspective, as historic entities, old academic institutions enjoy historical prestige, regulatory stability, and intellectual capital. Some of the best universities in the world are also among the oldest, so it's difficult for these elements not to be intertwined; this is a case where an aged institution seems especially scholarly. However, if this is the case in Indian engineering education, it raises a question that remains unaddressed.

3.4.4 **Institutional Theory Lens**

Enriched with Institutional Theory, we offer a theoretical explanation of how institutional features influence the formation of rankings. The theory also contributes to our understanding of why ownership differences may or may not be related to various ranking differences (as a function of external regulatory legitimacy), the extent to which campus size may function as a form of legitimacy sign among members of a highly competitive education market, and the extent to which school age may explain reputational advantages and variations in the relative position of the institutions in rankings. The constructs are also theoretically justified based on signaling theory and RBV, which jointly provide theoretical support for the presumed relationships.

It is this that we wish to empirically examine in the case of India – whether what we can infer about the nature of these organizations from theory, norms and comparative experience, is in fact reflected in the Indian higher education landscape.

4. Hypotheses Development

4.1. Institutional factors of ownership and ratings

Higher education institutions operate in an increasingly competitive environment where rankings influence institutional visibility, student preferences, and policy decisions. In India, the dichotomy between public and private engineering institutions is particularly pronounced, given the significant differences in governance, funding structures, and operational autonomy. Institutional ownership is a foundational attribute that shapes institutional strategy and perception. Public institutions are typically state-funded, follow regulatory oversight, and enjoy historical legitimacy

and policy alignment. In contrast, private institutions are driven by market forces and rely heavily on tuition, partnerships, and branding to maintain competitiveness (Klemenčič & Zgaga, 2014).

Institutional Theory suggests that both public and private institutions seek legitimacy, albeit through different mechanisms. Public institutions align with government mandates and long-term reputational capital, whereas private institutions emphasize innovation, responsiveness, and efficiency to gain stakeholder trust (Scott, 2008; DiMaggio & Powell, 1983). For instance, private institutions may have greater flexibility in recruiting faculty, designing curricula, and developing infrastructure, which can be reflected in their public ratings (Chirikov, 2023). On the other hand, the historic prestige and stable funding of public institutions (Andrabi et al., 2017) may enhance their perceived credibility.

Although previous studies have produced mixed evidence regarding ownership and rankings, these differences in institutional pathways and legitimacy suggest that government-run institutes and private institutes may have significant differences in their ratings. Therefore, this study posits the following hypothesis:

H1*: There is a significant difference in the ratings of government-run and private-run academic engineering institutions.*

4.2. Institutional factor of campus size and rating

Campus size is more than a spatial attribute—it reflects institutional capacity, investment in infrastructure, and the ability to offer a comprehensive academic experience. Larger campuses typically feature advanced laboratories, libraries, sports complexes, and student services, all of which contribute to a holistic learning environment (Hajrasouliha, 2017). Such features are not only valued by students but are also used as tangible indicators of institutional strength in public evaluations and rankings.

Drawing on Institutional Theory, campus expansion can be seen as a visible signal of legitimacy and growth, particularly in contexts where physical infrastructure is closely tied to educational quality. Moreover, the process of mimetic isomorphism suggests that institutions often emulate prestigious universities by investing in large campuses and modern facilities to appear more credible and resourceful (DiMaggio & Powell, 1983). While few studies have directly tested the influence of campus size on institutional ratings, research suggests that infrastructure plays a critical role in shaping perceptions and may serve as a proxy for institutional commitment to quality (Wilkins et al., 2024).

In the context of Indian engineering education, where visible infrastructure heavily influences public opinion and student decision-making, it is plausible that campus size plays a role in shaping institutional ratings. Hence, we hypothesize:

> *H2: The Institutional factor of campus size has a significant impact on the rating of the academic institutions.*

4.3. Institutional factor of age and ratings

Institutional age is a critical determinant of how academic institutions are perceived and evaluated. Older institutions typically possess a deeper academic legacy, long-standing faculty bodies, stronger alumni networks, and sustained industry or policy relationships all of which contribute to their symbolic capital and institutional legitimacy (Dextre-Chacón et al., 2021; Vernon et al., 2018). These characteristics are often perceived by stakeholders as proxies for quality and trustworthiness, resulting in more favorable ratings.

Institutional Legitimacy Theory (Meyer & Rowan, 1977) posits that institutions accumulate legitimacy over time by maintaining continuity, aligning with established norms, and integrating themselves within existing regulatory structures. Path Dependency Theory (Pierson, 2000) further explains how these early-established advantages, such as public trust, policy support, and reputation, tend to reinforce themselves over time, creating a self-sustaining cycle of prestige and recognition. In the context of rankings, older institutions may have already established reputational capital, giving them a structural advantage over newer entrants.

Complementing this, Signaling Theory suggests that institutional age itself can act as a signal of quality and reliability. Stakeholders, including students, parents, and industry experts, may interpret longevity as a sign of stability and consistent academic performance. Although newer institutions may attempt to compensate through modern infrastructure and innovative teaching, these signals may not be as influential as the historical reputation that older institutions carry.

Given these theoretical perspectives and empirical indications, institutional age is expected to have a significant and positive association with how engineering institutes are rated. Therefore, we hypothesize:

> *H3: The Institutional factor of the age of the institute has a significant impact on the rating of the academic institutions.*

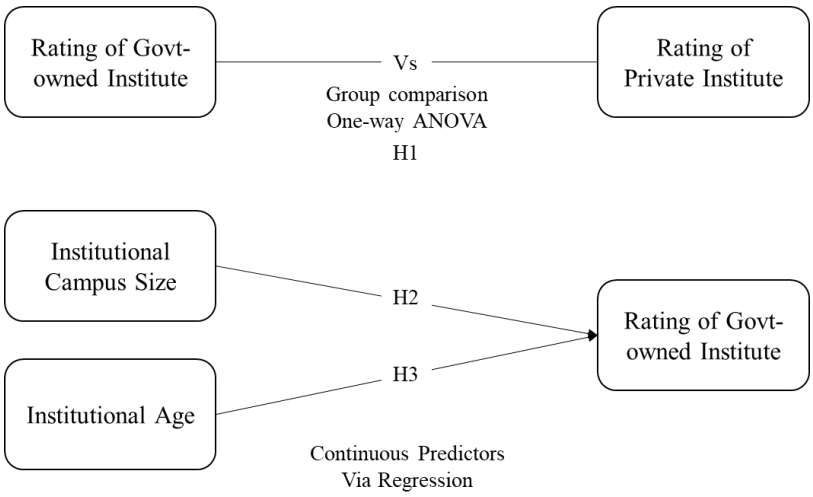

Figure 1: Proposed research model

5. Research Methodology

5.1. Research context

This study aims to examine how institutional characteristics, specifically campus size and institutional age, influence the ratings of engineering institutions in India. Additionally, the study investigates whether there is a significant difference in ratings between government-run and privately managed institutions, reflecting commonly held perceptions about ownership and institutional quality. Given the complexity of these relationships, a quantitative approach was employed to analyse the data and provide systematic empirical clarity.

A secondary dataset was selected to ensure objective, large-scale, and diverse representation across institutions. India offers a particularly relevant context for this inquiry, as it is home to one of the world's largest higher education ecosystems, with over 5,900 engineering institutions offering a broad spectrum of academic programs (Jain, 2022). Unlike Western systems, where rankings are typically influenced by metrics such as research output and faculty credentials, institutional ratings in India are shaped by a combination of factors, including infrastructure, legacy, and public perception. Despite the significance of rankings in guiding student choices and institutional strategy, there has been limited empirical research on how specific institutional attributes shape these outcomes within the Indian context.

To address this gap, the present study focuses on engineering institutions due to their central role in India's STEM education landscape. The research design is guided by three core questions: (1) Do institutional ratings significantly differ between public and private institutions? (2) Does campus size predict higher institutional ratings? and (3) Does institutional age contribute positively to institutional ratings? The methodology is directly aligned with these questions, employing one-way ANOVA to test for group differences in ratings based on ownership, and regression analysis to assess the predictive impact of campus size and institutional age on ratings.

5.2. Sample and procedures

To empirically test the research hypotheses, the study relies on secondary data obtained from Careers360.com, a widely recognized and credible educational platform in India that aggregates institutional data, including rankings, infrastructure details, and ownership classification. The dataset provides a comprehensive representation of engineering institutions across India, ensuring that the findings are generalizable.

The sample consists of 299 engineering institutions, selected from a total population of approximately 1,210 engineering institutes in India. (Careers360.com, 2024). These 299 institutes represent the top engineering colleges for which accurate data were available on all four relevant parameters: institutional age, ownership, campus size, and rating. The selection ensures both data completeness and quality. These institutes span across all major states and regions in India, allowing for geographical and institutional diversity. Furthermore, the majority of these institutions actively participate in and are featured in the National Institutional Ranking Framework (NIRF), reinforcing their national standing and visibility (NIRF, 2024).

The dataset includes variables that enable a comparative analysis across public and private colleges, as well as across institutions of different sizes and ages. Institutional ratings published by Careers360.com are based on a multi-criteria evaluation framework that includes academic excellence, infrastructure and facilities, placement performance, research output, accreditations, student–faculty ratio, alumni feedback, and social responsibility. (Careers360.com, 2024). Each parameter is weighted, and the final rating reflects a comprehensive aggregation of both objective indicators and qualitative inputs.

Operationalization of variables was conducted as follows: Institutional ownership was treated as a binary variable (1 = government, 2 = private). Institutional age was measured as the number of years since the institute's establishment. Campus size was measured as the total area of the institution's campus in acres. The institutional rating was measured using a 5-point Likert scale, where 1 indicated the lowest rating and 5 the highest.

The choice of Careers360.com as the data source is justified based on its credibility, comprehensiveness, and relevance to the study's objectives. The platform aggregates and verifies data from multiple government and private sources, enabling a level of analytical depth and national coverage that would be difficult to achieve through primary data collection.

5.3. Method

To test the hypotheses and determine the influence of institutional factors on rankings, the study employs quantitative statistical techniques using IBM SPSS 26. The selected methods are carefully aligned with the research questions, ensuring rigorous hypothesis testing and robust analytical validity.

For H1, which examines whether ratings differ significantly based on ownership (public vs. private), a one-way ANOVA test is performed. This method is appropriate because it allows for the comparison of mean ratings across two independent groups, i.e., government vs. private institutions; thereby determining whether there is a statistically significant difference in their ratings. Two key considerations inform the decision to analyze ownership separately using ANOVA. First, during the preliminary research audit, engineering aspirants perceived that private institutions generally receive higher ratings, whereas industry experts expressed that ownership and ratings may not be directly related. This highlighted a perception gap that warranted a focused analysis of ownership's role in shaping institutional ratings. Second, the nature of the data necessitated a separate analytical approach - ownership is a categorical (binary) variable, whereas the other predictors (campus size and institutional age) are continuous. ANOVA is thus the most appropriate statistical technique for testing mean differences across categorical groups with a continuous outcome.

For H2 and H3, which investigate the impact of campus size and institutional age on ratings, linear regression analysis is conducted. This method enables a quantitative assessment of the strength and direction of relationships between the continuous independent variables and the dependent variable (institutional rating). Before conducting the regression, the data is tested for normality, linearity, multicollinearity, and homoscedasticity to ensure that the results are statistically valid and reliable.

The choice of ANOVA and regression analysis aligns with the study's objective of providing empirical evidence on how institutional factors influence rankings. By using statistical methods that assess both group differences (ownership) and continuous relationships (campus size and institutional age), the study offers a comprehensive and nuanced understanding of the determinants of engineering institute rankings in India. This methodological approach ensures that the research questions are answered using appropriate and rigorous statistical techniques, reinforcing the study's contribution to the literature on higher education rankings and institutional legitimacy.

5.4. Data Analysis

Tables 1 and 2 present the descriptive statistics for campus size (in acres), age of the institution (in years), and rating of the institution (out of 5.0). As shown in the table, the minimum, maximum, mean, and standard deviation of these variables have been presented. Table I presents interesting descriptive statistics that warrant highlighting. The range for campus size is shown to be from 2 acres to 2000 acres, suggesting the inclusion of the smallest to the largest campuses of engineering institutes in India. Our data also includes engineering institutes that are as old as 164 years (established during the British era), as well as those established in 2011, i.e., merely a decade ago. The lowest rating given to any institute is 2.01, and the highest rating given to any institute is 3.77, as shown in the table. Table II shows the breakup of the ownership of these institutes. Such a vast range is an indication of the richness of the data to be used in the analysis.

Table 1: Descriptive statistics for campus size, age and rating of the institutes

	N	Minimum	Maximum	Mean	Std. Deviation
Campus_Size	299	2	2000	165.38	259.862
Age	299	10	164	31.32	22.205
Rating	299	2.01	3.77	3.0681	.29525
Valid N (listwise)	299				

Table 2: Frequency distribution of government-run coded as "1" and privately run coded as "2" engineering institutes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	89	29.8	29.8	29.8
	2	210	70.2	70.2	100.0
	Total	299	100.0	100.0	

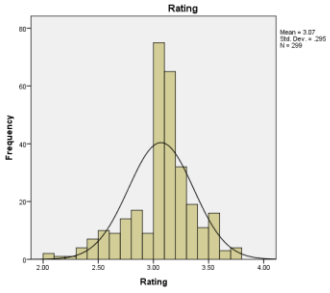

Figure 2: Normality test for the rating variable

Figure 2 illustrates the test of the assumption of normality for the rating variable, which is the dependent variable of our study. As can be seen from the figure, the data appear to be normally distributed, with the mean values for the ratings. We have also checked the skewness and kurtosis values for the dependent variable. The results are presented in Table III, which is given below. As can be seen from the table, the values for skewness and kurtosis seem to be well within the acceptable range.

Table 3: Skewness and Kurtosis for rating

N	Valid	299
	Missing	0
Mean		3.0681
Std. Deviation		.29525
Skewness		-.664
Std. Error of Skewness		.141
Kurtosis		1.138
Std. Error of Kurtosis		.281

To test H1, we conducted a one-way ANOVA to examine whether the mean institutional ratings differ significantly between government-run and privately run engineering institutes. In this analysis, institutional ownership was treated as an independent factor, and institutional rating (measured on a 5-point Likert scale) was the dependent variable.

Prior to the ANOVA, we performed Levene's test for homogeneity of variances, which yielded a significance value of 0.642, exceeding the 0.05 threshold, indicating that the assumption of homogeneity of variance was met. The results of the one-way ANOVA are presented in Table V. The p-value of 0.214 suggests that there is no statistically significant difference in the mean ratings between government and private institutions. Therefore, H1 is not supported by the statistical evidence.

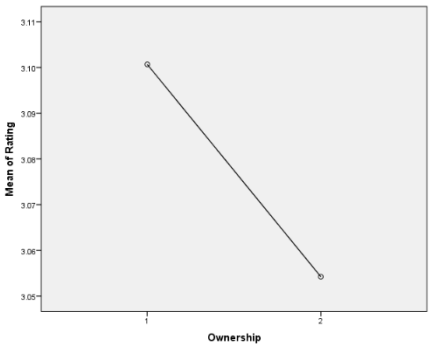

Figure 3: Mean plot for the rating of government-run colleges coded as "1" and privately run colleges coded as "2"

It is important to note that one-way ANOVA tests for mean differences between groups and do not imply causal impact or predictive influence of ownership on ratings. While the analysis reveals no significant difference, the mean rating for government institutions was numerically higher than that of private institutions (as shown in Figure 3), which contrasts with commonly held perceptions among students and parents in India. These results underscore the importance of evaluating institutional quality through evidence-based approaches rather than relying on assumptions tied to ownership type.

To further investigate the combined influence of multiple institutional characteristics (ownership, campus size, and age) on ratings, a multiple regression analysis may offer more comprehensive insights and is recommended as a possible extension of the present analysis.

Table 4: Levene's test for homogeneity

Levene Statistic	df1	df2	Sig.
.216	1	297	.642

Table 5: Result of one-way ANOVA test for H1

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.135	1	.135	1.549	.214
Within Groups	25.842	297	.087		
Total	25.977	298			

To test H2 and H3, we performed a linear regression analysis with the institute's rating as the dependent variable and age and campus size as the independent variables. We also tested the data to check whether we fulfilled the assumptions of linear regression. As evident from Fig. 2 and Table III, the data for the dependent variable are checked for the assumption of normality. We have also conducted tests for multicollinearity and homoskedasticity to verify the assumptions of the regression model. The results for these tests are reported in Table 6 and Figure 4. As evident from Table VI, the VIF values for both independent variables, i.e., the rating, which is the dependent variable, come to 1.170, which is well within the acceptable range. Hence, we can conclude that multicollinearity is not present in the data analyzed. As can be seen in Figure 3, the scatter plot of the rating suggests that our data is homoscedastic. By testing these assumptions, we ensure that the data used in linear regression meets all the necessary checks, allowing for the most accurate analysis and the presentation of reliable findings. The result of all the tests for assumptions suggests that our data is robust.

Table 6. Test for collinearity assumption & VIF values

Model		Collinearity Statistics	
		Tolerance	VIF
1	Campus_Size	.855	1.170
	Age	.855	1.170

Dependent Variable: Rating

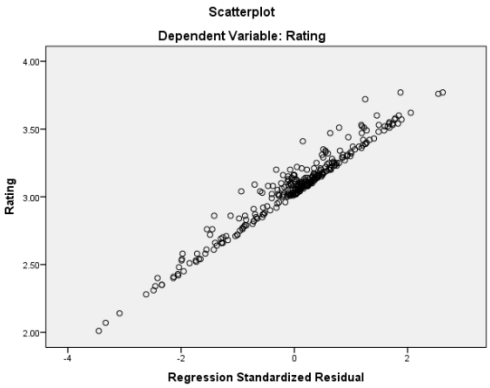

Figure 4: Scattered plot for rating to test for homoscedasticity

Finally, we performed the linear regression to test H2 and H3. The results of the linear regression from SPSS are shown below.

Table 7: Model summary for linear regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.221[a]	.049	.042	.28893	2.156

Table 8: ANOVA table for linear regression

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.266	2	.633	7.580	.001[b]
	Residual	24.711	296	.083		
	Total	25.977	298			

a. Dependent Variable: Rating
b. Predictors: (Constant), Age, Campus Size

Table 9: Coefficient for independent variables for the rating & significant value for each independent variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	2.986	.029		103.037	.000	2.929	3.043		
	Campus_Size	.000	.000	.125	2.043	.042	.000	.000	.855	1.170
	Age	.002	.001	.140	2.287	.023	.000	.003	.855	1.170

Tables 7, 8, and 9 present the results of linear regression from SPSS. From Table VII, we can see the value of the Durbin-Watson test for autocorrelation, which is 2.156. This value is well within the ideal range (1.5 to 2.5), which suggests that there are no traces of autocorrelation in our data. As shown in Table VIII, the p-value for the overall model is 0.001, which is less than 0.05. Hence, we can conclude that there is a significant overall effect of independent variables on the dependent variable. Table IX presents the coefficient values and significance levels for each independent variable. Significant values for both variables, as indicated by p-values less than 0.05, provide support for H2 and H3, suggesting that campus size and the age of the institution have a significant impact on the rating of engineering institutes in India.

6. Results

The results of our analysis provide empirical evidence in favor of all three hypotheses proposed by us. The one-way ANOVA test comparing the means of ratings of institutes run by government and private bodies provides empirical support for the hypothesis that ratings of colleges with different ownership have no significant difference. The significant value for this test is reported to be 0.214 (>0.05). This p-value indicates that the two groups, i.e., government-run and privately run institutes, do not differ significantly in terms of their ratings. The linear regression analysis suggests that institutional factors, i.e., campus size and age of the institute, both have a significant impact on the ratings of the institutes. The tests conducted to verify the assumptions of linear

regressions suggest that our data fulfills all the assumptions required for accurate regression analysis. The significant value for campus size is observed to be 0.042 (<0.05). This value suggests that campus size has a positive impact on the rating of engineering institutes. The larger the campus size is, the higher the rating of the institute can be predicted. The significant value for institutional age is observed to be 0.023 (<0.05). This value suggests that institutional age has a positive impact on the rating of engineering institutes. The older the institute is, the higher its rating can be predicted. The results of our study are presented in the table below.

Table 10: Final results

Sr No	Hypothesis	Result
H1	*There is a notable difference in the ratings of government-run and privately run academic engineering institutions.*	Rejected
H2	*The institutional factor of campus size has a significant impact on the rating of the academic institutions.*	Supported
H3	*The institutional factor of the institute's age has a significant impact on its academic rating.*	Supported

7. Discussion and conclusion

This study aimed to investigate how institutional factors, specifically campus size and institutional age, impact the ratings of engineering institutes in India. Moreover, the study examined whether ratings of government-run and private institutes are significantly different. Institutional rankings play a crucial role in shaping the perceptions of students, parents, and policymakers, yet the factors contributing to these rankings remain underexplored in emerging economies. Using Institutional Theory as the analytical lens, this study empirically tested whether infrastructure (measured by campus size) and institutional heritage (measured by age) significantly impact institutional ratings. The findings offer valuable theoretical and practical insights into how institutional legitimacy, stakeholder perceptions, and infrastructural investments interact to influence rankings.

The study's first hypothesis (H1) proposed that there is a significant difference in the institutional ratings of public and private engineering colleges. However, the results from the one-way ANOVA analysis did not support this hypothesis, as there was no statistically significant difference in ratings between government-run and privately owned engineering institutions. This finding challenges the widely held perception that private institutions inherently receive higher ratings due to their financial independence, infrastructure investments, and aggressive marketing strategies. While private institutions often emphasize modern facilities, branding, and faculty recruitment, government-run institutions derive legitimacy from state recognition, historical credibility, and regulatory backing. Institutional Theory helps explain why both public and private institutions maintain comparable ratings: public institutions adhere to strict regulatory standards, ensuring consistent quality assurance, while private institutions compete for market legitimacy, leading to similar performance outcomes.

This result aligns with previous research suggesting that ownership type alone does not determine educational quality (Klemenčič & Zgaga, 2014; Andrabi et al., 2017). The absence of a significant difference in ratings suggests that other institutional characteristics, such as reputation, faculty strength, and research output, may have a more pronounced impact on rankings than ownership status. This insight is particularly relevant for students and policymakers, who often assume that

private institutions provide superior education solely because of their ownership. Future research could explore whether specific internal factors within public and private institutions, such as governance models, faculty qualifications, and industry partnerships, play a more decisive role in rankings.

The second hypothesis (H2) tested whether campus size has a significant impact on institutional ratings, and regression analysis confirmed that campus size is a statistically significant predictor of ratings. Institutions with larger campuses were found to have higher mean ratings (M = 3.10) compared to institutions with smaller campuses (M = 2.76), suggesting that physical infrastructure is positively associated with perceived institutional quality. This finding provides empirical support for the idea that campus size may serve as a proxy for institutional resources, academic environment, and student support systems—all of which contribute to an enhanced reputation. This result is also consistent with Mimetic Isomorphism, as explained within Institutional Theory (DiMaggio & Powell, 1983), where institutions adopt visible and symbolic features, such as expansive physical space, to signal legitimacy, prestige, and competitiveness in the higher education landscape. Prior research corroborates this interpretation, indicating that better infrastructure and larger campuses enhance student satisfaction and shape public perceptions of institutional quality (Hajrasouliha, 2017; Wilkins et al., 2024). Thus, campus size not only reflects physical capacity but also influences how institutions are evaluated and ranked.

However, while the results confirm that larger campuses tend to receive higher ratings, it is important to consider potential underlying mechanisms. One possibility is that larger campuses attract higher enrolments, leading to greater funding and better faculty recruitment, which in turn enhances institutional quality. Another interpretation is that ranking agencies and students use campus size as a heuristic for institutional excellence, even if it does not directly correlate with educational quality. This finding has important managerial implications for academic administrators. Institutions aiming to improve their rankings should consider strategic infrastructure expansion as a means of signaling prestige. However, policymakers should ensure that rankings reflect actual educational quality rather than physical expansion alone, to prevent institutions from prioritizing infrastructure investments at the expense of academic development.

The third hypothesis (H3) proposed that institutional age has a significant impact on ratings, and the regression results confirmed a positive relationship between institutional age and rankings. Older institutions tend to receive higher ratings, reinforcing the idea that historical reputation and long-standing credibility contribute to institutional rankings. This finding aligns with institutional legitimacy theory (Meyer & Rowan, 1977), which suggests that older institutions benefit from cumulative legitimacy, established industry connections, and alumni networks. Path dependency theory (Pierson, 2000) further explains why older institutions maintain higher rankings—their established reputation attracts better faculty, research funding, and student enrolments, creating a self-reinforcing cycle of prestige. This result also aligns with findings from global university rankings, where older institutions often occupy top-tier positions (Dextre-Chacón et al., 2021; Vernon et al., 2018). However, the relationship between age and rankings may not be entirely deterministic, while older institutions tend to score higher, newer institutions can offset their age disadvantage by investing in innovation, modern pedagogy, and strategic industry collaborations. For institutional leaders, these findings suggest that establishing a strong, long-term reputation is crucial for achieving a high ranking. While newer institutions may struggle to compete solely

based on age, they can adopt alternative strategies, such as developing specialized programs, forging strong industry partnerships, and leveraging technology-enhanced learning, to compensate for their lack of historical credibility.

The study makes several theoretical contributions by extending Institutional Theory to the context of higher education rankings in an emerging economy. It provides empirical support for the idea that institutional legitimacy is shaped by multiple external and internal factors, rather than ownership alone. The findings reinforce the relevance of Mimetic Isomorphism, Legitimacy Theory, and Path-Dependency Theory, demonstrating how institutions gain and sustain credibility over time. From a practical perspective, these insights offer valuable guidance for students, academic institutions, and policymakers. Students and parents should consider factors beyond ownership when selecting institutions, as rankings do not significantly differ between public and private institutions. Institutional administrators should recognize that campus size contributes to rankings, but strategic investments in teaching quality, faculty development, and student engagement remain critical. Newer institutions must adopt alternative credibility-building strategies, while older institutions should leverage their historical reputation to maintain a competitive advantage.

This study contributes to the literature on higher education rankings by empirically testing the influence of campus size and institutional age on institutional ratings in the Indian engineering education sector. Using Institutional Theory, it demonstrates that institutional legitimacy is constructed through both structural characteristics (such as campus size and age) and external perceptions (including ownership legitimacy). The results indicate that ratings of government-owned and private institutions are not significantly different, challenging conventional perceptions about the differences between public and private institutions. However, campus size and institutional age significantly impact ratings, suggesting that infrastructure and historical reputation serve as key indicators of legitimacy in the higher education sector. These findings have significant implications for institutional decision-makers, ranking agencies, and students making decisions about higher education. Future research can expand this work by exploring additional factors, such as faculty qualifications, research output, student satisfaction, and employment outcomes, to develop a more comprehensive understanding of institutional rankings in emerging economies. By highlighting the structural and perceptual drivers of institutional legitimacy, this study underscores the need for a balanced approach to rankings that considers both quantitative indicators and qualitative educational outcomes.

8. Academic and managerial implications

This study offers significant academic contributions by extending Institutional Theory to the context of higher education rankings in an emerging economy. The findings demonstrate that institutional legitimacy is not solely determined by ownership structure but is also influenced by factors such as campus size and institutional age. This challenges the prevailing assumption that private institutions inherently perform better in rankings, highlighting the importance of structural attributes in shaping institutional credibility. Scholars studying higher education systems, institutional legitimacy, and rankings can build upon these findings by investigating how additional factors, such as faculty qualifications, student satisfaction, industry collaborations, and research output, interact with institutional characteristics to influence rankings. Furthermore, longitudinal

studies can explore how institutional rankings evolve, particularly as newer institutions attempt to establish legitimacy through innovative pedagogies and global partnerships. Future research should also consider cross-country comparisons to determine whether the observed patterns hold across different regulatory environments and cultural contexts.

From a managerial perspective, this study provides actionable insights for institutional leaders, policymakers, and ranking agencies. First, administrators of newer institutions should recognize that while age plays a role in rankings, it can be counterbalanced through strategic investments in academic reputation, research initiatives, and faculty development. Second, institutions seeking to improve their rankings should not focus solely on branding or marketing, but also enhance their physical infrastructure, as larger campuses signal legitimacy and prestige to students and evaluators. Third, government agencies and accreditation bodies should ensure that ranking methodologies account for both qualitative and quantitative measures, preventing institutions from gaining an undue advantage through superficial expansions. Finally, students and parents must be educated about the factors influencing rankings, encouraging data-driven decision-making rather than relying on outdated perceptions of public and private institutions. By aligning strategic institutional investments with the evolving landscape of higher education rankings, institutional leaders can foster a more transparent, credible, and competitive academic environment.

9. Limitations and future research directions

Our study is accompanied by a few limitations that could be addressed in future research. We have relied on secondary data for a particular year (2022–23). Future studies may gather panel data spanning a longer period (e.g., five to ten years) to analyze how changes in institutional factors impact institutional ratings over time. Additionally, we have focused on only one source of ratings Careers360. Future research may consider collecting ratings from multiple sources (such as NIRF or private education platforms) and conducting a comparative analysis to understand how different institutional factors influence different rating systems and with what intensity. The study examined only three institutional characteristics: ownership, institutional age, and campus size. Future studies should consider incorporating other influential variables such as faculty–student ratio, academic leadership, research productivity, funding sources, and geographic accessibility to provide a more comprehensive view of what shapes institutional ratings. Furthermore, the adjusted R^2 value for the regression model was relatively low (0.042), indicating that the included variables explain only 4.2% of the variance in institutional ratings. This suggests that a significant portion of the variance remains unexplained, possibly due to other qualitative or performance-based factors not included in this model. Future studies may build on this by integrating broader sets of predictors and applying multivariate models to improve explanatory power and offer deeper insights into what drives institutional ratings.

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