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Monopolisation via Technology Adoption in Institutions of Higher Education – Evidence from India

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Abstract: Disruptions led by technology have forced Institutions to think of new approaches and strategies to ensure their existence and dominance in the global marketplace. Institutions that can fund and leverage technology are in a relatively dominant position vis-à-vis other institutions like enrolments, research funding and forms of competitive positioning. Researchers have not attempted to determine whether the monopoly of an institution in the marketplace is influenced by technology. In our paper, we examine the perceived monopolization along with the intervention of technology using a structural Equation Modeling (SEM Model) considering the selected parameters of accreditation, rating, and innovation through a structured survey of 419 respondents from IHEIs (Institutions of Higher Education**)**. Results indicate that technology is a significant mediator of the monopolization of institutions. The role of the government and other agencies becomes extremely important to ensure a healthy and balanced competition between higher education institutions and help them position globally.

Introduction

Higher education globally has experienced an exceptional development from elite confinement to mass participation, which has contributed to the social well-being of people and is viewed as a national building exercise. The nature and form of higher education are changing rapidly, particularly with the large creeping intervention of technology.

A dramatic change in the profile and expectations of the students and teachers can be visualized in all corners of the teaching-learning mechanisms. The management of governance of higher educational institutions (HEIs) is largely influenced by disruptive technologies that have changed the entire model of higher education. Technology provides a twin challenge to the sustainability of the business model of higher educational institutions (Yadav, 2019). The ratings, accreditations and other performance indicators create a differentiation between the well-funded and prioritized institutions and the other stylized as traditional, primitive and lagging institutions.

An issue that has been a matter of debate is whether technological-based disruption leads to monopolization of HEIs. In an Indian context, we find no specialized studies on higher education in India that focus on the influence of disruptive technologies on Indian higher educational institutions and their monopoly positioning when the question of internationalization is raised. In recent years, the government has emphasized boosting spending on higher education and enhancing their autonomy. However, the role and management of technology is still unknown to the large number of

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institutions in India. It remains to be seen how the new education policy addresses these challenges. We also discovered that, despite the efforts of some corporate and public organizations to integrate technology into education, the phenomena are not widespread, given the speed of technology and the importance of education for the economy and society. Our paper attempts to examine whether the role of technology is significant in the monopolization of Institutions of Higher Education (IHE) evaluated in an internationalization context.

Review of Literature

With the privatization of HEIs, particularly in developing countries, government contributions are falling and intuitions are facing infrastructural constraints (Chakraborty, 2021). The obvious impact is on strategic positioning, education, research quality, value, and socio-economic structures. Various researchers have evidenced that technological advancements are disruptive in the context of higher education (Kozma, 1991; Kozma and Croninger, 1992; Herrington et al., 2003; Malhotra et al., 2023; Mittal and Jora, 2023). The need for research and development in learning has been highlighted in studies like Zhuang et al. (1999), Blin and Munro (2008), Conole (2008), Margaryan et al. (2011) etc. Various authors have raised the issue of improving academic productivity through technology. It is believed that after a huge upfront investment is made in technology, the operational cost in the next stages is sufficiently low. Thus, the incremental cost of dissemination of the information ensures large information transfers (Massy and Zemsky, 1995). The bureaucratic and political structures pose barriers to the transfer of cost to the customers, the students(Massy and Zemsky, 1995).

In Greece, the constitution permits the provision of tertiary education exclusively to "public" institutions wherein the faculty and administrators act as civil servants and public officials, respectively, implying a sub-optimal allocation of efforts towards education (Mitsopoulos and Pelagidis, 2011). Educators in various institutions lag behind the technological curve and feel that technological adoption expressed as a means of communication and interaction is a big challenge for transforming their educational paradigms(Davidson, 2011).

In various studies, the global e-learning market size has been projected to reach $840.11 billion by 2030, which implies a growth rate of 17.5% from 2021 to 2030 (Shadaab and Beesetty, 2021). It can be observed from various available global ratings that Indian institutions are far lagging behind their counterparts in the developed world, including the Asian ones (Kidwai, 2023; Umarji, 2021).

Foreign collaboration by institutions of higher education requires extensive support from the government (Chakraborty, 2021). The internationalization of higher education is a global phenomenon that suffers from various challenges, offering immense growth opportunities (Tight, 2022). The most notable problem facing higher education, especially after the pandemic, is affordability and a rush towards innovative pricing practised globally by many universities (Nicole Engelbert and Steve Hahn, 2020).

Global universities have been able to implement advanced software like Turnitin, ithenticate etc., for plagiarism checks in wide areas of activities like student assignments, master and doctoral theses, research papers etc. though some researchers say that this software is not authentic (Foltýnek et al., 2020). In India, the government started an initiative for plagiarism detection in 2017 through its UGC guidelines in 2018. Urkund has been initiated as a low-cost option but has failed to make any impact when it comes to publishing in high-impact journals. Despite the large focus of the government on science and technology witnessed during the period after 2015, the shortage of well-trained scientists and researchers is hampering the development and use of new technologies (Shuriah Nazi, 2021).

It has been argued that technology-driven initiatives of faculty organizations can pose a threat to faculty autonomy, intellectual property, and job security. The commodification of higher education via technology may be detrimental to the larger effort to preserve and enhance public higher education (Noble, 2002). Compared to global institutions, students and teachers in India do not have sufficient or no access to the required technology at home (Gosmawi, 2013). In a study conducted by Reddy (2015), it is argued that India ranks 10th among the top 20 productive countries in science and technology, with its global publication being relatively inferior, thus pointing out the need for infrastructure support for higher educational institutions.

A study by UNICEF points out that 31% of students worldwide do not have access to formal education due to the paucity of required household assets and low-income families have few or only one device like a mobile phone, which is used by parents, which limits the time the student can use the device for learning (Hannah, 2020). The adoption of technology in education is possible only when digitalised tools are available in classrooms and at home (Financedigest, 2021). It can be established that extensive use of technology to build Unique Value

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Propositions for educational products by institutions without adequate security measures can boomerang and may lead to huge financial losses.

The major barriers to the adoption of technology by higher educational institutions in India are paucity of resources, limited or no access to technology, low expertise in the use of technology, limited organizational and policy support and time constraints (Ravi, 2021). The costs of technology constrain the ease of adoption of technologiesand, and investment in technology is generally met out of the left-out budgets of institutions (Stateuniversity.com, 2022). Apart from the physical technological infrastructure, educational institutions need training of faculty and staff members, thus pointing to the policy weaknesses of the regulating bodies.

In India, some central and private universities are making huge investments in building technology-based infrastructure to compete with their foreign counterparts. However, to internationalize, a tech-based revolution around the country is important (Ravnit, 2019). Some of these institutions have acquired a monopolistic characteristic in terms of teaching-learning systems. The increasing dependence on technology requires that students and teachers be provided with the right technological tools. Lack of funding support from the government hampers research and innovations, thus making it difficult for the institutions to commercialize (Ravi and Janodia, 2022).

The application of technology in the teaching-learning process significantly affects the probability of getting an accreditation (Epravesh.com, 2021). The National Education Policy in India released in 2020 principally lay emphasis on the "extensive use of technology in teaching and learning, removing language barriers, increasing access as well as education planning and management" (Educationasia.in, 2020).

Institutions of Higher Education should strive for effective competition and cooperation to achieve innovative development (Carayannis and Grigoroudis, 2016). The competition between the existing institutions of higher education should assume a "monopolistic nature" wherein the differentiating factor is the standardization of services driven by technology (Tretyak et al., 2019). This is different from the artificial monopoly created by the governments.

Minister for Education and Skill Development and Entrepreneurship, in a speech, has advocated that the government endeavours to offer all kinds of public, private and foreign institutions without monopolies to address the challenges of India's education system, namely affordability, accessibility, quality and inclusivity (Vidya, 2022).

The Higher Education Commission of India Bill (HECI) was introduced in the year 2018 and primarily aimed at responding to University Grants Commission (UGC) Act stances on the issues of autonomy and transparency in India's education system(Rupeja, 2018). In this context, researchers and analysts are worried about the loss of power within states, the monopolization of control over the release of funds, the lack of transparency, and the anti-democratic nature of the state.

A research puzzle arises about how the Indian HEIs that are primarily short of resources to support technology should position themselves and compete with players in an international context. It is important to know whether the poor institutions (insufficiently funded, lower-rated) perceive a monopoly suffering from the rich, tech-enabled institutions and may not be able to internationalize themselves. The recently launched National Education Policy, 2020, has greatly emphasized the adoption of technology by educational institutions. Thus, research in the Indian context has become imperative, particularly in light of national education policy and the funding criterion to support technology, as evidenced by the recent global ratings.

Materials and Methods

Sampling Method and Data Collection

To measure the opinions on the selected constructs and variables for the study, we conducted a perception survey of 419 respondents from Indian higher educational institutions, including universities, affiliates, and autonomous institutions. The sample set represents academicians from various academic disciplines, including Engineering, Management, Science, Mass Communication, Journalism, Law etc. The respondents' perception was analyzed using various selected parameters of the teaching-learning process, administration, research efforts, and performance to draw a comparison between the self-sufficient(rich) and poor(deficit) institutions.

Variables

The survey questionnaire comprised seventeen items (questions) along with the questions based on the profile of the institutions. These questions have been framed in light of previous studies based on the literature review and discussions with experts involved in studies of Indian Higher Educational Institutions under five constructs namely Accreditation (3 items) (Bajwa, 2018; Pineda and Winkler, 2021), Innovation (3 items) (Pardo-Garcia and Barac, 2020; Torfing & Triantafillou, 2016), Rating (3

items) (Patchan et al., 2018), Technology factor (4 items) (Hrabowski, 2014; Trinidad and Ngo, 2019), and Perceived Monopoly (4 items) (Al-Amri et al., 2020; Tomlinson, 2008). Table 1 provides the summary of measures included in the questionnaire.

The perceptions of the respondents regarding the rating, accreditation, innovation, role of technology, and the perceived monopoly of higher education were gathered on a Likert Ranking Scale of 5 Points. Ranking scales are common to the research in social sciences, particularly for assessing attitudes. The Likert scale, one of the most popular ranking evaluation tools, asks respondents to rate how much they agree or disagree with the given assertions (Croasmun).

For the analysis of the hypotheses concerning the relationships between accreditation, innovation, rating and the role of technology factors on the perceived monopoly of the institution, this study has utilized partial least squares structural equation modelling (PLS-SEM), which is a non-parametric approach. PLS-SEM path analysis was chosen since it does not put restrictions on sample size and its ability to tackle asymmetric data, distinguishing it from other Structural Equation Modelling Techniques, like AMOS and LISEREL, that necessitate the presence of normal data (Hoyle, 1999; Westland, 2007). PLS-SEM results have been analyzed in two stages – (a) through the verification of assumptions using convergent validity and reliability measures

Table 1. Measures of the Survey Questionnaire.

Construct	Item
A: Accreditation	
AC1	E-resources in present times are necessary for any accreditation endeavour.
AC2	Share in my region's accredited programs depends upon the accreditation's nature.
AC3	Accredited institutions generate bargaining power among the technology vendors, thereby reducing the cost of technology.
B: Innovation	
INV1	Technology is necessary to generate innovative capabilities.
INV2	The government finances only those institutions that demonstrate innovative capabilities.
INV3	Technology-based innovation in Learning Management Systems attracts resources and talents.
C: Rating	
RA1	The quality of the rating impacts the positioning of the institution.
RA2	A good rating is essential for a student to choose an institution.
RA3	Continued ratings impact the market share of an institution.
D: Technology Factor	
BM1	Institutions that use the latest technology in their operational processes can generate research funding.
BM2	Technology is both a supplementer and complementary in the value chain of a higher educational institution.
BM3	Tech-enabled institutions can achieve their desired fee structures.
BM4	Institutions that use advanced technology are better in terms of research outputs.
E: Perceived Monopoly	
PM1	The strategic positioning of the institution impacts its market share.
PM2	Institutions that invest heavily in technology gain a competitive advantage.
PM3	Institutions with propriety technology or exclusive partnerships for technology control the access to top technology vis a vis other institution.
PM4	Government agencies prefer technology-enabled institutions for policy research.

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(measurement model analysis) and (b) analysis of the relationships among dependent variables and constructs through structural path analysis.

Table 2. Use of Technology in Teaching-Learning.

Description	Meagerly	Partially	Somewhat	Mostly	Fully
	% of respondents				
Engineering	20.2%	52.5%	17.2%	8.1%	2.0%
Science	15.5%	58.7%	15.2%	9.8%	0.8%
Management	14.2%	64.7%	14.2%	6.0%	0.9%
Mass communication	52.9%	26.5%	14.7%	5.9%	0.0%
Journalism	53.7%	22.4%	14.9%	7.5%	1.5%
Others	61.6%	28.1%	8.6%	1.7%	0.0%
Total	29.5%	48.2%	14.4%	6.9%	1.0%

Table 3. Use of Technology in Operations.

% age of Use	0-10%	10-30%	30-70%	70-90%	90-100%
% of respondents	44.3%	32%	18.7%	3.0%	2.0%

Results and Discussions

Adaption of Technology in Indian Higher Education Institutions

Table 2 presents the results of different benefits of technology in enhancing the important teaching-learning model to institutions, which may impact how institutions prioritize different aspects of their strategies. Most (47%) of the respondents believe that a lack of technological adaptation leads to poor global ratings. In interviews, the respondents opined that most of the Indian higher institutions that find a place in QS ranking, Times Higher Education Ranking etc. have adopted the latest technologies compared to their counterparts in the world as also highlighted in studies by Umarji (2021) and Kidwai (2023). A significant number of respondents (Somewhat 32%, Very Much 33%) believe that they are late in the implementation of technology. Much of this is attributable to the government policy initiative towards providing infrastructure and building the technology culture. We see that post-pandemic, the attitude of IHEs towards technology has changed dramatically. We observe that the application of technology in various teaching-learning processes is still low. Only 1.0% of the respondents fully use the technology 29.5% have meagerly used technology and 48.2% partially used technology along with the conventional teaching-learning mechanisms (Table 2). In management discipline, we find that a large number of institutions partially use technology, contrary to the notion that management education has fully leveraged technology. Further inquiry found that the major reasons for poor adoption of technology are poor infrastructure and lack of resources. Also, 2.0% of engineering institutions have fully used technology in teaching-learning processes. The use of technology in educational administration and operations % age-wise is shown in Table 2.

It can be seen that the use of technology for administrative and operational purposes is too low and a large number of administrative processes are still carried out manually, though the use of e-mails has been growing sharply. A study based on the technology acceptance model by Coman et al. (2020) shows that educators lack technical skills and resist change. Also, the adaptation to the technology-based environment is low or poor.

Technology as a Monopoly Force

The respondents' perceptions have been analyzed to determine whether technology plays an important role in enduring monopolies in institutions that subsequently help institutions internationalize. We find that 25% of the respondents strongly agree, and 26% of the respondents agree that technology adoption brings monology to higher educational institutions that can afford and provide suitable infrastructure to support technology.

Test of Model's Convergent validity and reliability

Evaluation of the Model's Convergent validity and reliability has been conducted using four prominent measures (a) Factor loadings, (b) Cronbach's Alpha, (c) Composite Reliability and (d) Average Variance Extracted (AVE) values as presented in Table 4. Table 4 shows that factor loadings for all items processed in the model are > 0.7 and significant at 1% ($p<0.01$). Furthermore, for all constructs together, Cronbach's Alpha coefficient is greater than 0.8, indicating consistency of latent variables' indicators, according to the framework of Hair et al. (2010).

Average Variance Extracted (AVE) values to examine the convergent validity have been computed. For all constructs under the model, AVE values are greater than the threshold proposed by Fornell and Larcker (1981) i.e.,

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0.5, providing strong evidence for the test of convergent validity, as shown in Table 4.

Table 4. Factor loadings, reliability and convergent validity test.

Construct	Loadings	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
A: Rating				
RA1	0.777	0.674	0.809	0.589
RA2	0.881			
RA3	0.623			
B: Accreditation				
AC1	0.867	0.609	0.782	0.549
AC2	0.657			
AC3	0.681			
C: Innovation				
INV1	0.794	0.575	0.759	0.522
INV2	0.516			
INV3	0.819			
D: Technology Factor				
BM1	0.723	0.688	0.811	0.519
BM2	0.625			
BM3	0.737			
BM4	0.788			
E: Perceived Monopoly				
PM1	0.981	0.941	0.959	0.857
PM2	0.739			
PM3	0.981			
PM4	0.977			

Table 5. Assessment of Discriminant Validity (Fornell and Larcker, 1981).

Parameters	Accreditation	Innovation	Perceived Monopoly	Rating	Technology Factor
Accreditation	**0.741**				
Innovation	0.304	0.722			
Perceived Monopoly	0.186	0.288	0.926		
Rating	0.452	0.157	0.130	0.768	
Technology Factor	0.449	0.378	0.451	0.368	0.720

Tables 5 and 6 show the discriminant validity using a correlation matrix that shows the squared correlations at the non-diagonal matrix locations and the AVE of each latent variable at the diagonal. All constructs confirm the discriminant validity. The AVE was greater than the squared correlation (Fornell and Larcker, 1981; Hair et al., 2010). The outcomes have also been validated by the Heterotrait-Monotrait (HTMT) ratio of correlation, the second discriminant validity measure. Higher specificity and sensitivity have been achieved by the HTMT matrix when compared to other discriminant validity measures, such as the Fornell-Lacker criterion (Henseler et al., 2015). Several authors have proposed a threshold of 0.9 for this criterion (Franke and Sarstedt, 2019; Henseler et al., 2015; Voorhees et al., 2016). Discriminant validity is validated if the HTMT value is below this cutoff (Table 4).

Path Analysis

The derived slope coefficients, t-test values and p values for the computed relationships between the perceived monopoly, accreditation, innovation, rating and the role of the technology factor are presented in Table 7.

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The results also depict the technology factor's moderating effect(s) on the relationships between accreditation, rating and perceived monopoly, respectively.

It has been observed that the relationships between accreditation, innovation, and rating with the technology factor are statistically significant at the 5% level.

Table 6. Assessment of Discriminant Validity (HTMT Criterion).

Parameters	Accreditation	Innovation	Perceived Monopoly	Rating	Technology Factor
Accreditation					
Innovation	0.401				
Perceived Monopoly	0.286	0.384			
Rating_	0.592	0.380	0.246		
Technology Factor_	0.600	0.521	0.542	0.511	

Table 7. Path Analysis.

Relationship	Slope coefficient	Standard error	t-statistics	P Values	Remarks
Accreditation -> Technology Factor_	0.279	0.09	3.108	0.002	Significant
Innovation -> Technology Factor_	0.261	0.081	3.226	0.001	Significant
Moderating Effect of Technology factor Accreditation - > Perceived Monopoly	-0.223	0.14	1.596	0.111	In significant
Moderating Effect of Technology factor in Rating - > Perceived Monopoly	0.023	0.14	0.165	0.869	Insignificant
Rating_ -> Technology Factor_	0.2	0.092	2.179	0.03	Significant
Technology Factor_ -> Perceived Monopoly	0.375	0.096	3.922	0	Significant

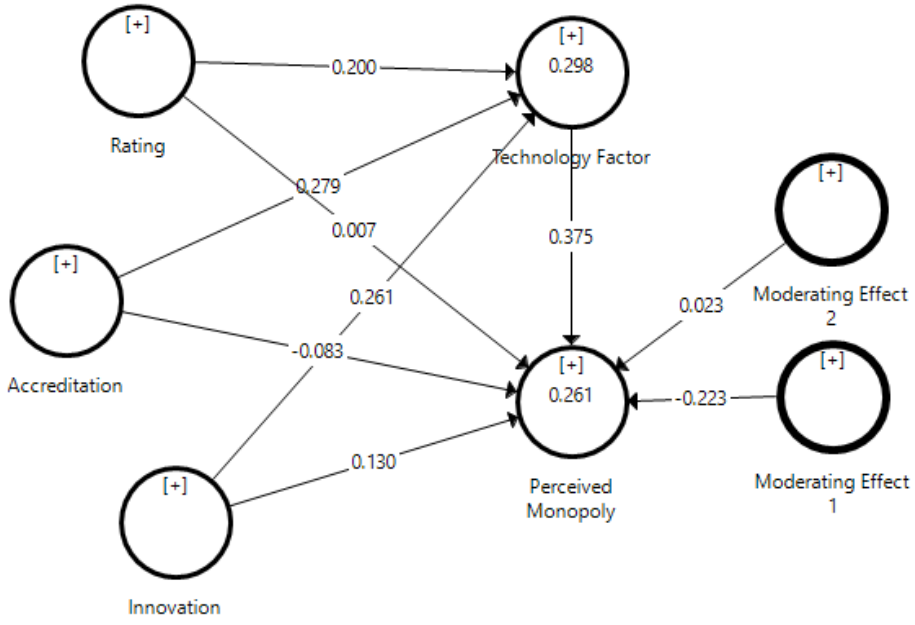

Figure 1. Realized SEM.

Moreover, the relationship between the "technology factor" and "perceived monopoly" in higher education institutions is significant ($p < 0.05$). Furthermore, we find no evidence of the moderating effect of the "technology factor" on the computed relationships between "accreditation" and "rating" with perceived monopoly. Figure 1 displays the results in the form of a structural model.

Table 8 presents the direct and indirect effects of the technology factor in the relationships involving accreditation, rating, innovation and perceived monopoly. The results support hypothesis 1, indicating that accreditation has an insignificant impact on perceived monopoly.

Table 8. Mediation Analysis.

Hypothesis	Path	Slope Coefficient	Sample mean	STDEV	t Statistics	P Values	Results
	Direct Effects						
H1	Accreditation -> Perceived Monopoly	-0.083	0.137	0.61	0.542	p>0.05	Insignificant
H2	Innovation -> Perceived Monopoly	0.13	0.13	0.998	0.319	p>0.05	Insignificant
H3	Rating -> Perceived Monopoly	0.007	0.177	0.04	0.968	p>0.05	Insignificant
Indirect Effects: Mediation Model							
H4	Accreditation -> Technology Factor -> Perceived Monopoly	0.105	0.047	2.25	0.025	P<0.05	Significant (Full Mediation)
H5	Innovation -> Technology Factor -> Perceived Monopoly	0.098	0.037	2.673	0.008	P<0.05	Significant (Full Mediation)
H6	Rating -> Technology Factor -> Perceived Monopoly	0.075	0.039	1.911	0.057	P>0.05	No Mediation

Specifically, results reveal that the slope coefficient of accreditation concerning perceived monopoly is not statistically significant (-0.083; $p > 0.05$). However, with the presence of the technology factor in the relationship, it becomes significant at the 5% level, confirming the full mediation of the technology factor in the relationship between accreditation and perceived monopoly. Further, the direct relationship between innovation and perceived monopoly is found to be insignificant (slope coefficient = 0.13, $p>0.05$). While in the presence of the technology factor, this relationship becomes significant ($p<0.05$), affirming the full mediation of the technology factor in the connection between innovativeness and perceived monopoly, supporting hypothesis 5. However, the results indicate no mediation of the technology factor in the relationship between rating and perceived monopoly, as both the direct and indirect effects were insignificant. It is inferred that accreditation and innovation do not significantly affect the perceived monopoly of higher educational institutions, but with the intervention of technology, monopolization is demonstrated.

The pricing structures of some institutions inherently load the cost of technology in various forms, making them monopolizing but infeasible to larger masses (Chattopadhyay, 2007). In our study, we do not find a significant impact of rating on creating monopolies, but the parameters of rating include research that is believed to be dominated by technology. The argument for low-cost, affordable technology is valid in developing countries like India (Haleem et al., 2022). Some authors have established that the digital transformation of higher educational institutions is essential to make them innovative (Kaputa et al., 2022). To achieve this transformation, technology orientation is essential. Shaposhnikov et al. (2022) have argued that for contemporary response to the industry requirements, the higher education ecosystem in the country should foster technology-based innovative development of institutions. While state-structured monopolies may be relevant in regional contexts (Mitsopoulos & Pelagidis, 2011b), they

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lose importance globally. This implies that the whole higher education system should significantly structure technology in the education delivery model so that institutions can compete and grow within the country and in a globalized context.

Conclusion

We find that technology-based monopolization built upon financial powers is a major deterrent to Indian higher education institutions in an international context. We suggest that global accrediting and ranking institutions must account for this aspect and that international bodies endeavour to provide a level playing field for poor and developing countries. The study finds that institutions that adopt proprietary technology and have larger technology budgets may gain a competitive advantage over other institutions, leading to monopolization. The study shows that institutions with exclusive partnerships with technology companies, control over data, ownership of intellectual property rights to technology, and access to top technology talent may gain significant advantages over other institutions. This can lead to a monopoly in the higher education market, making it difficult for other institutions to compete and limiting the choices available to students.

The observations from the results of our study carry significant implications for policymakers and higher education leaders. It suggests that policymakers carefully consider the potential for technology to contribute to monopolization in higher education and take steps to promote competition and ensure that students have access to a diverse range of educational options. Higher education leaders must ensure that their technology strategies align with their mission and values and do not contribute to monopolization. This manuscript highlights the need for a more critical examination of technological intervention in higher education in developing countries like India and its potential impact on competition and monopolization. Our study provides an impetus to the positioning of technology in the educational delivery and administration model to all stakeholders viz., HEIs themselves, government, policymakers and society as a whole.

Conflict of interest

None

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