DESIGNING A MODEL FOR AUGMENTING QUALITY IN HIGHER EDUCATION (AQHE) IN INDIA:AN EMPIRICAL STUDY OF ENGINEERING INSTITUTIONS

For the degree of Doctor of Philosophy

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DECLARATION

l hereby declare that this thesis "DESIGNING A MODEL FOR AUGMENTING QUALITY IN HIGHER EDUCATION (AQHE) IN INDIA: AN EMPIRICAL STUDY OF ENGINEERING INSTITUTIONS" is an original work done by me for Degree of Doctor of Philosophy in Management. I also declare that thesis or any other part of it has not been submitted by me award of any other degree, diploma, title or recognition before.

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DATE-26th Oct 2023

CERTIFICATE

Certified that the thesis titled "DESIGNING A MODEL FOR AUGMENTING QUALITY IN HIGHER EDUCATION (AQHE) IN INDIA:AN EMPIRICAL STUDY OF ENGINEERING INSTITUTIONS" which is being submitted by Ms. Alka Pandita in fulfilment of the requirements for the award of degree of Doctor of Philosophy in Management, Thapar Institute of engineering and technology, Patiala is the record of the candidate's own work carried out under my supervision and guidance. The matter embodied in the thesis has not been submitted in part or full to any other institution or university for any other degree.

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"Believe you can and you're halfway there." - Theodore Roosevelt

Completing this journey fills me with joy, as I reflect on the past and express gratitude to all those who have motivated and supported me in achieving my goals.

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ABSTRACT

The role of engineers in creating employment opportunities and contributing to a country's growth is crucial. Therefore, it is imperative to examine the current state of engineering education to ensure its quality and relevance in addressing the challenges of the dynamic 21st century, influenced by globalization. With the rising number of engineering institutions in India surpassing the demand, the significance of quality becomes paramount in today's competitive business environment. The notion of quality in technical education is gaining global recognition and Indian providers of technical education have also recognized the need for quality education to sustain their institutions and produce competent engineers.

The year 1990 holds significant importance in the history of higher education quality assurance. It marked a turning point when the federal Department of Education in the United States recognized accrediting organizations that assess institutional performance based on student learning outcomes. This recognition paved the way for the development of new quality assurance agencies and practices, although there was initial resistance and a need for improvements. Over time, there has been a growing emphasis on reviewing the quality of student learning, particularly through institutional accreditation, which traditionally focused on resources and strategies. This shift towards outcomes has also been observed in quality reviews of universities worldwide. India, too, is embracing this new approach to measuring and ensuring quality.

The present study aims to develop a model for augmenting the quality of higher education (AQHE) in India. This empirical research relies on a literature survey to identify and select critical success factors (CSFs) relevant to the study. The study investigates the interactions among these CSFs to implement the AQHE model, focusing on the perspectives of faculty members and students from technical institutes in five selected states of India. The ultimate goal is to improve the performance of higher education institutions (HEIs). This study holds great importance as the performance of higher education has a substantial impact on individuals, institutions and society as a whole.

The final structural model highlights the significance of several critical success factors in higher education, including academic culture, academic environment, academic operations, student

engagement, learning assessment, student satisfaction, employability of students, employee involvement, employee attraction and transnational branding of institutions. This information can be utilized by institutions to establish performance management systems, implement quality assurance frameworks, enhance student retention rates and effectively integrate new technologies. Consequently, the study offers a validated model that can guide planners in the higher education sector, enabling them to strategically focus on specific critical success factors and improve the overall performance of Higher Education Institutions (HEIs).

LIST OF ABBREVIATION

FICCI	The Federation of Indian Chambers of Commerce and Industry Ernst & Young
HEI	Higher Education Institute
CSF	Critical Success Factor
AC	Academic Culture
AE	Academic Environment
AO	Academic Operations
TLP	Teaching Learning Pedagogies
SS	Student Satisfaction
SE	Student Engagement
LA	Learning Assessment
CS	Career Service
SSE	Skill Set for Employability
EA	Employee Attractiveness
SP	Student Perspective
FP	Faculty Perspective
EP	Employer Perspective
SUSP	Sustainability Perspective
PLS	Partial Least Squares
TQM	Total Quality Management
ISO	International Standard organisation
CR	Composite Reliability
AVE	Average Variance Extracted
EFQM	European Foundation for Quality Management
UGC	University Grants Commission

UoE	University of Excellence
NEP	National Education Policy
IEQMS	Integrated Educational Quality Management System
AQHE	Augmenting Quality in Higher Education
EI	Employee Involvement
ICT	Information And Communication Technology
IT	Information Technology
ITQM	Integrated Total Quality Management
EMS	Environmental Management System `
QMS	Quality Management System
OHSAS	Occupational health and Safety Management System
ISM	Interpretive Structural Modeling
KM	Knowledge management
AI	Artificial intelligence
ML	Machine learning
IISER	Indian Institutes of Science Education and Research
R&D	Research and development
CLOs	Course learning outcomes
NASSCOM	National Association of Software and Services Companies
NIRF	National Institutional Ranking Framework
UNESCO	The United Nations Educational, Scientific and Cultural Organization
MHRD	Minister of Human Resource Development
CMB	Common method bias
PLS-SEM	Partial least squares structural equation modelling
CB-SEM	Covariance based structural equation modeling
AMOS	Analysis of Moment of structures
NGO	Non-governmental organization
IIT	Indian Institute of Technology
IIM	Indian Institute of Management
EEIs	Engineering Education Institutes

CHAPTER 1

INTRODUCTION

Quality is the degree to which something meets or exceeds established standards, expectations, or requirements. It refers to the characteristics, features, or attributes of a product, service, process, or experience that make it reliable, effective, efficient and desirable. In the context of higher education institutes, quality can be assessed based on various factors such as the academic standards, faculty expertise, curriculum design, infrastructure, student support services, research output and overall reputation. A high-quality higher education institution would demonstrate excellence in these areas, providing students with a valuable and comprehensive education that prepares them for their chosen careers or further academic pursuits.

Section 1.1 presents the Higher Education Scenario. Section 1.2 highlights the Emerging issues in HEIs; next section 1.3 indicates the Current scenario of Indian higher education. Section 1.4 deals with Education Policy (NEP) and future of Higher Education in India. Section 1.5 provides the Rationale for the study, which is followed by Objectives of the study presented in section 1.6. Section 1.7 provides details of Base Model; Critical Success Factors & Performance Indicators used in current Research.

1.1 Higher Education Scenario

In the context of higher education, where the processes are intangible, there is ongoing debate about the philosophy of educational excellence (Green, 1994; Harvey, 1995). Fincher observes the evolution of quality perspectives in higher education, transitioning from an emphasis on experience to technique, style and eventually process (Fincher, 1998). The multifaceted nature of quality leads to varying interpretations, causing confusion as individuals perceive quality differently (Shields, 1999).

Some researchers (Jongbloed *et al.*, 2008; Owlia & Aspinwall, 1996) emphasize the significance of quality by identifying the customers or stakeholders of higher education. In this context,

students enrolled in educational programs are considered as the primary external customers, while employers and parents are considered as secondary external customers. Other entities such as the government, alumni and the labor market are regarded as tertiary external customers. On the other hand, the teaching staff are considered the internal customers. In the case of technical higher education, engineers are the primary external customers of educational institutes, as they play a crucial role in creating employment opportunities. Therefore, it becomes imperative to examine the ongoing trends in engineering education to ensure its quality and relevance. Quality assumes a pivotal role in today's fiercely competitive global business environment and India has also recognized the importance of quality in technical education for the sustenance of educational institutions.

In a changing global environment in terms of the needs of the students, Total Quality Management (TQM) is being looked at as one of the appropriate techniques to deal with the challenges in the market, as well as the stakeholders (Hoque *et al.*, 2017). TQM has been considered as a main technique in upgrading and sustaining quality in higher education (Jasti *et al.*, 2022). All over the world, in the field of higher education (HE), TQM has also been broadly and intensively adapted and experimented upon by developed countries like Japan, USA and UK. In India too, high-quality engineering education is becoming increasingly important due to internationalization and the worldwide requirement for quality technical personnel (Pal Pandi *et al.*, 2014).

There are various models for quality of higher education that have been proposed and studied in literature. Some of the commonly studied models include: *Six Sigma*, which used to improve student satisfaction, reduce dropout rates and enhance the overall quality of education. In higher education institutes, ISO 9001 can be used to increase the quality of teaching, research and administrative processes. It is an international standard for quality management that presents a framework for organizations to determine and uphold a quality management system. *Baldrige Performance Excellence Framework* is a comprehensive framework for organizational performance excellence that includes seven categories: leadership, strategy, customers, measurement, analysis and knowledge management, workforce and operations. This framework can be used to enhance the performance of higher education institutions. *European Foundation for Quality Management (EFQM) Excellence Model* is a holistic framework for organizational

excellence that comprises of nine criteria. These are: leadership, strategy, people, partnerships and resources, processes, products and services, customer results, people result and society results. This model can be used to evaluate and improve the performance of higher education institutions. In general, these models provide frameworks for continuous improvement and can be used to evaluate and improve the performance of higher education institutions.

1.2 Emerging Issues in HEIs

It has been observed that student satisfaction is directly linked to the quality of engineering institutes. Therefore, stakeholders strongly advocate for employability and believe that engineering education should prioritize quality and the ability to produce a larger number of employable students who meet global organizational needs (Cheng *et al.,* 2016). To enhance education quality, institutions must adopt a benchmarkingapproach that can be followed by all institutions worldwide. This approach should include essential criteria such as autonomy in strategic decision-making, academic planning, curriculum development and the implementation of rigorous accreditation standards to transform the teaching-learning process (Scheerens et al.,2004.). In India, it has been noted that the curriculum offered by many higher learning institutions, particularly in engineering, does not meet global standards. Thus, the lack of comprehensive quality management models in Higher Education Institutes (HEIs), particularly in engineering education, has become a prominent issue (JagadeshKumar, 2020). The inadequacy of quality in engineering education necessitates a revitalization of existing concepts within engineering educational institutions.

There has been a growing emphasis on reviewing the quality of student learning, particularly in the United States, where institutional accreditation has increasingly focused on the need for institutions to demonstrate and provide tangible evidence of student learning outcomes (Goss, 2022). The decline in quality in engineering education highlights the need to revitalize existing engineering educational institutions (EEIs) through the adoption of a structured and integrated quality management model (Choudhury, 2015). This trend has also been reflected in quality reviews of universities around the world. India has also recognized the importance of this new approach to measuring quality (Fernandes & Singh, 2022).

Specialized literature presents significant areas that need to be studied to understand some critical differences between the higher education quality assurance world of 1990 and today. This shift includes changes in the contemporary academic culture prevailing in the Higher Education Institutes which involves massive apprehension for faculty development and advanced teaching and learning pedagogies implemented in universities. All these changes result in augmenting the quality of higher education and another significant issues, i.e., student and employee experiences (Sattler & Sonntag, 2018).

According to Barnett, higher education serves multiple purposes, including the production of qualified manpower, training for research careers, efficient management of teaching provisionsand extending life chances (Benett, 1994). Transforming our higher education institutions into world-class centers of learning will promote high-quality education, scholarship and research. It will also nurture informed citizens with strong moral and ethical values, fostering a tolerant and pluralisticsociety deeply rooted in culture. India, as a progressing nation, has made significant strides in thefield of education since gaining independence. It has made efforts to reach all segments of society,driven by improvements in the country's economy, advancements in communication technologyand the advent of the internet. The educational sector has experienced remarkable growth as a result. However, the overall state of higher education in India does not yet meet global quality standards. Therefore, there is a compelling need for increased assessment of the quality of educational institutions in the country.

In the past, the perception of quality in higher education was often based on internal resources such as the qualifications and experience of faculty members, the availability of books and journals in the library and the presence of modern infrastructure (Salilul *et al.*, 2016). Another approach was to measure quality by the outcomes, such as producing well-educated, highly satisfied and employable graduates. However, the understanding of quality in higher education has evolved into a multidimensional concept. According to UNESCO (1998), quality in higher education encompasses various aspects, including teaching and academic programs, research and scholarship, faculty and staff, students, facilities and infrastructure, community services and the overall academic environment (World Conference on Higher Education in the Twenty-first Century: Vision and Action, 1998). Among these, special attention is given to the quality of

teachers. It is crucial that faculty members possess professional competence and dedication to their roles. A university teacher has a profound influence beyond teaching, contributing to enlightenment, stability, good conduct and national unity (Conderman & Mccarty, 2003).

To improve the quality of education in engineering institutions, it is crucial for them to embrace benchmarking practices that can serve as a global standard. This practice should encompass several key criteria, including the ability to autonomously develop strategic plans, make academic decisions, design curricula and enforce rigorous accreditation standards to foster a universally effective teaching and learning environment (Surenderkumar & Priya, 2017). The curriculum offered by many higher education institutions in India, particularly in the field of engineering, falls short of international benchmarks (Chhokar, 2010). This discrepancy stems from the absence of suitable and comprehensive quality management models in these institutions, specifically within engineering education.

1.3 Current scenario of Indian higher education

The significance of higher education in India's efforts to position itself as a global hub of knowledge cannot be emphasized enough. The competitiveness of the economy and its capacity to generate employment are deeply intertwined with the presence of well-trained and proficient professionals. Nonetheless, until just a decades ago, the condition of higher education in Indiawas disheartening. Shockingly low enrollment rates were observed in nearly half of the districts, severely limiting the pool of qualified and skilled individuals (‘Educational statistics at a glance’ report by Government of India Ministry of Human Resource Development Department of School Education & Literacy Statistics Division New Delhi 2018). Indian technical universities assume a pivotal role in disseminating technical education and training to students across the nation. Nevertheless, concerns have emerged regarding the caliber of higher education providedby these institutions. Several key issues and challenges directly impact the quality of higher education in Indian technical universities.

Outdated Curriculum: The curriculum in Indian technical universities is often outdated and does not keep up with the changing industry requirements. As a result, students are not equipped with the latest skills and knowledge that are in demand in the job market. Indeed, the issue of an outdated curriculum is one of the significant challenges that directly affect the quality of higher

education in Indian technical universities (Kandiko Howson & Kingsbury, 2021). There are several other issues and challenges that contribute to the overall quality of education in Higher Education institutions. Some of them are:

Lack of Industry-Integration: Indian technical institutes often struggle to bridge the gap between academia and industry. The curriculum might not incorporate enough practical training, internships, or industry projects, leaving graduates with theoretical knowledge but inadequate practical skills (Büth *et al.,* 2017; Goyal and Sharma, 2020; Parry, 2022).

Faculty Quality and Training: The quality of faculty plays a crucial role in delivering a comprehensive education. Inadequate faculty training, a shortage of experienced professors and outdated teaching methodologies can hinder the effectiveness of education (Gore *et al.,* 2017).

Research and Innovation: A thriving education system should encourage research and innovation. However, many technical universities in India may lack sufficient funding and facilities for research, limiting opportunities for students and faculty to contribute to advancements in their respective fields (Biasi *et al.,* 2021).

Assessment and Evaluation: Evaluation methods may not always be up to the mark, relying heavily on rote memorization and exams rather than practical application and critical thinking. This approach does not effectively assess a student's true understanding and problem-solving abilities (Wanzer, 2021).

Infrastructure and Facilities: Inadequate infrastructure and outdated facilities can hinder practical learning experiences. Modern technical education often requires state-of-the-art laboratories and equipment, which might be lacking in some institutions (Barrett *et al.,* 2019).

Limited Industry Collaboration: The collaboration between technical universities and industries is essential for curriculum design, internships and job placements. Insufficient industry collaboration can lead to a mismatch between what students learn and what employers expect (Valiente Bermejo *et al.,* 2022).

Access to Digital Learning: In the digital age, access to online resources and digital learning platforms is crucial for students to stay updated with the latest advancements. Uneven access to digital infrastructure and resources can be a hindrance (Haleem *et al.,* 2022).

Limited Focus on Soft Skills: While technical skills are essential, soft skills like communication, teamwork and problem-solving are equally crucial for a successful career. A curriculum that neglects the development of these skills may leave graduates ill-prepared for the real world (Ra *et al.,* 2019).

Addressing these challenges will require a comprehensive effort from the government, educational institutions, industries and stakeholders to ensure that technical education in India stays relevant, modern and of high quality. Despite these challenges, several initiatives and reforms were underway to enhance the quality of higher education in Indian technical universities. The government launched several programs and initiatives to promote research and innovation and there was a growing emphasis on providing students with industry exposure through internships and other experiential learning opportunities. Additionally, there was a growing trend towards public-private partnerships in higher education, which could bring in more resources and expertise to improve the quality of education provided by technical universities. It is important to discuss the new education policy (NEP) 2020 to help take the research in the right direction.

1.4 New Education Policy (NEP) and future of Higher Education in India

The National Education Policy (NEP) 2020, a forward-thinking document aimed at revolutionizing the Indian education landscape, emphasizes various aspects that Education 4.0 and the future of education (National Education Policy 2020 Ministry of Human Resource Development Government of India, 2020). This includes promoting flexibility and customization in learning, enhancing the overall student experience and integrating technology effectively. The implementation of this policy has the potential to formally regulate and drive the future of education in a sustainable and progressive direction. NEP 2020 proposes a comprehensive revision of the education structure, including regulations and governance, aiming to create a new system that aligns with the aspirations of 21st century education while respecting India's traditions and values. Online learning has undergone significant changes both in India and globally, with regulators accepting online degrees as a viable alternative to traditional classroom learning. HEIs now have greater flexibility to incorporate online learning components into regular programs. Online learning companies and global universities are innovating to provide unique student experiences through online programs, pedagogies and content.

The higher education is confronted with new global challenges worldwide, including in India. The nature of knowledge has undergone significant changes due to the dynamic and interconnected phenomena in the real world. The emergence of interconnected networks of

knowledge, facilitated by new technologies, has resulted in a vast wealth of information.However, no single discipline can generate sufficient and comprehensive knowledge about these interconnected phenomena or provide solutions to the complex problems of the real world. Considering this, the University Grants Commission (UGC) in India aims to identify universities among the University of Potential Excellences (UPEs) that have already demonstrated excellence and innovation in teaching and research to a significant extent, having completed the first or second phase under the Scheme. These selected universities will be designated as University of Excellence (UoE). The UoE will prioritize interdisciplinary innovative teaching, research and innovative programs. They are envisioned to become true "centers of knowledge creation" alongside their role as "centers of knowledge dissemination (Bureau, 2012-2017).

Education institutions and regulatory bodies now have the ability to embrace emerging technologies and processes at a much faster pace compared to when computer education first arrived in India several decades ago. This transformative journey has been further accelerated by the impact of the pandemic and subsequent global lockdowns. The structure of the education system, including learning methodologies, teaching techniques and assessment approaches, has undergone significant changes due to the rapid shift towards online education. Many HEIs have had to quickly adapt to remote learning measures without sufficient time to upgrade their infrastructure and systems to fully support this model.

In the present era, evolution is occurring at an accelerated pace, with changes now unfolding within years rather than centuries. Bonfield et al. (2020) highlights a transformative shift, within the future ecosystem of Education 4.0, where the learner occupies a central position. In Education 4.0, learning revolves around the learner, with a strong focus on their needs and preferences. The learner actively demonstrates their learning and takes charge of their educational journey, determining what, where, when, how and why they engage in learning as they progress along the educational path. This shift towards learner-centricity has been primarily driven by increased innovation in teaching methods, the desire for an enhanced higher education experience and the availability of improved learning opportunities supported by technology (Brinkmann, 2015).

Within this paradigm, it is crucial for higher education institutions (HEIs) to redefine the

education ecosystem by enhancing the overall student learning experience. This includes placing a strong emphasis on fostering employability skills and creating avenues for research excellence. HEIs need to go beyond traditional teaching methods and strive to create a holistic environment that equips students with the necessary knowledge, skills and practical experiences to thrive in their future careers (Miseliunaite *et al.*, 2022). By prioritizing employability and research opportunities, HEIs can ensure that students are well-prepared for the challenges and demands of the evolving professional landscape.

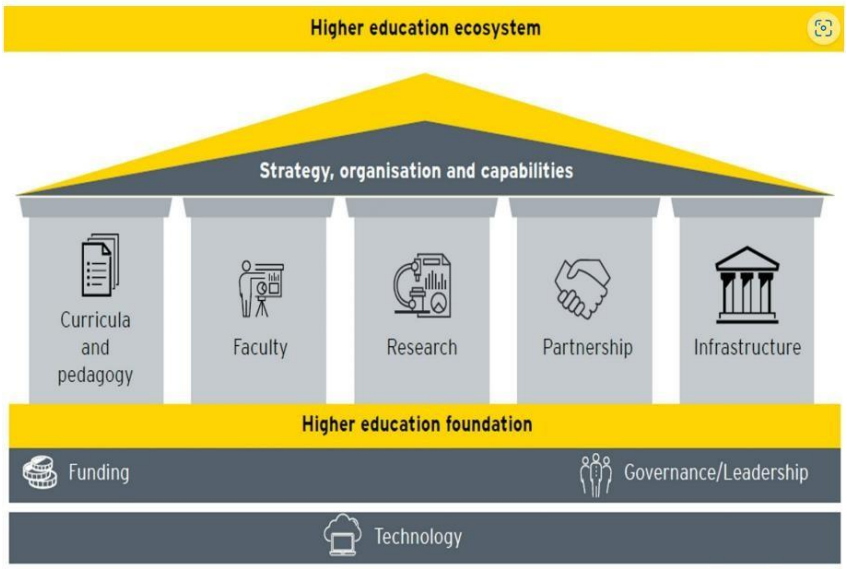

Figure 1.1: FICCI Higher Education Summit, 2021
Source: (*Higher Education in India: Vision 2040*, 2021)

Education 4.0 places significant importance on assessing and comprehending the elements that are sustainable for the future. This involves identifying global best practices, considering stakeholder perspectives and adapting to the evolving regulatory environment. To thrive in the "new normal," HEIs should reevaluate existing models and embrace sustainable, innovative practices that prioritize the student experience. Furthermore, it is essential to provide adequate support to faculty and staff during the transition to Education 4.0, enabling them to effectively navigate and contribute to the evolving educational landscape. By embracing these approaches, HEIs can successfully adapt to the changing educational paradigm and provide a student-centric learning environment.

As per the figure 1.1, the future of Indian higher education is promising, with several initiatives

and reforms underway to enhance the quality and accessibility of education. The following are some of the key points that are shaping the future of Indian higher education (*Higher Education in India: Vision 2040*, 2021):

i. *Digital Transformation:* COVID-19 pandemic has accelerated the adoption of technology in higher education. Online learning, virtual classrooms and digital assessments have become the new norm. The future of Indian higher education is likely to be more digitally enabled, with the integration of emerging technologies such as artificial intelligence (AI), machine learning (ML) and blockchain.
ii. *Skill-based Education:* The Indian government has launched several initiatives to promote skill-based education and vocational training. The future of Indian higher education is likely to focus more on providing job-oriented education and skills that are in demand in the job market.
iii. *Interdisciplinary Education:* The boundaries between different disciplines are blurring and the future of Indian higher education is likely to embrace interdisciplinary education. Institutions are likely to offer more flexible and customizable programs that allow students to combine different fields of study.
iv. *Internationalization*: India is gradually becoming a hub for international education. The future of Indian higher education is likely to witness more collaborations and partnerships between Indian and foreign institutions. Internationalization will also provide Indian students with more opportunities to study abroad and gain global exposure.
v. *Research and Innovation*: The future of Indian higher education is likely to focus more on research and innovation. The government has launched several initiatives to promote research and innovation, including the establishment of research parks and incubation centers. Institutions are likely to focus on research-based education and develop a culture of innovation.

The progress made by higher education institutions (HEIs) in various educational paradigms has been commendable, but there is still a long way to go. The global education sector, including India, has undergone a monumental transformation. The year 2020 has been unprecedented in history, accelerating the pace of change in the education system due to the pandemic and the introduction of the National Education Policy 2020 (NEP 2020).

With the advent of Education 4.0, India has introduced its third NEP, seeking to further transform the education system and provide quality education to all. The policy identifies existing gaps and proposes reforms to ensure high-quality, equitable and integral education from early learning to higher education. It recognizes the driving forces behind Education 4.0 and aims to accelerate its adoption in India through various interventions. The policy emphasizes a shift from content-based and rote learning to critical thinking, problem-solving, innovation, creativity and multidisciplinary knowledge. It also acknowledges the impact of technology and digital platforms on education, particularly in higher education and highlights the potential to leverage them to reach underrepresented and disadvantaged areas.

1.5 Rationale for the study

Higher education institutions are operating in a dynamic environment and have to strive constantly for excellence. In view of the challenges faced by HEIs, identification and understanding the critical success factors that contribute to the success of these institutions becomes extremely important. Thus, on the basis of earlier studies it becomes vital to examine which are the critical success factors and how are they related with performance indicators. The rationale of the study is not only to identify various critical success factors but examine their importance comprehensively and understand their interplay in shaping the success of higher education institutions. The landscape of higher education is constantly evolving, with changing student demographics, technological advancements and global market demands. Institutions need to adapt to these changes to remain relevant and competitive. For example, fostering a conducive academic culture through academic environment, optimizing academic operations and adopting new teaching and learning pedagogies. Students are at the center of higher education institutions and their success is a key indicator of institutional effectiveness. Thus, another critical factor is ensuring student satisfaction through student experience, implementing effective learning assessments and improving employability of students by providing career services and skill sets. The third critical factor influencing higher education is employee attractiveness as providing the best facilities and retaining talented employees will assist in improving quality in higher education institutions. The last factor is branding as building a strong institutional brand can all contribute to the overall success and effectiveness of higher education institutions. Many earlier studies

measure performance of higher education institutions through Kaplan & Norton (1992) Balanced Score Card. The study would try to analyse this through perception of all stakeholders, which is another research gap in earlier studies. Does the answer lie in measuring performance through a consolidated public performance scale covering faculty perspective, student perspective, employee perspective along with sustainability perspective? All these need to be examined in view of changes happening in the education sector.

Findings from this study can provide evidence-based insights to institutional leaders, policymakers and stakeholders for making informed decisions about resource allocation, strategic planning and policy formulation. The justification of the study is to contribute to the existing literature, enhance institutional effectiveness, improve student outcomes and respond to the changing educational landscape. The findings from this study will provide valuable insights for institutional leaders, policymakers and stakeholders to make evidence-based decisions that can contribute to the success and sustainability of higher education institutions. Thus, there is enough scope for undertaking research and design a model for augmenting quality in higher education (AQHE) considering the relation of Critical success factors with performance of higher educational Institutions. Based on the above rationale the current study has been undertaken with objectives mentioned in section 1.6.

1.6 Objectives of the Study

The present study has been undertaken with the following objectives:

O1: To analyze the relationship between Academic Culture and Student Satisfaction.

O2: To analyze the relationship among Academic Culture, Student satisfa. alction and PublicPerception.

O3: To analyze the relationship between Transnational Branding and Student Satisfaction.

O4: To analyze the relationship among Transnational Branding; Employee Attractiveness and Public Perception.

O5: To design a model for augmenting quality in higher education in Engineering Institutes in North India.

1.7 Base Model; Critical Success Factors & Performance Indicators used in current Research

This research focuses on designing a model for enhancing the quality of the Higher Education system in India, which will boost our engineers' ability to face competition and thus improve excellence in every sphere of trade and commerce. This research has been undertaken to design a holistic model- Augmenting Quality in Higher Education (AQHE) which will help augment the quality in Engineering Educational Institutes (EEIs) in India. Enhanced quality willboost the ability of our engineers to face competition and improve excellence in every sphere of trade and commerce. This model will embrace a balanced emphasis among the different core functions of EEIs to provide a basis for developing an environment conducive to their implementation. This research has referred to the IEQMS (Integrated Educational Quality Management System) model, which is a comprehensive framework for augmenting the quality ofhigher education (Pal Pandi *et al.*, 2014). The model is based on the principles of Total Quality Management (TQM) and provides a structured approach to quality management in higher education institutions. The IEQMS model consists of the following critical success factors:

- Leadership and Management: This component focuses on the role of leadership in establishing and maintaining a culture of quality within the institution. It involves the development of a quality policy, quality objectives and a quality management system that is aligned with the institution's strategic plan.
- Curriculum Development and Delivery: This component focuses on the development and delivery of a curriculum that is relevant, up-to-date and meets the needs of the stakeholders. It involves the use of student feedback, industry input and faculty expertise to continuously improve the curriculum.
- Student Support and Development: This component focuses on the provision of support services to students that promote their academic and personal development. It involves the development of student-centered support services, such as counseling, mentoring and career services.
- Faculty Development: This component focuses on the development of faculty members through training, professional development and recognition of their contributions to the institution. It involves the establishment of a culture of continuous improvement and the

recognition of faculty excellence.

- Research and Innovation: This component focuses on the promotion of research and innovation within the institution. It involves the development of research policies, the provision of resources for research and the establishment of partnerships with other institutions and organizations.
- Infrastructure and Facilities: This component focuses on the provision of infrastructure and facilities that support the academic and research activities of the institution. It involves the maintenance and improvement of facilities, such as laboratories, libraries and classrooms.
- Stakeholder Engagement: This component focuses on the engagement of stakeholders, such as students, faculty, staff, alumni and the community. It involves the establishment of mechanisms for communication, feedback and collaboration with stakeholders.

The IEQMS model provides a comprehensive framework for augmenting the quality of higher education. It emphasizes the importance of leadership, curriculum development and delivery, student support and development, faculty development, research and innovation, infrastructure and facilities and stakeholder engagement in the pursuit of quality in higher education institutions.

Critical Success Factors: Extensive literature has led to the figuring out some new and some current CSFs which were not covered in depth in the earlier models. This study is based on the CSFs mentioned below, using IEQMS as a base model.

Table 1.1 : Critical Success Factors considered in the study

Critical Success Factors		KPI: Public Perception
Academic Culture	Academic Environment Academic Operations Teaching and Learning Pedagogies	Student /Faculty Perception
Student Satisfaction	Student Engagement Learning Assessment Skill sets for Employability.Career Services	Student Perception/Employer Perception
Employee Attractiveness	Employee Involvement in Decision-MakingEmployee Recognition and Rewards Professional Development Opportunities	Faculty Perception
Branding	Participation in Ranking and Reputation Social Media Engagement and OnlinePresence Partnerships and Collaborations	Sustainability Perception

These critical success factors (CSFs) include Academic Culture (AC). Academic culture has been studied by researchers earlier, but the proposed research has focused on sub-constructs that include academic environment; academic operations and advanced teaching and learning pedagogies. Another critical factor which has been identified is Student satisfaction (SS). Student Satisfaction has been identified as the outcome of student engagement (SE), learning assessment (LA) and employability of students (ES). Employability aspect covers skill sets for employability and career services. Employee Attractiveness is another CSF considered in the present study. It covers: Employee Involvement in Decision-Making; employee recognition and rewards; and professional development opportunities. Transnational branding is a new CSF considered in this study, which along with partnerships and collaborations also includes participation in rankings and reputation, social media engagement & online presence. Public perception (PP) identified as a key performance indicator has lot of roles to play in perceiving the quality standards of the HEIs and thus act as measuring technique to sustain the quality management-controlled strategies and procedures.

Academic Culture (AC) refers to the values, beliefs and attitudes that shape the academic community's behavior and interaction (Mollo, 2021). In India, academic culture plays a vital role in promoting academic excellence, research and innovation (Bai Gokarna *et al.,* 2021). While leadership is a topic that has been extensively studied, the focus on leadership in academia has received increased scholarly attention only in recent times (Braun *et al.,* 2016; Lawton-Misra & Pretorius, 2021). Academic leaders face ongoing challenges in effectively managing autonomy, navigating change and addressing uncertainty (Braun *et al.,* 2016). Autonomy holds a central position in academia as it is closely intertwined with the identity of academics (Henkel, 2005). Accordingly, academics can determine how to work and are barely constrained by organizational structures. Second, change is a further element which constantly needs attention from academic leaders because universities are required to not only initiate change but also respond to changes in society (Burkhardt, 2002). Lastly, uncertainty remains a fundamental challenge for academic leaders because research success and academic career paths lack predictability (Corley, 2010; Smith & Hughey, 2006). These challenging conditions put substantial responsibility on leaders in academia. It is important to differentiate between administrative, formal leader roles (e.g., Head of Department, Academic Dean or Vice-Chancellor1) and research leader roles in typically rather informal settings (e.g., Professors who lead a research project and guide junior scientists).

Academic leader is responsible for academic culture, academic environment and academic operation of the HEIs (Rehbock, 2020).

The physical and social surroundings that create a conducive atmosphere for learning, research and academic activities constitute ***Academic Environment (AE)*** (Closs *et al.*, 2022). In India, the academic environment varies significantly across institutions, with some institutions offering world-class facilities and infrastructure, while others struggle with inadequate resources. A positive academic environment is crucial in fostering academic excellence, promoting research and attracting quality faculty and students (Divaris *et al.*, 2008). The role of academic leaders cannot be ignored in fostering a conducive academic environment. Additionally, a supportive academic environment also helps in nurturing a sense of community and promoting collaboration among students and faculty.

Academic operations are critical in ensuring that institutions operate efficiently, effectively and sustainably. The academic operations include admission and enrolment procedures, curriculum design and delivery, faculty hiring and retention, student support services and research administration (Shrivastava & Shrivastava, 2022). Effective academic operations help institutions in providing quality education, promoting research and maintaining institutional credibility and reputation (Fomba *et al.*, 2023).

Prior studies have established the fact that academic culture via academic environment and academic operations are critical factors that impact higher education (Gallant & Rettinger, 2022). A positive academic culture, supportive academic environment and effective academic operations help in promoting academic excellence, research, innovation and overall institutional growth and development (S. Yang & Wang, 2022). Institutions that prioritize these factors have a competitive edge in attracting quality faculty and students, enhancing institutional reputation and credibility and contributing to India's knowledge economy (Buitrago R. & Barbosa Camargo, 2021).

Advanced teaching and learning pedagogies (TLP) refer to innovative and effective approaches used in education to enhance the teaching and learning experience (Naga Subramani & Iyappan, 2018). These pedagogies go beyond traditional methods and incorporate modern technologies, research-based strategies and student-centered approaches to promote active engagement, critical

thinking and deep understanding (Nancy *et al.,* 2020). These advanced teaching and learning pedagogies aim to create dynamic, learner-centered environments that foster creativity, collaboration and lifelong learning skills (Bizami *et al.,* 2023). They leverage technology, research-based strategies and innovative approaches to prepare students for the demands of the modern world (Haleem *et al.,* 2022).

Student satisfaction through student experiences plays a vital role in today's global context for several reasons. In an increasingly interconnected world, student experiences contribute to developing cultural understanding and global perspectives (Mebert *et al.,* 2020; Nguyen,2018; Simm & Marvell, 2017). When students engage with diverse cultures, whether through studying abroad, interacting with international peers, or participating in multicultural activities, they gain firsthand knowledge and appreciation for different customs, traditions and ways of life.This fosters empathy, tolerance and respect, which are essential qualities in today's globalized society (Kim, 2020; Rosøy Steele & Leming, 2022; Tarchi & Surian, 2022). Through exposureto different societies, students can develop a sense of responsibility towards global issues such asclimate change, poverty, inequality and human rights. They learn to think beyond national boundaries and actively engage in finding solutions to global challenges (Idris *et al.,* 2012). By embracing a global mindset, students become more aware of their role in creating a better and more sustainable world (Nonis *et al.,* 2020).

Student experiences provide opportunities for networking and building connections that transcend borders. Interacting with fellow students, professors and professionals from different countries expands one's personal and professional network (Han *et al.,* 2022; Raaper *et al.,* 2021). These connections can prove invaluable in the future, whether for job prospects, collaborative projects, or simply gaining a broader perspective through ongoing dialogue with individuals from various backgrounds. In general, student experiences are of paramount importance in today's globalized world. They contribute to cultural understanding, foster global citizenship, enhance language skills, facilitate networking, promote personal growth and improve employability. Encouraging and supporting students in seeking diverse experiences is crucial for their holistic development and for building a more interconnected and inclusive society. Student experience majorly depends on student engagement which promotes academic success, retention and overall institutional effectiveness is proven fact (Han *et al.,* 2022). The various factors that contribute to student

engagement, including student-faculty interaction, extracurricular activities and student-centered teaching approaches (Tani *et al.,* 2021). Satisfactory student experience due to effective **student engagement**, measurable student **learning assessment** impacts the student satisfaction and are the critical components of higher education (Holmes, 2017). These components play an essential role in improving the overall performance of higher education institutions. This literature review also provides an overview of research on the role of student engagement, student learning assessment and student centric strategies on the overall performance of higher education institutions. Studies examined the impact of student engagement on student satisfaction in higher education institutes. The studies also found that student engagement is positively associated with student learning outcomes, including critical thinking, problem-solving and communication skills (O'Donnell & Reschly, 2020). Studies also highlight the importance of student-faculty interaction in promoting student engagement and learning outcomes. There is a positive relationship between student satisfaction and institutional effectiveness, including student success, retention and graduation rates (Cents-Boonstra *et al.,* 2020). The student learning assessment in improving the quality of education, promoting student success and enhancing institutional effectiveness. Student satisfaction helps in promoting student success, retention and overall institutional effectiveness. The student satisfaction, including academic quality, faculty-student interaction and support services.

Employability of students is a critical success factor for higher education for several reasons. The primary objective of higher education is to prepare students for the workforce (Cheng *et al.*, 2021). Higher education institutions must provide students with the skills and knowledge required to meet the demands of the labor market. If students are not employable, it can negatively impact their future prospects and the reputation of the institution (Scott & Willison, 2021). Higher education is a significant investment for students and their families. Students expect to see a return on their investment in the form of a well-paying job after graduation (Römgens *et al.,* 2019). If higher education institutions fail to provide students with the necessary skills and knowledge, they may not be able to secure employment and the investment may not be worthwhile (Đonlagić & Kurtić, 2016). Employability can also impact the reputation of the institution, contribute to economic development and help institutions to continuously improve their curriculum and teaching methods (Nogales *et al.,* 2020). If graduates are successful in securing employment, it can enhance the reputation of the institution and attract more students. Higher education

institutions play a critical role in the economic development of a country. Employable graduates can contribute to economic growth by applying their skills and knowledge in various industries. The employability of graduates can also help higher education institutions to continuously improve their curriculum and teaching methods. If graduates lack the skills and knowledge required by employers, it is a signal that the curriculum and teaching methods may need to be revised (Hassock & Hill, 2022; Mgaiwa, 2021; Sato *et al.*, 2021).

Branding is an important success factor for higher education for attracting students. Higher education institutions need to attract students to their programs (Amzat, 2016; Clark *et al.*, 2020). A strong brand can help institutions stand out in a crowded marketplace and appeal to prospective students. A strong brand can help build the reputation of the institution, which can lead to more opportunities for collaboration, research partnerships and funding (Mahmood & Bashir, 2020). Reputation is critical to the success of an institution and a strong brand can enhance it (Da Camara, 2007). A brand can help differentiate an institution from its competitors. Alumni Engagement is also an outcome of a strong brand. It can help engage alumni and foster a sense of pride and loyalty among them. Engaged alumni can contribute to the success of an institution through financial support, recruitment efforts and advocacy.

Performance scale items for higher education can vary depending on the specific context and goals of the evaluation. However, in this study the performance of higher education institutes is measured through parameters of public perception which includes various perspectives like student perspective, faculty perspective, employer perspective and sustainability perspective. In general, performance scale items for higher education can include measures of student success, satisfaction, faculty engagement, research output, employer satisfaction, public perception, accreditation status (Sarrico, 2020). These performance scale items can be used to evaluate the effectiveness of an institution in providing quality education and identify areas for improvement. A strong brand can also impact the perception of all the stakeholders of higher education institutes (Mahmood & Bashir, 2020). Employers may be more likely to hire graduates from institutions with a strong brand reputation, as they may perceive them as being better prepared and more desirable candidates. The employee perspective is important for higher education because employees play a critical role in achieving institutional goals, supporting student success and maintaining institutional excellence (Javed *et al.*, 2019). Institutions that prioritize employee

engagement, satisfaction, development and well-being are more likely to create a positive and effective work environment that supports institutional success (Abdou *et al.*, 2023). A strong brand can help institutions gain international recognition and attract students and faculty from around the world. This can lead to greater diversity and a more vibrant academic community. Having said that branding is an important success factor for higher education. A strong brand can help institutions attract students, build reputation, differentiate themselves, engage alumni, impact employer perception and gain international recognition. A strong brand can contribute to the success and sustainability of higher education institutions (Perera *et al.*, 2022).

1.8 Chapter Summary

This chapter elucidates the landscape of higher education, delves into the challenges confronting institutions of advanced learning, examines the ramifications of the New Education Policy 2020 and establishes the rationale behind this investigation. Against this backdrop, the study formulates its objectives, accentuating the critical success model employed for analysis. A contemporary trend in the realm of higher education is the emphasis on branding, which emerges as a pivotal factor warranting exploration. Educational establishments are compelled to institute transparent protocols and cater to the expectations of diverse stakeholders to cultivate a favorable image and perception. The appraisal of public sentiment, functioning as a yardstick to uphold quality management strategies and processes, also necessitates an in-depth scrutiny. This chapter underscores the significance of investigating the intricate interplay and correlation between branding and public perception, a key performance indicator examined within the purview of this research.

CHAPTER 2
LITERATURE REVIEW AND HYPOTHESIS FORMATION

Conducting a thorough literature review is crucial as it provides researchers with relevant and appropriate perspectives on the subject matter while addressing limitations in previous research. It serves as a foundation for the development and execution of any research study. A comprehensive literature review allows researchers to become acquainted with existing studies and gain a deep understanding of the research already conducted in their field. This familiarity helps them to build on existing knowledge and identify gaps or areas for further exploration. It offers deep insights into research techniques and methods and researchers can draw upon these insights to select appropriate methodologies for their own study and thus enhance the robustness and validity of their research design.

This chapter has been structured into four sections to organize the literature review, which is based on previous studies conducted. The literature review has been categorized into the following four broad sections:

2.1 Existing quality models for HEIs

2.2 Literature review on Critical Success Factors in Higher Education

2.3 Critical Success Factors considered in the present study

2.4 Literature review on Performance Indicator

2.5 Hypotheses development

Section 2.1 encompasses an examination of existing quality models for Higher Education Institutions (HEIs). Section 2.2 covers the literature review for CSFs in HEIs. Section 2.3 covers the CSFs considered in the present study, viz. Academic culture; student satisfaction, employee attractiveness; Transnational branding. Section 2.4 focuses on Literature review on Performance Indicator. Section 2.5 focuses on developing hypotheses and the chapter summary is presented in section 2.6.

2.1 Existing quality models for HEIs

Prior literature reveals that while there is a considerable amount of research available on higher

education quality models and some studies have established a connection between student satisfaction and public perception, however, empirical testing of the relationship is still a less explored area. Further there are studies on CSFs in HEIs, but some new critical success factors such as branding, employee attractiveness have not been included in earlier models. Additionally, there is a scarcity of studies examining critical success factors and HEI public perception specific to the context of India. Therefore, this presents an opportunity for further research in this area.

A systematic review of existing quality models for higher education institutions (HEIs) has been conducted to gain insights into the critical success factors. One study (Spanbauer, 1995) focused on the key elements of Total Quality Management (TQM) in education, including leadership; education and training; organizational climate; customer service; scientific methods and tools; meaningful data; and team problem-solving. This research explored how these concepts of TQM can be applied to reactivate higher education, highlighting their successful implementation in manufacturing and service organizations. Owlia and Aspinwall (1977) study also emphasized the significance of leadership in the academic industry (Owlia and Aspinwall, 1997). Tang and Zairi (1998) suggested that the core functions of a university are primarily teaching, research and scholarship (Tang & Zairi, 1998). However, based on quality principles and mission statements, seven critical factors of strategic importance were identified. These are: teaching and learning, research, community service, institutional management, priority resource allocation, enhancing technical and information support and quality advancement procedure. These CSFs were further categorized into five types, namely leadership, policy and strategy, people management, resource management and process management.

Kanji *et al.,* (1999) identified nine critical success factors (CSFs) that significantly impact the performance of institutions. Each factor has varying degrees of criticality. Continuous improvement was identified as the most critical factor, which was followed by leadership, external customer satisfaction, process improvement, teamwork, internal customer satisfaction, people management, measurement of resources and prevention, in the descending order. Venkatraman (2007) highlighted that successful implementation of Total Quality Management (TQM) in higher education could be achieved by adopting a TQM framework that emphasizes continuous improvements in the core processes, particularly teaching and learning. In 2007, a

HE-TQM framework was developed by (Venkatraman, 2007) incorporating six core principles that encompassed various quality elements. This framework included: leadership, educational management, human resource management, information management, customer focus and satisfaction and partnership development and management. Such an approach enables higher education institutions to stay attuned to evolving customer needs and also enables them promptly to address them while efficiently allocating resources. Furthermore, it is crucial to utilize the feedback loop from course evaluations for making systematic and continuous improvements through active involvement of both learners and institution members.

Bayraktar et al. (2008) developed operational measures for 11 critical areas of TQM, including leadership, vision, measurement and evaluation, program design, quality system improvement, employee involvement, recognition and rewards, education and training, student focus and other stakeholders' focus. These measures could be used individually or collectively to create a comprehensive profile of institution-wide quality management. Viswanadhan, (2009) covering technical institutions in Kerala, India, identified and prioritized "Indicators of Quality" to assess the performance of undergraduate engineering programs. These indicators were used to evaluate the quality of education provided in these institutions. Pal Pandi et al. (2009) employed an Integrated Total Quality Management (ITQM) theory involving various stakeholders. Furthermore, in a later study, (Pal Pandi *et al.,* 2013) compared the perceptions of students, faculty and stakeholders regarding the implementation of ITQM. This study revealed that the concept of ITQM was not substantially practiced in various technical institutions in Tamil Nadu, India. Based on these models the next section 2.2 focused on Critical Success Factors (CSFs) as has been identified through earlier literature.

2.2 Identification of Critical Success Factors (CSFs) in Higher Education

Table 2.1 Critical Success Factors (CSFs) with Literature support

S.No.	CSFs	Author(s)
1.	Top Management Commitment, Strategic Planning, Organizational for quality, Employee Involvement, Teamworking	(Owlia and Aspinwall, 1997)
2.	Leadership, Policy and Strategy, People Management, Resource Management, Process Management	(Tang & Zairi, 1998)
3.	Leadership, strategic quality planning; employee management and involvement; supplier management; Customer Focus; process management; Continuous Improvement; information and analysis; and knowledge and education	(Fotopoulos & Psomas, 2010), companies, Greek
4.	Customer Focus; Continuous Improvement; Teamwork and involvement; top-management commitment and recognition; Training and development; quality systems and policies; supervisory leadership; communication within the company; supplier partnership; measurement and feedback; and cultural change	(Hing Yee Tsang & Antony, 2001) service organisations, UK
5.	Customer identification, Leadership, cultural and organisational issues	(Sirvanci, 2004), HE, Swedish
6.	Leadership, Continuous Improvement, prevention, measurement of resources, process improvement, internal customer satisfaction, external customer satisfaction, people management and teamwork	(Kanji *et al.,* 1999), HE, UK
7.	Leadership and Top Management Commitment, Customer Focus and satisfaction, policy and strategy planning; human resource management; process management and control; product/service design and control; Continuous Improvement; supplier management; Training; employees' satisfaction; employees' participation; employee appraisal, reward and recognition; quality culture; quality assurance; quality system; impact on society; Teamwork; flexibility; zero defect; and benchmarking	(M. S. Khan *et al*., 2007), service sector, India
8.	TMC and visionary leadership; human resource management; Customer Focus, information analysis and system; service culture; and social responsibility	(Irfan & Kee, 2013), service sector, Pakistan
9.	TMC, strategic planning, organisation for quality, Employee Involvement and team working, Training for quality, design management, process management, supplier quality management, information and analysis and Customer Focus and satisfaction	(Owlia & Aspinwall, 1996) HE, UK
10.	Top management, customer centric advancements; benchmarking; relentless improvement; and strengthening the employee base	(Rahman & Siddiqui, 2006), IT/IS firms, India
11.	Leadership and commitment; Customer Focus; Continuous Improvement; get things right first time; just-in-time; competitive benchmarking; cost of quality; Employee Involvement; Teamwork; Training; communication; and recognition and reward	(Yusuf *et al.,* 2007), companies, China
12.	Top-management support; Customer Focus; strategy; benchmarking; Employee Involvement; recognition and reward; problem analysis; quality technologies; service design; services-capes; service culture; social responsibility; human resource management; Continuous Improvement; quality department; and quality systems	(Al-Marri *et al.,* 2007) banking sector, UAE
13.	Top Management Commitment and leadership; benchmarking; Customer Focus and satisfaction; service marketing; social responsibility; human resource management; employee satisfaction; service culture; services cape; Continuous Improvement, technical system; and information and analysis	(Saravanan & Rao, 2007) service industry, India

14.	reputation and image of institutions, infrastructure quality, faculty excellence, research and industry exposure and stakeholders' satisfaction	(El-Sherbini *et al.*, 2005), HE, India
15.	Leadership, vision, measurement and evaluation, process control and improvement, program design, quality system improvement, Employee Involvement, recognition and reward, education and Training, student focus, other stakeholders' focus	(Bayraktar *et al.*, 2008b), HE, Turkish
16.	TMC and visionary leadership; human resource management, technical system, information and analysis system, benchmarking, Continuous Improvement, Customer Focus, employee satisfaction, union intervention, social responsibility, service caps and service culture	(Sureshchandar *et al.*, 2002) service sectors, India
17.	Commitment of top management, course delivery, campus facilities, courtesy and customers' feedback and improvement	(Sakthivel & Raju, 2006), engineering education, India
18.	Commitment of top management and leadership, Customer Focus, course delivery, communication, campus facility, congenial learning environment and continuous assessment and improvement	(Sakthivel, 2007) engineering education, India
19.	Top Management Commitment, systematic approach to management, Customer Focus, Employee Involvement, Training, teamwork and Continuous Improvement	(Pandi *et al.*, 2009)
20.	Top-management commitment, Customer Focus, Training and education, Continuous Improvement and innovation, supplier quality, EI, employee encouragement, benchmarking, quality information and performance measurement	(Talib & Rahman, 2010), service organisations, India
21.	Top Management Commitment, Customer Focus, Training and education, Continuous Improvement and innovation, supplier management, Employee Involvement, process management, quality systems, benchmarking, quality culture, human resource management, strategic planning, employee encouragement, teamwork, product and service design and communication	(Talib *et al.*, 2013) , ICT industry, India
22.	Roles and responsibilities of senior management, infrastructure, Training and development and placement, research and development and consultancy, administration, promoting institute's initiatives, technical institute's excellence measures	(Sahu *et al.*, 2013), technical education, India
23.	Institutional resource management, long-term strategy and planning, excellence HRM, Continuous assessment and improvement, Top Management Commitment and visionary leadership, student focus, employee focus, alumni focus, information management system, quality mission and vision statement, service culture, innovative academic philosophy and method and Industry institution partnership	(Mehta *et al.*, 2013) engineering education, India

El-Sherbini *et al.*in (2005) examined the relationship between the performance of engineering institutes and TQM. The five critical factors that played a significant role in this relationship include: reputation and image of institutions, infrastructure quality, faculty excellence, research and industry exposure and stakeholders' satisfaction. Talib and Rahman (2010) examined nine critical success factors (CSFs) of TQM in service organizations, including banks, hotels, information communication and technology (ICT)/information technology (IT) and healthcare. In a later study by Talib et al. (2013) the CSF include: Top Management Committee, Customer

Focus, Training and Education, Continuous Improvement and Innovation, Supplier Management, Employee Involvement, Information and Analysis Process Management, Quality Systems, Benchmarking, Quality Culture, Human Resource Management, Strategic Planning, Employee Encouragement, Teamwork, Product and Service Design and Communication. The outcomes revealed that Top Management Commitment was considered the most critical CSF in the ICT industry, highlighting the significance of top management's responsibility in implementingquality policies and meeting customer satisfaction. The study also emphasized the importance of Continuous Improvement and Innovation, quality culture, Training and education, customer focus and teamwork as essential practices. These findings can be extended to emerging Indian service industries, such as education, to explore the application of TQM CSFs in those specific contexts.

Burli *et al.* (2012) focused on ISO certified engineering institutes and explored the significant dimensions of TQM and their inter-relationships. The study derived a theoretical framework based on quality management principles to establish a sustainable management system. This study also revealed that leadership from top management played a pivotal role in driving the establishment of an effective quality system. The importance of leadership in driving the implementation of TQM was also supported by (Kuei & Lu, 2013). Top management's leadership was identified as the main driving force behind the establishment of an effective quality system. Furthermore, the stakeholders' viewpoint and the financial position of an organization are crucial enablers for improving quality. These factors played an important role in enhancing the overall quality management practices within the organization. Overall, these studies have emphasized the significance of leadership, stakeholder perspective and financial stability as important factors in establishing and improving the quality management systems in various industries and organizations.

The research findings by Pal Pandi *et al.,* (2013) indicated a lack of substantial implementation of ITQM in the examined institutions. To address the significance of quality in educational environments, Pal Pandi *et al.,* (2016) introduced the Integrated Educational Quality Management System (IEQMS). This model integrated various global management practices, including ISO 14001:2004 Environmental Management System (EMS), ISO 9001:2008 Quality Management System (QMS), Occupational Health and Safety Management System (OHSAS

18001:2007), Six-Sigma (DMAIC methodology), knowledge management (KM), lean thinking and TQM. Pal Pandi *et al.,* (2016) identified top-management commitment, systematic approach to management, customer focus, employee involvement, training, teamwork, continuous improvement, corporate social responsibility, academic culture and knowledge audit. These CSFs were recognized as the primary drivers of quality education, representing various global quality management concepts. The researchers analyzed the importance of these CSFs in the successful implementation of the IEQMS model using the interpretive structural modeling (ISM) approach. The ISM approach provided insights into the contextual relationship among the CSFs, contributing to a better understanding of their significance in achieving quality education.

The CSFs identified by Pal Pandi et al. (2016), play different roles in implementing quality education. The CSFs of Top Management Commitment, Systematic Approach to Management and Training are recognized as the main drivers of quality education through the IEQMS model. Additionally, CSFs such as Customer Satisfaction, Employee Involvement, Continuous Improvement and Academic Culture act as connecting factors, linking the other CSFs and stimulating the implementation of a quality system. These factors contribute to achieving the expected quality, which aligns with the goals of stakeholders, through the effective implementation of the IEQMS. However, the study suggests that Corporate Social Responsibility (CSR) activities are not given significant value in educational institutions based on their findings. Figure 2.1 presents the IQEMS model, which is taken as a base model in the current study.

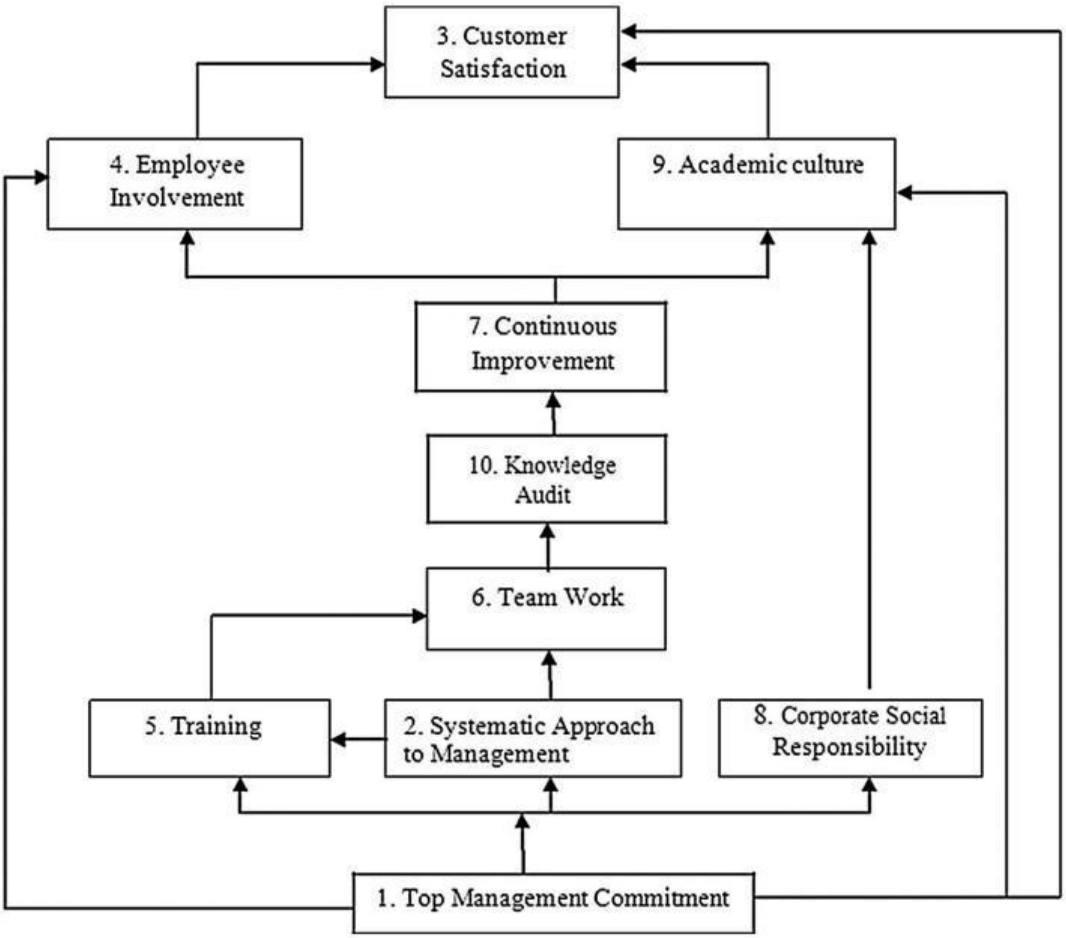

Figure 2.1: IEQMS Model
Source: (Pal Pandi *et al.,* 2016)

2.3 CSFs included in the current study

The present study has aimed to encompass several quality dimensions from the existing models, particularly the Integrated Educational Quality Management System (IEQMS), while it also incorporates new indicators such as: student employability and branding. Based on this model, the current study includes Academic Culture as a first CSF. This is comprised of three sub-scales, viz. academic environment, academic operations and advanced teaching and learning. The second CSF extracted from this model is employee attractiveness. This scale comprises of professional development avenues available for teaching and non-teaching employees; employee involvement in decision making and employee recognition and rewards for their achievements. The third CSF which has been identified for this study is student satisfaction. In the IEQMS model customer satisfaction is taken into consideration and since this study also covers higher educational institutions,

the scale considered is student satisfaction. Student satisfaction covers student engagement, learning assessment, career services available for the student and achievement of employability skills by the students.

The current study as mentioned above includes Branding as a new CSF. Branding is a measure of efforts put in by the institute for enhancing visibility through participation in surveys for ranking and reputations. Branding is also a measure of initiative like social media engagement and online presence along with partnerships and collaborations. The parameter of performance is measured through public perception.

2.3.1 Academic culture

Academic Culture is accountable for academic environment, academic operation of the HEIs and advanced teaching and learning pedagogies (Shen & Tian, 2012). Academic culture refers to the values, beliefs and attitudes that shape the academic community's behavior and interaction. Academic culture plays a vital role in promoting academic excellence, research and innovation (Mollo, 2021). The emphasis on academic culture has led to the establishment of various institutions of excellence, including the Indian Institutes of Technology (IITs), Indian Institutes of Management (IIMs) and Indian Institutes of Science Education and Research (IISERs). These institutions have set high academic standards, emphasizing critical thinking, research and innovation, which have contributed to the development of India's knowledge economy (Dahm *et al.,* 2021; Gupta, 2021). Based on the study by (Shen & Tian, 2012), academic culture scale is comprised of i) academic environment, ii) academic operation of the HEIs and iii) teaching and learning pedagogies.

Academic Environment: Academic Environment in higher education institutions includes a range of elements that support learning and intellectual development (Huang, 2012). The academic environment is designed to provide students with the resources, support and opportunities they need to succeed academically and professionally (NEP 2020)**.** A positive academic environment is crucial in fostering academic excellence, promoting research and attracting quality faculty and students (Closs *et al.,* 2022; Huang, 2012; Ismail *et al.,* 2020). Additionally, a supportive academic environment also helps in nurturing a sense of community and promoting collaboration among

students and faculty (Wijnia, 2021). However, In India, the academic environment varies significantly across institutions, with some institutions offering world-class facilities and infrastructure, while others struggle with inadequate resources. Thus, this has been considered in the current study.

*Academic Operations***:** *Academic Operations* refers to the administrative and managerial aspects of running a higher educational institute. Academic operations are critical in ensuring that institutions operate efficiently, effectively and sustainably (Shrivastava & Shrivastava, 2022). The academic operations include admission and enrolment procedures, curriculum design and delivery, faculty hiring and retention, student support services and research administration (Strike, 2018). Effective academic operations help institutions in providing quality education, promoting research and maintaining institutional credibility and reputation (Baltaru & Soysal, 2018).

Advanced teaching and learning (ATL) pedagogies: Any study on Academic culture would be incomplete without a focus on Advanced teaching and learning (ATL) pedagogies. ATL pedagogies. aim to create dynamic, interactive and learner-centered environments that fosters deeper understanding, critical thinking skills, creativity and lifelong learning abilities among students (Nancy *et al.,* 2020). Educators can leverage these approaches to accommodate diverse learners and prepare them for the challenges of the 21st century. ATL pedagogies refer to innovative approaches and methodologies used in education to enhance the teaching and learning process. These pedagogies go beyond traditional methods and integrate various strategies, technologies and student-centered approaches to promote deeper understanding, critical thinking and active engagement among learners (Sanger, 2020). Some examples of advanced teaching and learning pedagogies include Inquiry-Based Learning which involves posing open-ended questions, problems, or scenarios to students, encouraging them to explore and investigate concepts and find solutions (Attard *et al.,* 2021). Another advanced teaching learning method is Project-Based Learning (PBL), which involves students working on real-world projects or tasks that are meaningful and relevant to their lives. It encourages collaboration, research, problem-solving and the application of knowledge and skills in a practical context (Kokotsaki *et al.,* 2016). Then comes Flipped classroom, where students learn the content outside of class, typically through pre-recorded videos or readings and use classroom time for discussion, collaboration and

hands-on activities. This model allows for more personalized instruction and active engagement during face-to-face sessions (Jensen *et al.,* 2018). Blended Learning and collaborative learning have also been used. Blended learning combines traditional face-to-face instruction with online learning components and provides flexibility in terms of time, place and pace of learning, allowing students to access resources and participate in activities both in and outside theclassroom (Rivera & Garden, 2021). However, Collaborative learning involves students workingtogether in groups or teams to solve problems, complete projects, or discuss and share ideas. It fosters communication, teamwork and critical thinking skills while promoting social interaction and peer learning (Laal & Laal, 2012). The contemporary ATL pedagogy is ExperientialLearning, which emphasizes hands-on, real-world experiences as a means of learning. It often involves internships, field trips, simulations, or other immersive activities that allow students to apply knowledge in practical settings (Lehane, 2020; Radović *et al.,* 2021). The latest ATL pedagogy, like gamification integrates game elements, such as competition, rewards and challenges, into the learning process. It can increase motivation, engagement and retention of knowledge by making learning more enjoyable and interactive (Rivera & Garden, 2021). HEIs strive to establish support centers for teaching and research, which devise innovative strategies toaddress the challenges faced by higher education institutes. These entities contribute to the development of a high-quality academic culture by integrating information and communication technologies (ICTs) into learning and teaching practices (Winter *et al.,* 2021) and (Parusheva *et al.,* 2023).

2.3.2 Student Satisfaction

In contemporary educational practices, student-centered learning has emerged as a novel concept. In the past, the teacher played a central role in determining the learning objectives and choosing the teaching methods, shaping the students' learning experiences accordingly. Student-centered education empowers students to take control of their own learning process, offering opportunities for active participation in discussions relevant to their course subjects and subsequent problem-solving. The implementation of student-centered education has been shown to enhance students' satisfaction levels, expand their critical thinking abilities, promote self-directed learning, increase motivation and foster interactive learning environments (Hillyard *et al.,* 2010; Elliott & Reynolds,

2014; Frambach *et al.,* 2014). Notably, student-centered systems prioritize knowledge retention, deep understanding and the establishment of supportive learning environments within an academic framework (Remedios & Hawthorne, 2008; Frambach *et al.,* 2014). COVID-19 pandemic has accelerated the shift towards online learning, with many institutions offering remote classes and hybrid learning models (G. Suri *et al.,* 2016; Keržič *et al.,* 2021). While online learning offers flexibility and convenience, it can also be challenging for students who lack reliable internet access or struggle with self-motivation. Student satisfaction scale includes Student Experience; Student Engagement; Learning Assessment and employability skills of students. These are discussed in the subsequent sections.

Student Engagement: Students, as the primary beneficiaries of education, are at the receiving end for acquiring knowledge and information (Sinclair & Zairi, 1995). The adoption of TQM in higher education underscores the emphasis on students as the focal point for institutional sustainability. In this context, students are increasingly viewing themselves as customers, approaching education as an opportunity to explore the world and seeking a valuable return on their investment(Lawrence & Sharma, 2002). In recent times, higher education institutions (HEIs) are placing increased significance on meeting the expectations of students, recognizing the service industry nature of their role (DeShields *et al.,* 2005). In the current learning landscape, there has been a shift from a teacher-centered approach to a learner-oriented method, where the teacher's role is primarily that of a facilitator. In this new setup, students are encouraged to take control of the knowledge production process (Frambach *et al.,* 2014), there is a greater emphasis on student involvement and engagement, fostering an environment where students actively exchange ideas with one another (Hillyard *et al.,* 2010; Elliott & Reynolds, 2014). The impact of students on knowledge acquisition necessitates less control and a more flexible structure. However, it is important to note that the effectiveness of student-centered learning approaches is deeply influenced by the specific context in which they are implemented (Frambach *et al.*, 2014).

The value of self-study has significantly increased among teachers compared to the past. Research has identified two distinct approaches to enhance the quality of education: emphasizing the importance of both "good" teachers and students, or primarily focusing on having "good" teachers (Vroeijenstijn, 1995). To embrace teaching and learning methods that promote active student

involvement, it becomes crucial to prioritize the quality of education (Mazur, 1997; Redish,2003). This requires a shift in students' mindset and the cultivation of a sense of responsibility intheir learning process. Encouraging students to participate in tutorial sessions, workshops that emphasize their role as higher education students and fostering active learning in classrooms are effective strategies. When students' ideas and perspectives are valued, they become more attentive, cooperative and motivated to learn (Allen, 2008). Higher education institutions are increasingly expected to prepare students for the workforce, with a focus on developing practical skills and real-world experience. This has led to a greater emphasis on internships, co-op programs and other forms of experiential learning (Understanding Cooperative Education, 2020). Overall, student experiences in HEIs globally are shaped by a complex array of factors. As institutions continue to adapt to changing social and technological trends, it is important to prioritize the needs and well-being of students to ensure their success. Higher education institutions have the potential to shape their future by fostering a culture of learning and adhering to academic norms. This transformation aims to support research, foster innovation, encourage invention and address unanswered questions, all with the goal of nurturing students' thirst for knowledge (Bilal *et al.,* 2019; O'Shea, 2021). This shift occurs through the implementation of teaching methodologies such as the "think-pair-share" approach and other innovative techniques within a novel teaching-learning environment (Rahmah Tahir *et al.,* 2019).

The importance of student engagement in promoting academic success, retention and overall institutional effectiveness is proven fact. The various factors that contribute to student engagement, including student-faculty interaction, extracurricular activities and student-centered teaching approaches (Cents-Boonstra *et al.,* 2020).

Learning Assessment: The student learning assessment in improving the quality of education, promoting student success and enhancing institutional effectiveness is a well-researched topic (Baghdadi, 2021). A significant number of students successfully complete their courses and graduate within the designated timeframe, despite failing to fully grasp the core knowledge provided. However, addressing the deficiencies in the assessment culture and practices could have effectively addressed this issue (Bin Othayman *et al.,* 2022). Such a transformation necessitates a change in the mindset of academicians, as well as education policymakers and decision-makers

(Kandiko Howson & Kingsbury, 2021). It required a shift in priorities for some students and brought about alterations in both assessment practices (Philpott, 2016) and the dynamics of the student-teacher relationship (Thornberg *et al.,* 2020). The objective is to guarantee that students who do not possess the necessary competencies are not granted a passing grade.

Currently, the assessment of course learning outcomes (CLOs) typically involves both indirect and direct measures. Indirect measures assess CLOs through tools such as, surveys or feedback, providing insights into students' perceptions of their learning. On the other hand, direct measures directly evaluate student performance by examining their responses to exam questions, assignments and projects that are aligned with the learning outcomes (Coates, 2015; Nugent & Crews, 2013). The combination of scores from these direct and indirect measures allows for a comprehensive assessment of the overall achievement of course learning outcomes and objectives. Undoubtedly, the purpose of pursuing this process had significant effects on teaching-learning practices as well as on course and programme objectives. The probability of success depended on devising a balanced, ethical and reasonable way to implement the new methods. This requires re-engineering of primacies, policies and practices to a considerable extent. It involves re-allocations of resources to cater for the expanded student needs.

Career Services: Career Services in higher education institutions have evolved significantly over the years to cater to the diverse needs of students and align with the demands of the ever-changing job market. These services play a crucial role in bridging the gap between education and employment, equipping students with the necessary skills, knowledge, and opportunities to succeed in their chosen careers (Cheng *et al.,* 2021).

Skill Sets for Employability: The concept of 'employability' establishes a hypothetical connection between employment and education (Ashok Pandit & Wallack, 2016). Within this construct, the notion of "career identity" emerges as a significant factor that contributes to the sustainability of employment. However, understanding the complex relationship between career identity and employment remains a challenging task. In Slovenia, a Higher Education quality model has been developed, encompassing both internal dimensions of quality and external dimensions, particularly focusing on outcome dimensions that were previously overlooked by existing quality

models (Rodman *et al.,* 2013). The findings indicate that stakeholders gauge the quality of a HEIs through the perspective of employers. In Rodman's Model, particular emphasis is placed on employers in relation to other aspects of HEI quality. The strategic involvement of employers in managing the performance of Higher Education Institutions (HEIs) is crucial, as emphasized by studies conducted by HEIs (Owlia & Aspinwall, 1996; Macfarlane *et al.,* 2013). Unfortunately, employers are often overlooked by policy makers when defining quality in HEIs,as noted by Lagrosen *et al.,* (2004) and Niven, (2003). Neglecting the outcomes dimension is a significant factor contributing to weak quality management in higher education (Rodman *et al.,* 2013).

Thus, employability of students is a critical success factor for higher education for several reasons. The primary objective of higher education is to prepare students for the workforce. Higher education institutions must provide students with the career services to create skills and knowledge required to meet the demands of the labor market (Cheng *et al.,* 2021). If students are not employable, it can negatively impact their prospects and the reputation of the institution. Higher education is a significant investment for students and their families. Students expect to see a return on their investment in the form of a well-paying job after graduation. If higher education institutions fail to provide students with the necessary skills and knowledge, they maynot be able to secure employment and the investment may not be worthwhile.

The employability of graduates can impact the reputation of the institution (Nogales *et al.,* 2020). If graduates are successful in securing employment, it can enhance the reputation of the institution and attract more students. Higher education institutions play a critical role in the economic development of a country. Employable graduates can contribute to economic growth by applying their skills and knowledge in various industries. The employability of graduates can also help higher education institutions to continuously improve their curriculum and teaching methods. If graduates lack the skills and knowledge required by employers, it is a signal that the curriculum and teaching methods may need to be revised.

2.3.3 Employee Attractiveness

Employee attractiveness in higher education institutions refers to the desirability of an institution

as a place to work for potential employees. It encompasses various factors that influence individuals' perceptions of an institution and their decision to seek employment there (Yameen *et al.*, 2020). Employee attractiveness is crucial for higher education institutions to attract and retain talented faculty and staff, promote a positive work environment and enhance their overall reputation (Prakash *et al.*, 2022). The reputation of an institution plays a significant role in attracting employees. Institutions with a strong academic standing, research opportunities and a history of producing successful graduates tend to be more attractive to potential employees. Competitive salary and benefits packages are important considerations for attracting and retaining talented employees. Higher education institutions that offer attractive compensation, health insurance, retirement plans and other benefits are more likely to be seen as desirable places to work. Institutions that promote work-life balance and provide supportive policies and programs, such as flexible work arrangements, family leave and wellness initiatives, are often considered more attractive by potential employees (Nwagbara, 2020). HEIs that invest in professional development and provide opportunities for growth, such as funding for conferences, research grants and sabbaticals, are likely to be more appealing to prospective employees who seek opportunities to enhance their skills and advance their careers. A positive and inclusive institutional culture that fosters collaboration, diversity and a supportive work environment is highly attractive to potential employees. Institutions that prioritize diversity, equity and inclusion initiatives are more likely to appeal to individuals seeking an inclusive workplace. The availability of state-of-the-art facilities, well-equipped laboratories, libraries and research centers can significantly enhance an institution's attractiveness. Access to resources and infrastructure that support research, teaching and learning is often a consideration for potential employees. Factors such as the quality of life in the area, access to amenities, cost of living and proximity to cultural and recreational opportunities can impact an employee's decision to work at a particular institution.

Higher education institutions that demonstrate financial stability, long-term planning and a strong leadership structure are often more attractive to potential employees. Job security and a supportive administrative structure contribute to an institution's attractiveness. It's important for higher education institutions to assess and continually improve their employee attractiveness to remain competitive in recruiting and retaining top talent. Regular feedback, surveys and an understanding

of the evolving needs and expectations of employees can help institutions enhance their attractiveness and create a positive work environment.

Research conducted by Phipps, Prieto and Ndinguri (Phipps *et.al*., 2013) reveals a significant correlation between employee involvement, commitment and organizational productivity. By empowering employees and granting them autonomy, organizations expose them to challenging situations that foster knowledge enhancement and ultimately contribute to improved productivity. Moreover, when employees participate in decision-making processes, it establishes a link between individual performance and *overall* organizational performance,providing opportunities for professional growth and the acquisition of work-related knowledge (Butts *et al.,* 2009).

According to Levine (1990), employee involvement is a valuable approach to implement standards and establish an organization that attracts job seekers (Levine, 1990). It is crucial for employees to be actively engaged and motivated to perform at their best. Employees should have a sense of empowerment, believing that they have tangible ways to contribute and make a difference. Additionally, combining employee ownership with effective employee involvement programs can serve as a motivating factor. When employees are given the opportunity for significant participation, allowing them to have a real impact on decision-making processes, it further enhances their sense of involvement and ownership (Pierce *et al.,* 1991).

Employee attractiveness, a significant performance indicator for institutes, encompasses several factors such as the research and career development, compensation, research resources, organizational integrity, work-life balance, commitment to quality and recognition (Priyadarshini *et al.,* 2016). Positive interaction among employees plays a crucial role in enabling them to identify and understand problems, generate multiple solutions and implement effective strategies that reduce costs and enhance quality. However, without such interaction, the positive impact of employee involvement may be limited.

2.3.4 Branding

The perception of quality in higher education institutes (HEIs) has been subject to trends and

debates, often seen as a fashionable concept (Birnbaum & Deshotels, 1999). The increasing internationalization of higher education has sparked discussions on various schemes and plans for quality assurance, with a focus on the branding of institutions and its impact on quality (Harvey, 2004). International rankings have emerged as a reflection of university quality and the implementation of US accreditation practices beyond its borders is a growing trend (Altbach, 2012; Eaton, 2012). Transnational branding has gained significance, with universities collaborating with renowned institutions worldwide to enhance learning and development. However, the effects of international branding in higher education, beyond the notions of 'McDonaldization' (Ritzer, 2004; Bush, 2006) are still not fully understood.

India has experienced a surge in the number of universities and engineering institutions, particularly in the past two decades (A Pal Pandi, et. at., 2008). Keeping stakeholders informed about these developments has become mandatory. Achieving national and international rankings has become increasingly important to maintain qualitystandards. As a result, HEIs are facing heightened competition and striving to maintain their rankings and accreditations (Nandi & Chattopadhyay, 2011).

Branding is an important success factor for higher education for attracting students (Amzat, 2016). Higher education institutions need to attract students to their programs. A strong brand canhelp institutions stand out in a crowded marketplace and appeal to prospective students. A strongbrand can help build the reputation of the institution, which can lead to more opportunities for collaboration, research partnerships and funding (Nguyen *et al.*, 2016). Reputation is critical tothe success of an institution and a strong brand can enhance it. A brand can help differentiate an institution from its competitors. Alumni Engagement is also an outcome of a strong brand. It can help engage alumni and foster a sense of pride and loyalty among them. Engaged alumni can contribute to the success of an institution through financial support, recruitment efforts and advocacy (Hemsley-Brown *et al.*, 2016).

Branding can have a significant impact on student satisfaction in higher education institutions. A strong brand reputation enhances the perceived quality and credibility of an institution. When students perceive an institution as reputable and of high quality, they are more likely to feel

satisfied with their choice. Positive word-of-mouth and online reviews contribute to a favorable brand image, which can attract and retain students (Perera *et al.,* 2022). A well-defined brand identity helps students develop a sense of belonging and pride in their institution. A clear brand message and values create a cohesive community and foster a positive campus culture. Students who identify with the brand are more likely to feel connected to the institution, leading to higher satisfaction levels (Waqas, 2021).

Effective branding aligns students' expectations with the actual experience provided by the institution. When branding effectively reflects the educational environment, facilities, programs and support services, students develop realistic expectations (Clark *et al.,* 2020). Meeting or exceeding these expectations enhances satisfaction, as students feel they are receiving the value they anticipated. Strong branding can differentiate an institutionfrom its competitors, highlighting its unique offerings and strengths (Işık, 2022). This differentiation can attract students who align with the institution's specific mission, vision and educational approach. When students find an institution that aligns with their values and goals, they are more likely to be satisfied with their educational experience.

A strong brand can positively impact an institution's alumni network and relationships with potential employers (Dennis *et al.,* 2016). When students perceive that their institution's brand is respected by employers and has a successful alumni network, they are more likely to feel confident about theircareer prospects. The perceived career opportunities associated with the brand can significantly impact student satisfaction. In this study, attention is on transnational branding. Transnational branding refers to the process of creating and maintaining a consistent brand image and identity across different countries and cultures. It involves developing a brand strategy that can be effectively communicated and understood by diverse audiences in various regions of the world (Amis & Silk, 2010). When a company engages in transnational branding, it aims to establish a unified brand presence globally while considering the unique characteristics and preferences of each market (Mikáčová & Gavlaková, 2014).

2.3.4 Literature Review on Performance Indicator

Perception will lead to the performance of the Higher Education Institute (Srinivasan *et al.,* 2020). Public perception refers to the overall image, reputation and standing of an institution in the eyes of the public, including students, parents, employers, alumni and the broader community (C. White & Park, 2010). Performance scale items for higher education can vary depending on the specific context and goals of the evaluation (Sarrico, 2020). Here in this research study, public perception can be used as a performance measure for higher education institutions through following scale items: Faculty perspective, Student perspective, Employer perspective and Sustainability perspective**.**

Student and Faculty perspective together depend on reputation and rankings of the higher education institutes (Sarrico, 2020). Public perception plays a crucial role in determining the reputation and rankings of an institution (Amado Mateus & Juarez Acosta, 2022). It is often reflected in various national and international rankings, such as the QS World UniversityRankings or the U.S. News & World Report rankings. These rankings consider factors like academic quality, faculty expertise, research output, student satisfaction and institutional reputation, which are influenced by public perception (Hazelkorn & Gibson, 2017). Student perception can significantly impact the enrollment and admissions process and thus has an impacton student perception (Khan & Hemsley-Brown, 2021). Positive student perception can attracta larger pool of qualified applicants, resulting in higher selectivity and more competitive admissions (Amerstorfer & Freiin von Münster-Kistner, 2021). Conversely, negative student perception may deter potential students from applying or enrolling, affecting the institution's overall enrollment numbers and diversity. Public perception can influence the engagement and support of alumni. If alumni have a positive perception of their alma mater, they are more likelyto stay connected, participate in alumni events, contribute to fundraising campaigns, and providevaluable support to current students. Strong alumni engagement and giving are often seen as indicators of an institution's reputation and perceived value (Connolly & Blanchette, 1986) and (Pedro *et al.,* 2020).

From a student perspective, there are several parameters that students often consider when

assessing the quality of higher education institutions. Students value institutions that provide high-quality education and academic programs (Salilul *et al.,* 2016). This includes the reputation and expertise of faculty members, the curriculum design, the availability of advanced courses, research opportunities and the overall academic rigor. Institutions with a strong academic reputation, accreditation and high rankings in relevant fields are often preferred by students seeking quality education (Fernandes & Singh, 2022). Students place importance on the quality of teaching and the learning experience (Zerihun *et al.,* 2012). This includes factors such as small class sizes, interactive and engaging teaching methods, accessibility and approachability of faculty, availability of academic support services, well-equipped classrooms and laboratories and use of modern teaching technologies. Institutions that prioritize effective teaching practices and student-centered learning environments are often favoured by students (Emery *et al.,* 2021).

Students often consider the institution's track record in terms of graduate employability and career prospects (Emery *et al.,* 2021). This includes factors such as internship and cooperative education opportunities, strong connections with industry partners, career counseling and guidance services, job placement rates, alumni networks and success stories of graduates. Institutions that have a strong reputation for preparing students for the job market and facilitating successful career outcomes are attractive to students (How Higher Ed Can Prepare Students for Today's Digital Jobs, 2021). Students value institutions that provide comprehensive support services to enhance their overall experience. This includes academic advising, mentoring programs, tutoring services, counseling and mental health support, disability services, housing and accommodation options, student organizations and extracurricular activities. Institutions that prioritize student well-being, personal development and a sense of community often create a positive student experience (Remskar *et al.,* 2022). Institutions that embrace diversity and provide a welcoming and inclusive atmosphere are often preferred by students (Rapp & Corral-Granados, 2021).

Studies suggest students value institutions that actively seek and respond to student feedback. This includes mechanisms for student evaluation of courses and instructors, opportunities for constructive feedback, transparency in assessment and grading practices and mechanisms for addressing student concerns and grievances (L. Yang *et al.,* 2021). Institutions that value student input and continuously improve based on feedback demonstrate a commitment to student satisfaction and academic excellence (Harvey, 2022).

The quality of campus facilities and infrastructure can significantly impact the student experience. This includes well-maintained classrooms, libraries, laboratories, research facilities, sports facilities, computer labs, dining options, student accommodation and recreational spaces. Institutions that invest in modern and state-of-the-art facilities contribute to a positive learning and living environment (Hanssen & Solvoll, 2015).

Employer perspective can impact how employers view graduates from a particular institution. If an institution is well-regarded and has a positive reputation, employers may have a higher level of trust in the quality of education and skills developed by its graduates (Henrich, 2016). This can result in better job placement rates, partnerships with employers and opportunities for internships and cooperative education programs.

Employers value institutions that provide education and training that aligns with industry needs. Institutions that offer up-to-date, industry-relevant curriculum and regularly update their programs to reflect changing market demands are favoured by employers (Kantikoy Howson & Kingsbury, 2021). They look for programs and courses that equip students with the knowledge, skills and competencies necessary for the job market. Institutions that emphasize practical skills and provide opportunities for experiential learning are valued by employers (Lauder & Mayhew, 2020). Employers look for graduates who have hands-on experience, industry internships, co-op programs, or industry projects during their studies. Institutions that incorporate practical learning experiences, such as internships, cooperative education, or industry partnerships, help students develop real-world skills and enhance their employability (Bawica, 2021).

The recently published report titled "Technology Sector in India 2023: Strategic Review" (Technology Sector in India 2023: Strategic Review | NASSCOM, 2023) provides a comprehensive analysis of the key trends, segments and strategies that have shaped and solidified the foundations of the technology industry in the fiscal year 2023. The report highlights the industry's value proposition, which is built upon a diverse ecosystem, a talented and skilled workforce, robust physical and digital infrastructure, a thriving domestic market and unwavering

support from the Government. In summary, practical learning experiences such as internships, co-op programs, or industry projects play a vital role in enhancing students' employability. They provide students with the opportunity to develop relevant skills, gain industry exposure, build networks and demonstrate their readiness for the workplace. Institutions that prioritize and facilitate these experiences contribute to producing graduates who are well-prepared to meet the expectations of employers and excel in their careers.

Studies suggest that institutions with strong career services, job placement programs and a network of employer partnerships are often preferred by employers (Hassock & Hill, 2022; Terzaroli & Oyekunle, 2019). Employers often consider the reputation and prestige of an institution when evaluating candidates. They value degrees from reputable and well-established institutions known for producing high-quality graduates (Nogales *et al.*, 2020). Institutions that have a strong brand image, recognition and a history of producing successful alumni are more likely to be favoured by employers. It is explored, employers appreciate institutions that have strong connections and partnerships with the industry (Hemsley-Brown *et al.*, 2016). They value institutions that actively engage with employers through industry advisory boards, guest lectures, networking events and collaborative research projects. Institutions that facilitate opportunities for employers to interact with students and provide platforms for recruitment, such as career fairs and employer networking events, are attractive to employers.

Employers recognize the importance of soft skills, such as communication, teamwork, problem-solving and leadership abilities, in addition to technical expertise. They appreciate institutions that prioritize the development of these skills through workshops, seminars, leadership programs and extracurricular activities (Cheng *et al.*, 2021; Hassock & Hill, 2022; Scott & Willison, 2021). Institutions that foster a well-rounded education and support the holistic development of students are valued by employers. Employers consider the success and engagement of an institution's alumni network also a parameter of importance. Employers value institutions with active alumni networks that provide opportunities for networking, mentorship and industry connections. Employers often seek graduates from institutions with a strong alumni community that can serve as a source of talent and professional connections (Tomlinson, 2012).

These parameters reflect the priorities and expectations of employers when evaluating the quality of higher education institutions. However, it's important to note that different industries and employers may have specific requirements and preferences based on their respective fields. Institutions that effectively address these parameters and maintain strong connections with the job market are more likely to produce graduates who meet employer expectations.

From a **faculty perspective**, there are several parameters that faculty members often consider when assessing the quality of higher education institutions. Faculty members seek institutions that provide professional development opportunities to enhance their skills and advance their careers (Phuong & Duong, 2022). This includes access to conferences, workshops, seminars and other continuing education opportunities. Institutions that invest in faculty development programs, mentorship initiatives and support for attending professional conferences and workshops are attractive to faculty members. The quality of the teaching environment is a significant factor for faculty members. This includes factors such as class sizes, teaching resources, support for innovative teaching methods, availability of teaching assistants, professional development opportunities for teaching skills and recognition for teaching excellence. Institutions that prioritize teaching quality and provide faculty members with the necessary support and resources for effective teaching are valued by faculty. Faculty members place importance on the availability of research support and resources provided by the institution. This includes research funding opportunities, access to research facilities and equipment, support for grant applications and assistance with research administration. Institutions that prioritize research and provide robust support to faculty members contribute to a conducive research environment and attract researchers who seek opportunities for scholarly advancement.

Academic Reputation is an important thing that faculty members value. This includes factors such as the institution's research output, publications in reputable journals, citations of faculty research, grant funding and recognition within their academic discipline (Valdivieso *et al.,* 2022). Institutions with a strong academic reputation attract talented faculty members who seek to collaborate with colleagues at the forefront of their fields. Faculty members appreciate institutions that promote intellectual freedom and respect academic autonomy. This includes having academic freedom policies that protect faculty members' rights to explore diverse research areas and express

their opinions without fear of censorship or reprisal. Institutions that foster an environment of intellectual inquiry, open dialogue and free expression attract faculty members who value academic freedom (de Matos Pedro *et al.,* 2022).

Faculty members value institutions that foster a collaborative and collegial environment (Ward & Selvester, 2012). This includes opportunities for interdisciplinary collaboration, supportive and inclusive departmental cultures, opportunities for joint research projects and publications and a sense of community among faculty members. Institutions that promote collaboration and provide platforms for intellectual exchange and networking enhance the overall professional satisfaction of faculty members.

Finally, faculty members also value institutions that prioritize work-life balance and support their well-being. This includes flexible work arrangements, family-friendly policies, access to wellness programs and support services and policies that promote a healthy work-life integration. Institutions that prioritize faculty well-being create an environment conducive to productivity, creativity and long-term commitment (Soomro & Ahmad, 2013).

Sustainability perspective can influence the institution's relationships with the local community and industry partners (Torelli, 2021). A positive perception can lead to increased collaboration, support for research and community outreach initiatives and stronger partnerships with businesses and organizations (Schiavo, 2021); (Parusheva *et al.,* 2023). These partnerships can provide valuable resources, internships and employment opportunities for students. From a sustainability perspective, higher education quality parameters can encompass various aspects that promote environmental, social and economic sustainability.

The presence of sustainability-focused or related courses within the curriculum is an important parameter. Institutions that offer a wide range of courses addressing sustainability challenges, such as environmental science, renewable energy, sustainable business practices, or social justice, demonstrate a commitment to equipping students with the knowledge and skills needed to address sustainability issues (O'Byrne *et al.,* 2015). The quality and impact of research conducted by the institution in sustainability-related fields is another parameter. Institutions that prioritize and excel

in research areas such as climate change, sustainable development, conservation, or clean technologies contribute to advancing knowledge and finding solutions to sustainability challenges.

The sustainability practices adopted by the institution in its own operations and infrastructure can serve as a parameter. This includes energy efficiency measures, renewable energy use, waste management systems, water conservation practices, green building certifications and sustainable transportation options. Institutions that demonstrate sustainable practices on their campuses not only reduce their environmental footprint but also serve as examples to students and the broader community. Collaboration with local communities, NGOs, government bodies and industry partners to address sustainability challenges is another important parameter. Institutions that actively engage with external stakeholders and foster partnerships to promote sustainability initiatives, such as community outreach programs, environmental conservation projects, or sustainable development initiatives, contribute to broader social and environmental well-being.

The involvement of students in sustainability-related activities and initiatives can encourage and support student engagement in sustainability issues nurture future leaders and changemakers. The existence of sustainability policies, strategies and practices at the institutional level can serve as an important parameter. Institutions that have well-defined sustainability frameworks and embed sustainability principles into their governance and decision-making processes demonstrate a strong commitment to sustainability.

By considering these sustainability parameters, higher education institutions can evaluate and improve their overall performance in terms of sustainability, fostering a culture of sustainability among students, faculty and staff and contributing to the broader goal of creating a more sustainable society. It is also important to note that sustainability is just one of the performance measures used for higher education institutions. Other factors such as academic quality, research productivity, faculty-student ratio, graduation rates, student satisfaction surveys and financial indicators are also considered in assessing the overall performance and effectiveness of an institution.

2.4 Hypotheses development

The subsequent section delves into the development of hypotheses, establishing a comprehensive framework to investigate the elaborate relationships between the study's dependent variables—namely Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness—and the independent variable, represented by the performance of Higher Education Institutes (HEIs). This performance is measured through the multifaceted lens of public perception, encompassing viewpoints from students, faculty, employers and sustainability considerations. Within this context, the section is dedicated to formulating hypotheses that outline the potential impacts of Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness on public perception. This endeavor is driven by the overarching goal of crafting a comprehensive model tailored to elevate the quality of the Higher Education system within India.

Central to this effort is the intention to fortify the capabilities of our engineers, enabling them to effectively navigate the competitive landscape. The research at hand is motivated by the aspiration to construct a holistic model-Augmenting Quality in Higher Education (AQHE) model-dedicated to enhancing the quality of Engineering Educational Institutes (EEIs) across the Indian educational landscape.

Academic Culture, Student Satisfaction and Performance of Higher Education Institutes

The studies have established the fact that academic culture is a critical factor that impacts higher education performance. A positive academic culture helps in promoting academic excellence, research, innovation and overall institutional growth and development. These components play an essential role in improving the overall performance of higher education institutions.

Institutions that prioritize these factors have a competitive edge in attracting quality faculty and students, enhancing institutional reputation and credibility and contributing to India's knowledge economy. The literature review provides an overview of research on the role of academic culture in the overall performance of higher education institutions.

Numerous studies in the field of higher education have explored the relationship between

academic culture and student satisfaction, recognizing the significance of the institutional environment in shaping students' experiences and overall satisfaction. A study (Kuh *et al.,* 2008) emphasized the importance of academic culture in influencing student engagement and satisfaction. It revealed that a supportive academic culture, characterized by high expectations, rigorous academic standards and faculty-student interaction, positively impacted student satisfaction. Research also (Trowler & Trowler, 2010) examined the influence of academic culture on student satisfaction in the context of a diverse student body. Findings showed that a positive academic culture, including a sense of belonging, a supportive learning environment and inclusive practices, significantly contributed to higher levels of student satisfaction. Pike *et al.,* (2011) examined the influence of academic culture on student satisfaction and retention. The study highlighted the significant contributions of academic support systems, including effective advising and mentoring for the enhancement of student contentment. A strong academic culture that prioritized student success and provided necessary support mechanisms positively influenced student satisfaction and persistence.

Research by Kim & Lundberg, (2016) explored the association between academic culture, faculty-student interaction and student satisfaction. The findings indicated that a positive academic culture, characterized by engaged faculty members, accessible support services and a nurturing learning environment, significantly contributed to higher levels of student satisfaction (Brick *et al.,* 2020). The results demonstrated that a supportive academic culture, including effective teaching practices, student-centered approaches and a positive learning climate significantly correlated with higher levels of student satisfaction (Thornberg, Forsberg, Chiriac, *et al.,* 2020). Literature consistently highlights the importance of academic culture in shaping student satisfaction. A positive academic culture, characterized by supportive and inclusive practices, effective support systems and high academic standards, plays a vital role in fostering student satisfaction and overall success in higher education (Sanger, 2020).

The literature suggests that a positive academic culture, characterized by a focus on teaching quality, research excellence, faculty-student relationships and supportive learning environments, has a significant impact on student satisfaction. Higher levels of student satisfaction, in turn, contribute to a positive public perception and reputation of higher education institutions.

Academic culture plays a crucial role in shaping both student experiences and the external perception of the institution by the public.

Studies explored the relationship between academic culture and public perception of higher education institutions (Bhatnagar *et al.,* 2020; Cox *et al.,* 2011; Ostojić & Leko Šimić, 2021). It found that an institution's academic culture, characterized by a strong focus on teaching quality, research excellence and community engagement, positively influenced public perception and reputation. Research by Kuh et al. (2008) study examined the link between academic culture, student satisfaction and public perception. The findings indicated that a positive academic culture, including supportive faculty-student relationships, challenging academic standards and a stimulating learning environment, contributed to higher levels of student satisfaction. Increased student satisfaction, in turn, positively influenced the institution's public perception and reputation. Similarly, study on the relationship between academic culture and public perception emphasized the role of faculty in shaping both student experiences and public opinion (Cox *et al.,* 2011). It revealed that an academic culture that valued teaching excellence, student support and innovative pedagogies positively influenced student satisfaction and enhanced the institution's public perception.

Research by Altbach & Knight, (2007) explored the impact of academic culture on public perception and international rankings of higher education institutions. The findings indicated that a strong academic culture, characterized by research productivity, academic reputation and faculty expertise, played a significant role in enhancing the institution's public perception and global recognition. A study by Dill, D.D. & Soo, M. (2005) examined the association between academic culture, student satisfaction and public perception in the context of diverse institutional missions. The findings highlighted that a congruence between the academic culture and the institution's stated mission positively influenced both student satisfaction and public perception.

The literature suggests that a positive academic culture, characterized by a focus on teaching quality, research excellence, faculty-student relationships and supportive learning environments, has a significant impact on student satisfaction (Liem, 2019; Thornberg *et al.,* 2022). Higher levels of student satisfaction, in turn, contribute to a positive public perception and reputation of higher

education institutions. Academic culture plays a crucial role in shaping both student experiences and the external perception of the institution by the public.

H1. There is a positive relationship between Academic Culture and Student Satisfaction.

H2. There is a positive influence of Academic Culture with mediation of Student satisfaction on Public Perception.

Employee Attractiveness, Transnational Branding and Public Perception

This study focuses on the concept of transnational branding often referred to branding in higher education. Transnational branding refers to the practice of creating and promoting a brand identity that extends beyond national borders, aiming to resonate with diverse consumers across different countries and cultures (Broucker *et al.,* 2021; Waqas, 2021). In the context of higher education, branding plays a crucial role in attracting students to institutions. Higher education institutions strive to attract students to their programs and a strong brand can serve as a competitive advantage in a highly saturated market. By developing a distinctive brand image and message, institutions can stand out from the competition and appeal to prospective students (Perera *et al.*, 2022).

Moreover, a strong brand in higher education can contribute to the overall reputation of the institution. A reputable brand enhances the perception of quality and excellence, which can attract not only students but also opportunities for collaboration, research partnerships and funding. A positive brand image can instill trust and confidence among stakeholders, including students, faculty, alumni and the public. This, in turn, can lead to increased student satisfaction, higher levels of engagement and a positive perception in the eyes of the public. Overall, transnational branding in higher education plays a significant role in attracting students, building reputation, fostering partnerships and enhancing the overall success and sustainability of institutions. By cultivating a strong and cohesive brand, higher education institutions can effectively position themselves in the global marketplace and differentiate themselves from competitors, ultimately leading to increased student enrollment and a positive impact on the institution as a whole.

Although there is limited research specifically examining the relationship between transnational branding and student satisfaction in higher education, several studies have explored the broader connection between branding and student satisfaction. These studies provide insights into how

branding efforts can influence students' perceptions and experiences, thus indirectly affecting their satisfaction levels. Branding in higher education involves creating a distinct and recognizable image that resonates with prospective students. A strong brand can influence students' perceptions of an institution's quality, reputation and fit with their personal values and aspirations. When students perceive alignment between their expectations and the brand promise of an institution, it can lead to higher levels of satisfaction. Research by Kim & Kim, (2017) examined the impact of university branding on student satisfaction and found a positive relationship between the two. They highlighted the importance of consistent brand communication and the role of branding in shaping students' expectations and experiences. Similarly, a study by Alhaza *et al.,* (2021) explored the influence of brand image on student satisfaction in higher education, revealing a significant relationship between the two variables.

Furthermore, transnational branding, with its focus on appealing to diverse audiences across different countries and cultures, can contribute to student satisfaction in several ways. First, an institution with a strong transnational brand can attract a diverse student body, creating a multicultural and inclusive learning environment. This diversity can enhance students' satisfaction by providing opportunities for cross-cultural interactions, exposure to different perspectives and a richer overall educational experience. Second, transnational branding efforts often emphasize global opportunities and connections, such as study abroad programs, international partnerships and career prospects across borders (Ruiz-Real *et al.,* 2020; Sataøen, 2015). Students who are drawn to such opportunities and who feel supported in their pursuit of a global mindset are likely to experience higher levels of satisfaction. Lastly, a well-established transnational brand can signal institutional quality and excellence, influencing students' perceptions of the education they will receive. When students perceive an institution as reputable and aligned with their educational goals, they are more likely to be satisfied with their choice and the overall learning experience (Amerstorfer & Freiin von Münster-Kistner, 2021; Barbera & Linder-Vanderhoof, 2013; Rajabalee & Santally, 2021).

It is important to note that student satisfaction is a complex construct influenced by various factors beyond branding, such as teaching quality, curriculum, support services and campus culture. However, transnational branding can play a complementary role by shaping students' initial

expectations, attracting a diverse student body, providing global opportunities and signaling institutional quality—all of which contribute to overall student satisfaction (Ashour, 2018). Further research specifically focusing on the relationship between transnational branding and student satisfaction would provide valuable insights into the unique dynamics at play in the context of international students and diverse cultural backgrounds.

The relationship between public perception and employee attractiveness is an important aspect for organizations across various industries including the higher education sector (Wang *et al.*, 2019; Yameen *et al.*, 2020). Employee attractiveness refers to the desirability of an organization as an employer in the eyes of potential employees. When an institution of higher education has attractive employees who excel in their roles, it can positively influence public perception (Reis & Braga, 2016; Wang *et al.*, 2019). The expertise, teaching excellence, research contributions, faculty success and community engagement of attractive employees can collectively contribute to a positive image of the institution, attracting students, garnering support from stakeholders and enhancing the institution's overall reputation (Kreber, 2002; Zou *et al.*, 2020). When an institution of higher education is seen as having satisfied employees, it can positively influence how the public perceives the institution. In context to higher education, good employee experience refers to how well they are treated and that plays a crucial role in shaping the overall service quality provided by higher education institutions (Kreber, 2002). Satisfied and engaged employees are more likely to deliver high-quality services, which can positively influence the public's perception of the institution. Employee experience encompasses various aspects such as job satisfaction, work environment, organizational culture and opportunities for professional growth and development. Engaged employees are committed to their work, feel a sense of ownership and have a strong emotional connection to the institution. Research suggests that engaged employees are more likely to go the extra mile to deliver exceptional service and positively impact the public's perception. Their enthusiasm and dedication can create a favorable impression of the institution and contribute to a positive perception.

The relationship between public perception and transnational branding is a critical aspect of branding strategies in various industries, including higher education. Public perception refers to the collective opinions, beliefs and attitudes held by the general public towards a particular entity

or organization. Transnational branding, on the other hand, involves creating a consistent brand identity and message that resonates with audiences across different countries and cultures. The way the public perceives an institution's brand can have a significant impact on its reputation, credibility and overall success. A positive public perception of an institution results in increased trust, credibility and support from various stakeholders, including prospective students, parents, alumni, funding agencies and the community at large.

Transnational branding plays a crucial role in shaping public perception. By effectively developing and promoting a strong brand image that transcends national boundaries, institutions can influence how they are perceived by the public. A well-executed transnational branding strategy can create positive associations, differentiate an institution from its competitors and establish a unique value proposition in the minds of the target audience. When an institution successfully implements transnational branding efforts, it can shape public perception in several ways. Firstly, a consistent and compelling brand message can enhance the institution's visibility and recognition, making it more memorable and influential among the public. This increased visibility can lead to positive perceptions and associations with the institution's values, offerings and achievements (White & Murray, 2015).

Secondly, transnational branding can help establish the institution as a global leader or a preferred choice for international students, faculty and partners. A strong transnational brand can communicate the institution's commitment to diversity, global perspectives and excellence in education, research and innovation. This positioning can attract stakeholders who value internationalization and seek opportunities for collaboration, cultural exchange and exposure to a global network. Moreover, transnational branding can positively impact public perception by fostering a sense of trust, reliability and quality associated with the institution. When an institution consistently delivers on its brand promises across different locations and cultures, it can build a reputation for excellence, leading to positive perceptions among the public. perceives its identity, values, strengths and impact.

Overall, effective transnational branding can shape public perception in a favorable manner. By consistently and strategically managing their transnational brand, institutions can influence public

perception, enhance their reputation and attract stakeholders who align with their values and aspirations. The image and reputation of an institution, as perceived by the public, can significantly impact the interest and desire of job seekers to work in that institution. Positive public perception, driven by effective transnational branding efforts, can enhance the institution's appeal and make it more attractive to prospective employees.

The relationship between public perception, transnational branding and employee attractiveness in the context of higher education is an important area of study that has received some attention in the literature (White & Murray, 2015; Yameen *et al.*, 2020). Although limited, existing research provides insights into how transnational branding efforts can influence public perception and can employee attractiveness of an institution be influencing public perception.

H3. There is a positive relationship between Transnational Branding and Student Satisfaction.
H4. There is a positive relationship between Transnational Branding and public perception.
H5. There is a positive influence of Transnational Branding with mediation of student satisfaction on public perception.
H6. There is a positive relationship between Employee Attractiveness and public perception.
H7. There is a positive relationship between Student Satisfaction and Public Perception

Designing a model for augmenting quality for higher education (AQHE) in engineering institutes in India

Current research focuses on designing a model for enhancing the quality of the Higher Education system in India, which will boost our engineers' ability to face competition and thus improve excellence in every sphere of trade and commerce. This research has been undertaken to design a holistic model- Augmenting Quality in Higher Education (AQHE) which will help augment the quality in Engineering Educational Institutes (EEIs) in India. Enhanced quality willboost the ability of our engineers to face competition and improve excellence in every sphere of trade and commerce. The Augmenting Quality for Higher Education (AQHE) model will aim toenhance the quality of engineering education in institutes (EEIs) across India. By incorporating various dimensions of quality, including curriculum design, teaching methodologies, faculty

development, infrastructure, industry collaboration and student support services, the AQHE model provides a comprehensive framework for institutes to elevate their educational standards. This paper presents an overview of the AQHE model, its key components and its potential impact on engineering institutes in India. This model will embrace a balanced emphasis among the different core functions of EEIs to provide a basis for developing an environment conducive to their implementation. This research has referred to the IEQMS (Integrated Educational Quality Management System) model. The AQHE model will offer a comprehensive framework for engineering institutes in India to elevate the quality of education and meet the evolving needs of the industry. By addressing key dimensions of quality, this model will have the potential to enhance the learning experience, employability and overall outcomes of engineering graduates.

H8. There is a positive influence of Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness on Public Perception, which can be enhanced by AQHE model.

2.5 Chapter Summary

This chapter explores the existing body of literature concerning academic culture, student satisfaction, branding and employee attractiveness. Various studies have examined the relationships between academic culture (AC) and student satisfaction (SS), as well as student satisfaction and public perception. Additionally, research has been conducted on the impact of branding (BR) on student satisfaction (SS) and public perception (PP). Furthermore, literature on employee attractiveness has been examined. The present study identifies several key factors. This chapter presents a brief of Critical Success Factors and Performance indicator, considered in the study. This chapter also projects the research hypotheses as derived from literature.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

This chapter presents the research methodology employed to accomplish the objectives of the research. It outlines the various phases of the research process and provides a comprehensive understanding of the methodology implemented.

Section 3.1: This segment underscores the indispensable necessity and relevance of the study within the context of the research topic. It prominently highlights the gaps or issues identified that have spurred the research, underscoring the paramount importance of addressing these concerns. Section 3.2: In this section, the scope of the study is encapsulated, demarcating the boundaries and confines of the research. This portion specifies the target population, geographical extent and temporal framework of the investigative endeavor. Section 3.3 delineates the research objectives serving as guiding beacons for the study. These objectives distinctly orient the research process. Section 3.4 unveils the research design and survey instrument utilized for data collection, providing a sneak peek into the chosen methodology and rationalizing its adoption in line with the research objectives. Section 3.5 expounds on the strategies embraced to gather information from the selected sample. This part encompasses sampling intricacies and elucidates the process of demarcating the survey area. Furthermore, it delves into the pilot study that refined the data collection process. Section 3.6 examines the validity and reliability of the survey instrument. Section 3.7 elaborates on the analysis methodologies applied to meticulously dissect the amassed data. It expounds on the rationale guiding the choice of methods, offering an overview of the analytical procedures employed to interpret the data and address the research questions or hypotheses. Section 3.8 represents Research Framework Illustration. Within this section, a pictorial representation or diagram is presented to visually elucidate the research framework. This visual portrayal offers a comprehensive panorama of the research model, accentuating the interrelations between variables and key components. Section 3.9 represents the Proposed Conceptual Model and introduces the proposed conceptual model, furnishing a comprehensive framework that integrates the pivotal concepts and variables studied. This conceptual model

provides a theoretical foundation for comprehending the research topic. This chapter concludes through Section 3.10 which underscores the profound significance of the research methodology in accomplishing the study objectives. It sets the stage for the subsequent chapters, creating a seamless transition to the unfolding discourse.

3.1 Need and relevance of the study

The study is based on the critical success factors in higher education institutions. These include academic culture; academic environment; academic operations; student engagement; learning assessment; student satisfaction; employability of students; faculty involvement; employee attraction; and branding of the institution. This study has been undertaken to address the gap considering these critical success factors comprehensively and examining their interplay in shaping the success of higher education institutions. Higher education institutions operate in a dynamic environment and face wide and diverse challenges. Understanding the importance of critical success factors will help in institutional decision-making. Findings from this research can provide evidence-based insights to institutional leaders, policymakers and stakeholders for making informed decisions about resource allocation, strategic planning and policy formulation.

Higher education institutions are constantly striving for excellence and effectiveness. Identifying and understanding the critical success factors that contribute to the success of these institutions can help them enhance their overall effectiveness. For example, fostering a positive academic culture and environment, optimizing academic operations, promoting student engagement, implementing effective learning assessments, ensuring student satisfaction, improving employability of students, encouraging faculty involvement, attracting and retaining talented employees and building a strong institutional brand can all contribute to the overall success and effectiveness of higher education institutions. Students are at the center of higher education institutions and their success is a key indicator of institutional effectiveness. Understanding the critical success factors that impact student outcomes, such as student engagement, learning assessment, student satisfaction and employability, can help institutions tailor their strategies and policies to better serve their students. For example, planning engaging learning experiences, implementing effective assessment practices, ensuring high levels of student satisfaction and enhancing students' employability skills can all contribute to improved student outcomes and

success. The landscape of higher education is constantly evolving, with changing student demographics, technological advancements and global market demands. Institutions need to adapt to these changes to remain relevant and competitive. Understanding the importance of critical success factors such as faculty involvement, employee attraction and branding can help institutions adapt to the changing educational landscape by attracting and retaining top talent, building a strong institutional brand and positioning themselves effectively in the market. The rationale for the study is to contribute to the existing literature, indulge in informed decision-making, enhance institutional effectiveness, improve student outcomes and respond to the changing educational landscape. The findings from this study can provide valuable insights for institutional leaders, policymakers and stakeholders to make evidence-based decisions that can contribute to the success and sustainability of higher education institutions.

The relevance of the designed research model considering employability skills and implementing branding efforts will assist in meeting the evolving demands of the industry and produce competent engineering graduates. The proposed model recognizes the importance of equipping engineering graduates with the requisite skills to succeed in the job market. In today's competitive environment, employers seek candidates who possess not only technical knowledge, but also a range of transferable skills such as critical thinking, communication, problem-solving and teamwork. By focusing on enhancing employability skills, the model aligns educational outcomes with industry requirements, increasing the graduates' chances of securing meaningful employment.

The proposed model acknowledges the evolving nature of the industry. Technological advancements, globalization and changing market trends continuously reshape the demands and expectations placed on engineering professionals. By adapting and responding to these evolving demands, it ensures that graduates are well-prepared and equipped with the necessary knowledge and skills to contribute effectively to the industry. This relevance ensures that graduates are not only competent, but also adaptable to the changing needs of industry.

The proposed model recognizes the significance of branding in promoting and positioning higher education institutions. Effective branding efforts enhance the reputation and visibility of the institution, attracting prospective students, employers and stakeholders. By strategically aligning

the educational offerings with the industry demands, the study will aim to establish a strong brand identity that showcases the institution's commitment to producing competent HE graduates. This, in turn, can lead to increased student enrollment, partnerships with industry players and improved overall institutional performance.

The research acknowledges the importance of student satisfaction and its impact on the perception of higher education institutions. By prioritizing student engagement, learning assessment, career services and employability skills development, it seeks to enhance the overall student experience. Satisfied and engaged students are more likely to become brand advocates, positively influencing the institution's reputation and attracting future students. The focus on the student perspective ensures that the proposed research is student-centric and addresses their needs and aspirations.

In summary, the relevance of research lies in its proactive approach to aligning education with industry demands, developing employability skills and implementing effective branding efforts. By doing so, it aims to produce competent engineering graduates who are well-prepared for the job market and meet the surfacing needs of the industry. Ultimately, this research should lead to increased employability, institutional reputation and student satisfaction.

3.2 Scope of the study

The scope of a study is to design a model to enhance the quality of higher education by examining the interrelationship between academic cultures, student satisfaction, employee attractiveness and branding and their impact on public perception. The study would investigate different academic cultures within higher education institutions (HEIs). This could include examining factors such as institutional values, teaching methodologies, academic environment, support services and overall academic climate. The aim would be to understand how these factors influence student satisfaction, employee attractiveness and public perception. The study would explore the factors that contribute to student satisfaction within HEIs. This could include investigating student engagement, learning assessment practices, career services and the development of employability skills. Understanding the relationship between these factors and student satisfaction is essential for improving the overall quality of education and meeting students' needs and expectations. The study would examine the factors that make an institution attractive to employees, including faculty members and staff. This could involve analyzing aspects such as compensation, career

development opportunities, work-life balance, organizational culture and support for research and professional growth. Investigating the interplay between employee attractiveness and otherfactors in the model can help identify strategies to attract and retain talented and motivated facultyand staff members. The study would assess the branding efforts of HEIs and their impact on public perception. This would involve analyzing how institutions promote their strengths, values, achievements and unique offerings to stakeholders, including prospective students, parents, employers and the wider community. Understanding how branding influences public perception and its relationship with other factors in the model can provide effective branding strategies to enhance the institution's reputation and attract diverse stakeholders. The study would explore the role of public perception in evaluating the quality of HEIs. This could involve investigating how stakeholders perceive the institution's academic culture, student satisfaction levels, employee attractiveness and branding efforts. By understanding the relationship between these factors and public perception, institutions can develop strategies to shape positive perceptions and address any negative perceptions or misconceptions.

The scope of the study will likely involve a combination of qualitative and quantitative research methods, such as surveys, interviews and data analysis. The findings will contribute to the development of a comprehensive model that highlights the interdependencies between academic cultures, student satisfaction, employee attractiveness, branding efforts and public perception, ultimately leading to recommendations and strategies for enhancing the quality of higher education.

3.3 Objectives of the study

Considering the aforementioned need and scope, the present study has been embarked upon, guided by the following objectives:

O1: To analyze the relationship between Academic Culture and Student Satisfaction.

O2: To analyze the relationship among Academic Culture, Student satisfaction and Public Perception.

O3: To analyze the relationship between Transnational Branding and Student Satisfaction.

O4: To analyze the relationship among Transnational Branding; Employee Attractiveness and Public Perception.

O5: To design a model for augmenting quality in higher education in Engineering Institutes in North India.

3.4 Research design and Research methods

The attainment of objectives in any study hinges significantly upon crucial factors such as research design, sampling strategy, data collection sources and practices, as well as data analysis methods. This section offers a comprehensive outline of these fundamental elements and encompasses details about the survey instrument employed for data gathering, including its validity and reliability assessment.

3.4.1 Research Design

The research design delineates the scheme and approach for conducting the study. It encompasses the structure, framework and approach utilized to address research questions or objectives. The design selected for this study is empirical research design, which was chosen due to its appropriateness in investigating the research problem and achieving the study's goals. Empirical research aims to gather evidence and test hypotheses or research questions through gathered data. It's important to note that empirical research design can vary depending on the discipline, methodology and specific research goals. Researchers tailor their designs to address their unique research questions and apply appropriate methods and techniques to collect and analyze empirical data.

The investigation employs a blend of exploratory and descriptive research designs to formulate the conceptual framework. Factors like ‘Academic Environment,' 'Academic Operations,' and ‘Teaching and Learning Pedagogies,' were investigated using both exploratory and descriptive approaches. The factors of ‘student engagement’, ‘learning Assessment’, ‘Skill set for employability’ and ‘Career Services’ primarily employed a descriptive research design. Literature support was utilized to analyze the factors of Branding and ‘Employee Attractiveness' making it a blend of exploratory and descriptive research design. The utilization of a descriptive research design aimed to gauge the Higher Education Public Perception construct. Significantly, components like 'employability skill set,' 'career services,' and 'branding,' among other aspects,

had not undergone prior scrutiny and validation using the same labels. Thus, the study embodies elements of both exploratory and descriptive designs.

3.4.2 Survey Instrument

For this study, primary data was acquired utilizing a survey instrument presented in the form of a questionnaire. The questionnaire was meticulously crafted to suit the unique requirements of this research and was tailored to align with the research objectives. To ensure its content validity, a rigorous review process involving domain experts was conducted, while its reliability was evaluated through pilot testing and statistical analyses. The study's respondents encompassed both faculty members and students from engineering institutes located in five North Indian states: Punjab, Haryana, UT of Chandigarh, Uttar Pradesh and Delhi NCR. The study's population consisted of all faculty members and students within these institutions. While the majority of items in the research facilitation scale were taken and adapted from Pal Pandi (2016), other items such as 'branding' and 'employee attractiveness' were self-designed, with inputs from literature. Academic culture and academic services referred to as academic operation in this study are supported by (Burhanuddin *et al.,* 2023). Literature support for the concept of ‘academic environment’ was derived from (Ugodulunwa & Adeyemo, 2016).

The scale items for the concept of 'Teaching and learning pedagogies' were originally derived from a study by Patfield *et al.,* 2022. According to their research, effective pedagogy should prioritize the development of a deep understanding of important ideas among students. Furthermore, pedagogy should aim to create a productive classroom environment that facilitates student learning. Additionally, providing students with good quality resources is essential and pedagogy should ultimately help students recognize the value in what they are learning. Conversely, the scale items for the concept of 'Student engagement' were derived from Zhoc et al. (2019). The researchers provided a set of scale items that measure student engagement in the learning process. The scale items for the concept of 'Learning assessment' were adopted and modified from previous studies conducted by Goss, 2022 and Rawlusyk, 2012. These studies likely provided a foundation of assessment-related scale items, which were then adjusted or customizedto fit the specific context or purpose of the current research.

The scale for Employability has been derived from Bennett & Ananthram, 2021. Prakash *et al.,* 2022 and Bendaraviciene -rita *et al.,* 2017 provided scale for employee attractiveness. The scale for Branding was adopted from Rauschnabel *et al.,* 2016 and Spry *et al.,* 2020 while scale for Public Perception was adopted from Srinivasan *et al.,* 2020.

3.4.3 Sampling Design

This is a perception-based study getting inputs through a survey. The study used multi-stage sampling. Initially for short-listing Engineering institutes, National Institutional Ranking Framework (NIRF) was used. NIRF is a ranking framework which was setup on 29th September 2015 and approved by Minister of Human Resource Development (MHRD), Government of India. In the first stage top 50 ranked institutions located in India were selected. From these 50 Institutions, in the next stage, 15 Engineering institutions of India were selected. Finally, responses were collected from these 15 Engineering institutions. Six institutes were public and nine were private. 818 respondents were included in the sample, which covered 318 faculty members and 500 student respondents from top-rated public and private Higher Education Institutes. Informed consent was taken from the respondents. The respondents were duly informed about the reason for undertaking the present research. This research has been carried out to design a model for embracing a balanced emphasis on the necessity for quality academic culture, creating the basics for a student engagement and quality student employability skills for learning environment leading to enhanced student satisfaction.

Data was collected in two waves, from Sept 2020 to June 2021 and from January 2022 to June 2022. In the first wave data were collected from 630 respondents through google forms. In the second phase data was personally collected from selected institutions. There was not much difference in data collected in both waves. Before proceeding further, we employed Harman's common method bias test to see if data was free from bias. Common method bias (CMB) occurs when variations in responses are caused by the instrument, rather than the actual pre-dispositions of the respondents that the instrument attempts to uncover. This may affect the results and there may be inflated variation. Harman's single factor score suggests loading all items (measuring

latent variables) into one common factor. We applied this and the total variance for a single factor was less than 50%, (43.5) suggesting that CMB does not affect the data (Podsakoff *et al.*, 2012).

3.4.4 Sources of data

Main Data Source

The principal data source consisted of a questionnaire that was directly distributed to the faculty and students across all institutes considered in the study. The questionnaire encompassed the pivotal elements under investigation, which include Academic Culture, Student Satisfaction, Employee Attractiveness, Branding and Public Perception. During phase 2, the researcher conducted in-person visits to the institutes to personally collect data.

Additional Data Source

In addition to the questionnaire survey, the study also drew upon a secondary data source, which plays a significant role in the current research. Secondary data forms a substantial component of this study. In addition to the All India Survey on Higher Education (2020-21) report, the research examined a crucial policy document/report issued by FICCI (Federation of Indian Chambers of Commerce and Industry) Higher Education Committee and Ernst and Young, titled "Higher Education in India: Vision 2040." This report enabled the researcher to identify gaps within the higher education landscape that can be addressed to render the present study relevant and viable for practical implementation.

3.5 Data Collection Process and Pilot Study

In order to ensure the accuracy and reduce uncertainty in responses, an initial questionnaire was administered to a sample of 50 faculty members. Convenience sampling was employed for this purpose, allowing for the testing of questions pertaining to various constructs such as Academic Culture, Student Satisfaction, Employee Attractiveness, Branding and Public Perception. Both faculty members and students participated as respondents in this survey. In addition to responding to the questions, participants provided valuable insights that led to refinements in the structure and relevance of the questionnaire. As a result, certain questions were eliminated and the phrasing of others was adjusted based on their feedback. These recommendations were incorporated to

enhance the questionnaire, which ultimately consisted of close-ended questions presented on a 5-point Likert scale. The valuable input received from the pilot study participants contributed to the development of the final questionnaire.

The study uses structured scales for student satisfaction, academic culture, employee attractiveness and transnational branding. A pilot review was conducted on 50 respondents to finalise the scales. Moreover, the scales were validated by 20 experts and faculties from engineering institutions. The Academic Culture scale had three subconstructs viz. i) academic environment; ii) academic operations and iii) teaching and learning pedagogies. The student satisfaction scale had four subconstructs, viz. i) student engagement; ii) learning assessment; iii) career services and vi) skill set for employability. The branding and employee attractiveness scale had three subconstructs respectively. Branding subconstructs consist of (i) Participation inranking and reputation surveys, (ii) Social media engagement and (iii) online presence and partnerships and collaborations. Subconstructs of Employee attractiveness consist of (i) Professional development opportunities, (ii) Employee recognition and rewards and (iii) employee involvement in decision making.

The collection of data was carried out through a survey, following the acquisition of necessary permissions from the respective academic authorities of each university. To accommodate the diverse population comprising subgroups such as students, assistant professors, associate professors, professors and visiting professors, a stratified random sampling technique was employed. This approach ensured that data was collected in proportion to the population within each stratum. The data collection process was initially conducted for the states of Punjab, Haryana and UT of Chandigarh. Subsequently, the study expanded to encompass the two additional states of Delhi NCR and Uttar Pradesh.

Among the 818 respondents who participated in the survey, 20% fell within the age range of 25 to 30 years. The subsequent age bracket of 30 to 35 years constituted 34.4% of the respondents. Faculty members aged 35 to 40 years accounted for 19.5%, while those above 40 years comprised 26.1% of the total.

Regarding academic qualifications, 54% of the faculty held a Ph.D. degree, while 43.9% possessed postgraduate qualifications. In terms of designations, the majority of responses came from assistant professors, followed by associate professors, professors and other designations.

3.6 Validity and Reliability

Validity is the underlying principle that ensures a survey instrument accurately captures the intended information and measures what it intends to measure. Prior to the final survey, the questionnaire employed underwent a validation process conducted by esteemed academicians and faculty members to ascertain its validity. Reliability, on the other hand, pertains to the characteristic of a survey instrument that guarantees consistent results when administered repeatedly over various time periods. It ensures that regardless of when the survey is conducted, the outcomes remain largely similar.

Cronbach's Alpha was employed to assess the reliability of the scales. The commonly accepted threshold value for Cronbach's alpha is 0.70 (Nunnally,1978). Nonetheless, it is important to highlight that higher coefficients indicate enhanced reliability of the measurement tool (Ghauri *et al.*, 1995). The evaluation of validity and reliability was conducted to maintain the robustness of the research findings. The table labeled 3.1 presents the construct-wise reliability scores of the survey instrument. Throughout this study, meticulous care was taken in designing the research, sampling, data collection sources and procedures and data analysis methods to effectively accomplish the study's objectives. The survey instrument used underwent rigorous appraisal to warrant its validity and reliability in accurately capturing the essential data.

Table 3.1: Statistics of Reliability

S. No	Items	Construct	Cronbach Alpha
1	4	Academic Environment	0.741
2	5	Academic Operations	0.773
3	4	Teaching and Learning Pedagogies	0.808
4	10	Student Engagement	0.944
5	7	Learning Assessment	0.939
6	8	Skill set for employability	0.953
7	9	Career Services	0.898
8	10	Employee Attractiveness	0.933
9	12	Branding	0.933
10	5	Student Perspective	0.950
11	14	Sustainability Perspective	0.915

12	5	Faculty Perspective	0.954
13	4	Employer Perspective	0.932

Table 3.1 demonstrates a notable observation that each construct significantly surpasses the 0.70 threshold, signifying the instrument's complete reliability in the study. Furthermore, the collective reliability of all 97 items stands at 0.943, reinforcing the questionnaire's high level of validity and reliability for the current investigation.

3.7 Tools and Techniques

Partial least squares structural equation modelling (PLS-SEM) was applied, as it has high statistical power and is an alternative to CB-SEM, which has many restrictive assumptions, as suggested by Sun & Rueda, (2012). PLS-SEM combines principal components analysis with ordinary least squares regressions (Ergün & Usluel, 2016). While CB-SEM (AMOS) is covariance-based, PLS-SEM is variance-based. The latter applies total variance to estimate parameters, thus leading to its increasing acceptance among researchers (Bonwell & Eison, 1991; Donnellan *et al.,* 2016). As the current research is based on numerous constructs with several items and complex relationships, smart PLS was chosen. PLS-SEM is a nonparametric procedure; a bootstrapping procedure was also applied to examine the loadings and to interpret the indirect effect of a construct.

3.7.1 Structural Equation Modeling (SEM)

Structural Equation Modeling (SEM) is a robust multivariate analysis approach employed to explore intricate relationships between variables. It amalgamates distinct analysis methods as specific instances to assess and depict relationships within a conceptual or theoretical model. SEM serves as a potent technique for understanding complex interconnections among variables.

In SEM, researchers can assess both observed variables (measured directly) and latent variables (not directly measured but inferred from observed variables). It allows for the examination of direct and indirect effects between variables, making it suitable for testing complex hypotheses and theoretical frameworks. By utilizing SEM, researchers can gain valuable insights into the

underlying structures and dynamics of their data, helping them to understand the interconnections and causal relationships between variables in a more comprehensive and robust manner. SEM is widely used in various fields, including social sciences, business, psychology and education, to name a few.

3.8 Research Framework of the study

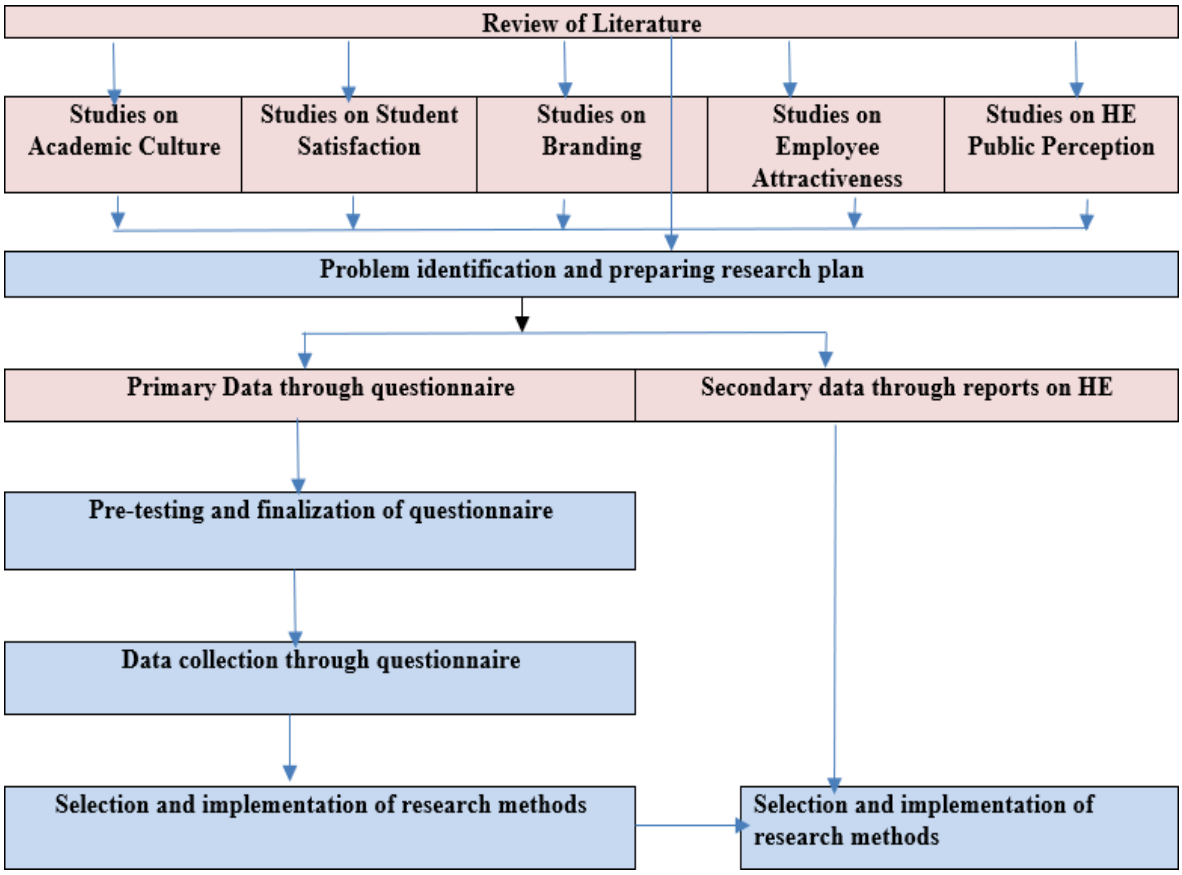

Figure 3.1 Research Framework

3.9 Conceptual Framework

The current research has formulated a structural model, focusing on university faculty members and students from five chosen states in Northern India. The primary aim is to improve the performance of engineering institutes in higher education, particularly in the context of public perception. This study seeks to investigate the influence of factors such as academic culture, student satisfaction, branding and employee attractiveness on the enhancement of HEI

performance.

Student satisfaction is a key indicator of the quality and effectiveness of an institution's educational programs and services (Rajabalee & Santally, 2021). When students are satisfied with their learning experiences, they are more likely to perceive the institution positively and share their positive experiences with others. Positive word-of-mouth feedback from satisfied students can significantly impact the public perception of the institution and attract more potential students (Amoako & Asamoah-Gyimah, 2020). Additionally, satisfied students are more likely to be engaged, motivated and successful in their studies, which further contributes to the institution's performance and reputation (Bell, 2021; Gupta, 2021).

As per research studies, branding enhances the image, reputation and identity of an institution (Foroudi *et al.,* 2019). A strong and positive brand helps create a distinct and recognizable identity in the minds of the public, including prospective students, employers and other stakeholders. Effective branding can position an institution as reputable, innovative and committed to delivering quality education (Amzat, 2016, Sataøen, 2015). Public perception is influenced by the institution's brand and a positive perception can attract students, faculty, fundingand partnerships (Perera *et al.,* 2022). Branding efforts when aligned with the institution's values,strengths and unique selling points create a favorable perception and enhance HEI performance.

The study attempts to examine how Academic Culture (AC) impacts student satisfaction. Academic culture involves academic environment (AE), Academic Operations (AO) and advanced teaching and learning pedagogies (TLP). *Academic environment* consists of items like, there is a strong commitment of management to provide congenial academic environment; information systems of the institution are updated regularly; significant academic guidance to the students is provided; students feedback is considered in policymaking; and there is organized teaching and learning environment. *Academic operations* cover items like information systems of the institution are updated regularly; teaching spaces, student spaces and common areas are as per the global standards; good quality computing /IT resources are available in the institute etc. *Advanced teaching and learning pedagogies* include items like curriculum is revised regularly to encourage innovation and research; laboratories with advanced equipment are available; good

quality books and other resources are available to students; use of smart gadgets for different tasks like teaching, designing question papers, assessment of student, feedback etc. (Nancy *et al.*, 2020); and classrooms are provided with advanced visual and learning aids. Also, well reviewed in literature, the quality and expertise of the faculty and staff significantly contribute tothe overall educational experience and reputation of an institution (Shankar *et al.*, 2020).Institutions with highly qualified and passionate faculty members who are committed to teaching,research and student support are more likely to achieve positive student outcomes (Cents- Boonstra *et al.*, 2020) and have a favorable public perception.

Student satisfaction, branding and employee attractiveness all play crucial roles in enhancing Higher Education performance in relation to public perception (Waqas, 2021). By prioritizing student satisfaction, developing a strong brand identity and attracting and retaining talented employees, institutions can optimistically influence public perception, attract more students and improve their overall performance in the Higher Education sector. Student satisfaction, scale with sub-constructs of student engagement, learning assessment, career services and skill set for employability has been adapted from previous studies (SaliHerdlein & Furner, 2015; Herdlein & Furner, 2015; Khan & Hemsley-Brown, 2021; & Keržič *et al.*, 2021). Employee attractiveness involves attracting and retaining talented and dedicated faculty and staff members (Yameen *et al.*, 2020). Positive faculty-student interactions, effective teaching methods, mentorship opportunities and supportive work environment augment employee satisfaction and engagement (Thornberg, Forsberg, Hammar Chiriac, *et al.*, 2020). Satisfied and motivated employees contribute to improved student experiences, positive public perception and overall institutional performance (Gokarna *et al.*, 2021).

In the final structural model student satisfaction has been identified as the outcome of student engagement (SE), learning assessment (LA), Career Service (CS) and Skill Set for employability of students (SSES). Two other critical success factors identified having an impact on the quality of HEIs are Employee Attractiveness (EA) and Translational Branding (TB). Employee Attractiveness (EA) covers constructs like professional development opportunities available to faculty members; employee recognition and rewards for faculty members; and their involvement in decision making activities. Translational Branding (TB) covers constructs like participation in

ranking and reputation activities; social media engagement and online presence; and finally, partnerships and collaborations. Public perception (PP) is recognized as performance measuring factor and has vital role to play in perceiving the quality standards of the HEIs. Thus, PP acts as a technique to sustain the quality management-controlled strategies and procedures through creating positive Student Perspective (SP), Faculty Perspective (FP), Employer Perspective (EP) and Sustainability Perspective (SusP).

As the current research is based on multiple constructs with several items and complex relationships, PLS-SEM was chosen. Figure 3.2 exhibits the conceptual framework, depicting the associations of the independent variables with the mediating variable and outcome variables. A conclusive path analysis affirms the significant impact of chosen critical success factors on institute performance. Consequently, the study furnishes an empirically validated model that offers insights to stakeholders in the higher education sector, facilitating strategic planning of essential success factors to elevate the overall institute performance.

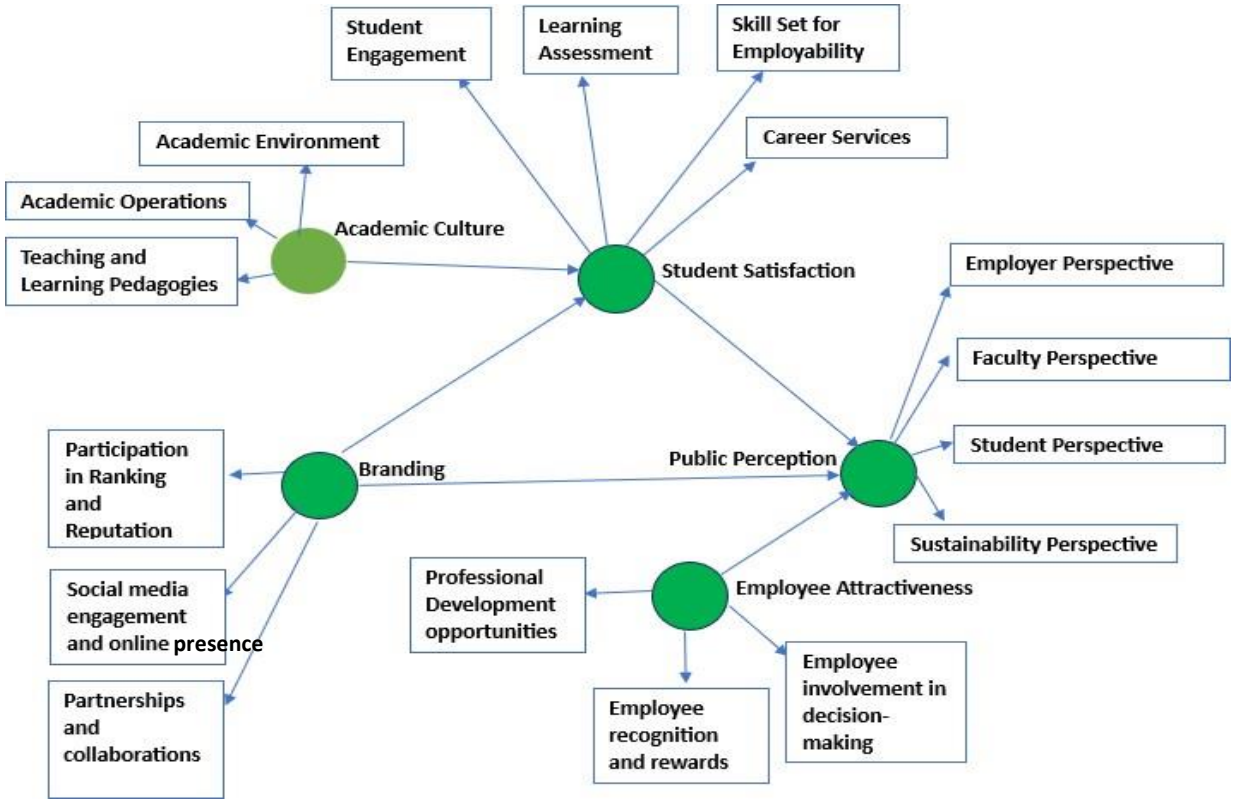

Figure 3.2: Relationship framework between critical success factors and the public perception of higher education institutes

3.10 Chapter Summary

This chapter explains the intricacies of data collection involving both faculty and students within engineering institutes situated across five states: Punjab, Haryana, Uttar Pradesh, UT of Chandigarh and Delhi NCR. Additionally, the chapter comprehensively outlines the research design adopted for the current study. It expounds upon aspects such as the sample framework, questionnaire composition, data collection sources, pilot study details, as well as the validity and reliability of the data. Furthermore, the chapter furnishes insights into the research methods and tools employed to assess the hypotheses, while also introducing the conceptual framework that underpins the study.

CHAPTER 4
DATA ANALYSIS AND INTERPRETATION

This chapter is dedicated to the analysis of the gathered data and its subsequent interpretation for the research study. The findings center on the influence of critical success factors like academic culture, student satisfaction, translational branding (referred to as Branding), employee attractiveness on HE public perception in order enhance its performance. The study explored the critical success factors of higher education public perception for performance enhancement. The critical success factors like academic culture, student satisfaction, transnational branding and employee attractiveness were investigated. The performance was evaluated in terms of public perception created by the higher education institutions covering, student perspective, faculty perspective, employer perspective and sustainability perspective.

Section 4.1 furnishes an overview of the demographic profile of the respondents, facilitating a comprehensive understanding of the sample's characteristics. In Section 4.2, the focus shifts towards exploring key elements such as academic culture, student satisfaction, branding and employee attractiveness, culminating in an assessment of their collective influence on public perception to contribute towards the improvement of institute performance. Ultimately, Section 4.3 encapsulates the concluding remarks.

4.1 Demographic profile

This section encompasses the demographic attributes of the participants in the current study:

4.1.1 Respondent Gender Distribution:

As depicted in Figure 4.1.1, the composition of the sample was bent in favor of male faculty, constituting 62.34% of the total sample size. Conversely, female faculty accounted for 37.65% of the sample.

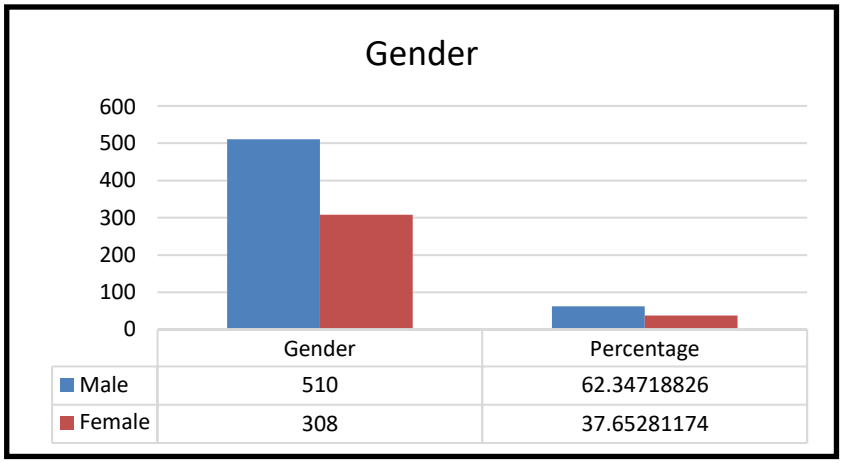

Figure 4.1: Gender Distribution

4.1.2 Age break-up of respondents-

Based on the data depicted in Figure 4.1.2, the highest response rate was observed among academicians aged above 40 years, accounting for 45% of the total responses. Following closely behind were academicians in the age bracket of 30-35 years, constituting 23% of the responses. These findings suggest that the survey garnered the most opinions from moderately established and well-established educators. The next category with notable responses consisted of academicians aged between 35 and 40 years, comprising 19% of the total responses. In contrast, the age range of 25-30 years displayed the least significant response rate, making up only 13% of the total responses. The visual depiction of this information is presented in the graph below.

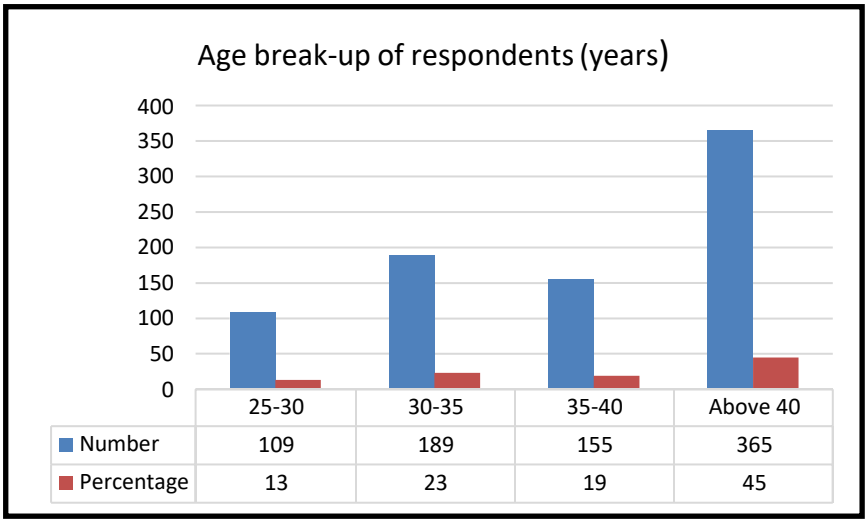

Figure 4.2: Age break-up of respondents

4.1.3 Academic Qualifications of Participants:

The survey encompassed three educational tiers: postgraduate, doctorate and other qualifications. Within the respondent pool, 30.7% reported holding a postgraduate degree, while 64.3% had attained a doctorate qualification. Figure 4.1.3 visualizes the prominence of individuals with a PhD, underscoring a substantial presence of doctorate holders among the surveyed participants.

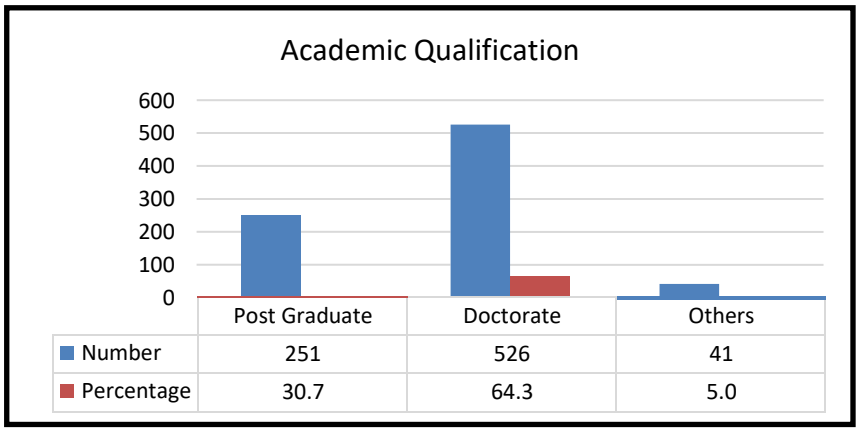

Figure 4.3: Academic qualification of respondents

4.1.4 Respondent Designations:

The study further presents a breakdown of respondents based on their designations. As shown in Figure 4.1.4, the distribution reveals that 60.88% of respondents held the position of assistant professors, while 14.79% were associate professors. The professor category accounted for 19.32%, followed by lecturers and other designations at 3.79% and 1.22% respectively.

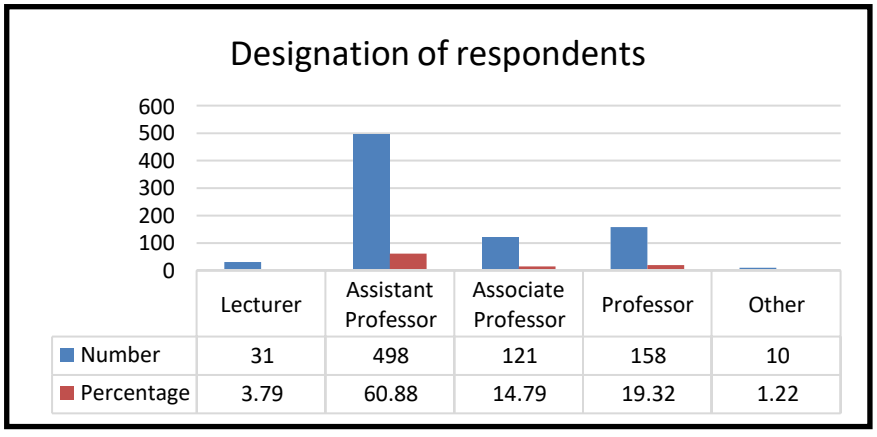

Figure 4.4: Designation of the respondents

4.2 SEM Analysis of critical success factors and their relationships in relation to the public perception of higher education

The basic purpose of the study was to identify the critical success factors and examine their relationships with public perception. Within this section, the data analysis employing SMART-PLS is detailed. This segment of the study divulges the fundamental factors underpinning the primary constructs. Subsequently, Section 4.2.1 outlines the measurement model, while Section 4.2.2 delves into the presentation of the structural model.

4.2.1 Analysis of Critical Success factors and performance of Higher Education in correlations with the public perceptions of the institutes

(i) Measurement model, reliability and validity

The data were checked for reliability and validity and results confirm that all constructs were reliable and valid as reflected through Table 4.1. The study estimates the reliability and validity of the proposed measurement model. The value of Cronbach's alpha, composite reliability (CR) and average variance extracted (AVE) of the model are all reflected through Table 4.1. The reliability and validity are checked. According to Hamid et al. (2017), the composite reliability (CR) value should be greater than 0.70 and AVE value should be greater than 0.50. The results reveal that the value of CR is above 0.70 and AVE is above 0.50 indicating that all the variables are above the acceptable value.

Table 4.1: Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Academic Culture	0.872	0.872	0.921	0.796
Branding	0.818	0.820	0.892	0.735
Employee Attractiveness	0.853	0.861	0.910	0.771
Public Perception	0.884	0.887	0.920	0.743
Student Satisfaction	0.892	0.893	0.925	0.755

As shown in Table 4.2, discriminant validity is in acceptable range and composite reliability is greater than 0.6 and AVE (average variance) ≥ 0.50. Also, the square root of the AVE (latent variables) value is greater than the absolute value of the correlation coefficient among latent

variables. Moreover, as shown in Table 4.2, the diagonal values are higher than the squared inter-construct correlations, indicating that discriminant validity is in acceptable range.

Table 4.2. Discriminant Validity

Fornell Larker Criteria

	Academic Culture	**Branding**	**Employee Attractiveness**	**Public Perception**	**Student Satisfaction**
Academic Culture	0.892				
Branding	0.815	0.857			
Employee Attractiveness	0.810	0.829	0.878		
Public Perception	0.843	0.853	0.857	0.862	
Student Satisfaction	0.799	0.796	0.823	0.865	0.869

Since in this study, survey participant's responses were used, it is vital that the common method bias problem should not be reflected in results. Common method bias (CMB) occurs when variations in responses are caused by the instrument, rather than by the actual pre-dispositions of the respondents. This may result in inflated variation. Harman's single factor score suggesting loading all items (measuring latent variables) into one common factor was applied and the total variance for a single factor was less than 50%, thus reflecting that CMB does not affect the data. The occurrence of a VIF greater than 3.3 is proposed as an indication of pathological collinearity and as an indication that a model may be contaminated by common method bias. We also checked whether all VIFs from a full collinearity test were less than 3.3 thus indicating absence of common method bias. The details as provided in table 4.3 depict that all VIF values for variables used in model were also less than 3 thus, it was thought to proceed ahead with analysis.

Table 4.3: Outer VIF

Constructs	Outer VIF
Academic Environment	2.312
Academic Operations	2.207
Teaching and Learning Pedagogies	2.477
Student Engagement	2.368
Learning Assessment	2.339
Skill Sets for Employability	2.832
Career Services	2.193
Employee Involvement in Decision-Making	2.545
Employee Recognition and Rewards	2.430
Professional Development Opportunities	1.762
Participation in Ranking and Reputation	2.122

Partnerships and Collaborations				2.196	
Social Media Engagement and Online Presence				1.542	
Student Perspective				2.994	
Employer Perspective				2.568	
Faculty Perspective				1.961	
Sustainability Perspective				2.330	
Inner VIF					
	Academic Culture	**Branding**	**Employee Attractiveness**	**Public Perception**	**Student Satisfaction**
Academic Culture					2.977
Branding				2.673	2.977
Employee Attractiveness				2.168	
Public Perception					
Student Satisfaction				2.557	

Factor loadings (Table 4.4) for all subdimensions were greater than 0.70. As all subdimensions of all scales, viz. Academic Culture, Student Satisfaction, Branding and Employee Attractiveness were as per the defined statistical criteria, the measurement model was validated. Thiswas enough to suggest moving further with the structural model to find the status of the proposedhypotheses.

Table 4.4: Outer Loadings

Scales	**Sub-scales**	**Original Sample (O)**	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T Statistics (|O/STDEV|)**	**P Values**
Academic Culture	Academic _Environment <- Academic Culture	0.888	0.888	0.010	85.919	0.000***
	Academic _Operations <- Academic Culture	0.889	0.888	0.011	78.275	0.000***
	Teaching and Learning _Pedagogies <- Academic Culture	0.899	0.899	0.010	90.312	0.000***
Student Satisfaction	Student_ Engagement <- Student Satisfaction	0.859	0.859	0.013	63.739	0.000***
	Learning _Assessment <- Student Satisfaction	0.863	0.862	0.011	76.192	0.000***
	Career _Services <- Student Satisfaction	0.860	0.860	0.012	68.856	0.000***
	Skill Sets_ for Employability <- Student Satisfaction	0.894	0.894	0.011	81.053	0.000***
Branding	Participation in Ranking _and Reputation <- Branding	0.874	0.873	0.011	82.607	0.000***

	Social Media Engagement _ and Online Presence <- Branding	0.809	0.808	0.017	46.279	0.000***
	Partnerships and _Collaborations <- Branding	0.887	0.887	0.010	91.817	0.000***
Employee Attractiveness	Professional Development _Opportunities <- Employee Attractiveness	0.866	0.866	0.008	105.206	0.000***
	Employee Involvement_ in Decision-Making <- Employee Attractiveness	0.890	0.889	0.011	82.586	0.000***
	Employee Recognition _and Rewards <- Employee Attractiveness	0.878	0.878	0.012	75.927	0.000***
Public Perception	Employer _Perspective <- Public Perception	0.869	0.868	0.011	76.727	0.000***
	Faculty _Perspective <- Public Perception	0.815	0.815	0.015	53.657	0.000***
	Student _Perspective <- Public Perception	0.906	0.906	0.007	135.906	0.000***
	Sustainability_ Perspective <- Public Perception	0.855	0.855	0.013	66.486	0.000***

*** $p \leq 0.001$

4.3 Structural Model

This section is related to Critical success factors and their influence on public perception.

Table 4.5: Path Coefficients: Mean, STDEV, T-Values, P-Values

		Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	F Square
H1	Academic Culture -> Student Satisfaction	0.448	0.447	0.033	13.756	0.000***	F^2= 0.226 (Medium)
H3	Branding -> Student Satisfaction	0.431	0.432	0.032	13.531	0.000***	F^2= 0.209 (Medium)
H4	Branding -> Public Perception	0.300	0.300	0.027	11.073	0.000***	F^2= 0.219 (Medium)
H6	Employee Attractiveness -> Public Perception	0.325	0.326	0.025	12.994	0.000***	F^2= 0.362 (Large)
H7	Student Satisfaction -> Public Perception	0.380	0.380	0.027	14.140	0.000***	F^2= 0.227 (Medium)

	Indirect Effect						
H2	Academic Culture -> Student Satisfaction -> Public Perception	0.170	0.170	0.018	9.608	0.000***	
H5	Branding -> Student Satisfaction -> Public Perception	0.164	0.164	0.016	10.091	0.000***	
		R Square			**R Square Adjusted**		
	Public Perception	0.887			0.886		
	Student Satisfaction	0.701			0.700		

(Note: Guidelines for assessing $f2$ are (Cohen, 1988): values of 0.02, 0.15, and 0.35, respectively, represent small, medium, and large effects of an exogenous latent variable on an endogenous latent variable. Effect size values of less than 0.02 indicate that there is no effect.)

4.3.1 Interrelationship among Academic Culture, Student satisfaction and Public Perception

The first and second objectives of the study are as under:

O1: To analyze the relationship between Academic Culture and Student Satisfaction.

O2: To analyze the relationship among Academic Culture, Student satisfaction and Public Perception.

The hypotheses formulated in Chapter 2, as reviewed in the literature, were subjected to testing and the results are illustrated in this section.

H1. There is a significant relationship between Academic Culture and Student Satisfaction.

H2: There is a positive influence of Academic Culture with mediation of Student satisfaction on Public Perception.

The current research was undertaken to not only deliver a more in-depth exploration of different features of public perception of the HEIs of India, but also to provide a more nuanced analysis of associations between the aspects of academic culture, student satisfaction, transnational branding and employee attractiveness. The association between all these parameters is significant and positively correlated (See Figure 4.5), which is in line with the findings of earlier studies (Memon *et al.,* 2022).

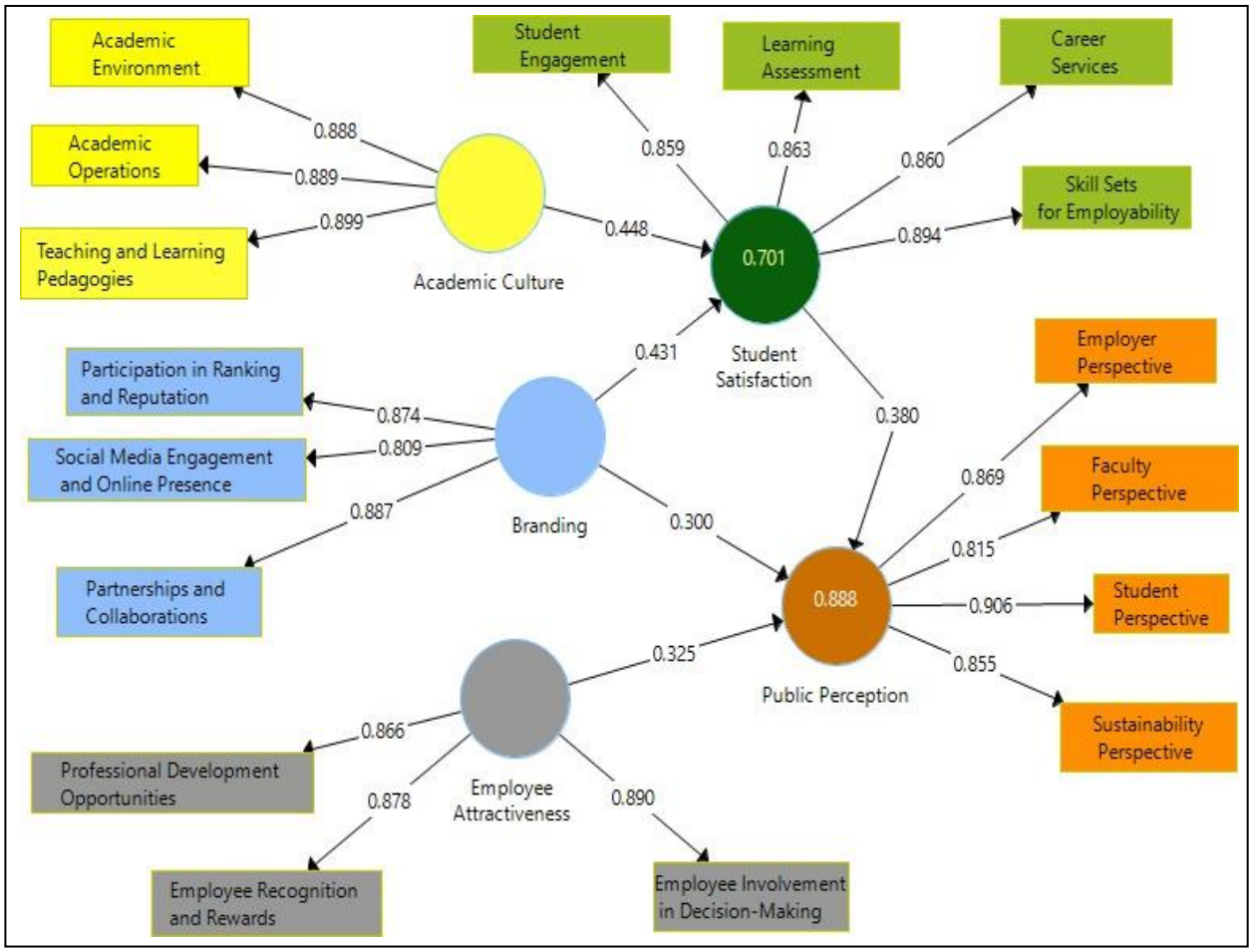

Figure 4.5: AC-SS-EA-TB-PP relationships

As highlighted through figure 4.5 and Table 4.4 the factor loadings for all sub-constructs of student satisfaction (SS) were in the range of 0.859 to 0.894. Moreover, all factor loadings were significant too. The factor loadings of the construct of Academic Culture consisting of: i) Academic environment (AE), ii) Academic Operations (AO) and iii) Teaching and learning pedagogies (TLP) were also significant and ranged between 0.888 to 0.899. Similarly, the construct of Branding consists of three sub constructs, viz. i) B1 which refers to participation in Ranking and Reputation (for recognition and perception) surveys, ii) B2 which refers to social media engagement and online presence and iii) B3 which refers to Partnerships and collaborations. The factor loadings of these sub constructs of branding ranged between 0.809 to 0.887. The construct of Employee Attractiveness (EA) which had three sub-constructs viz. i) EA1 i.e., Professional Development opportunities, ii) EA2 i.e., Employee recognition and rewards and iii) EA3 i.e., Employee involvement in decision-making processes. All these subconstructs are

significant as their loading were in the range of 0.866 to 0.890.

Next step was to check whether Public Perception was a multi-dimensional construct consisting of: i) Faculty perspective, ii) Student Perspective, iii) Employer Perspective and iv) Sustainability Perspective. Factor loadings of all dimensions, viz. faculty perspective; student perspective; employer perspective; and sustainability perspective were quite good and were greater than 0.815 and were above the acceptable range of 0.70 and $p \leq 0.001$.

The subsequent section deliberates the findings of the study in greater depth to address the articulated research hypotheses. The results lend support to the finding, that there is a significant effect of academic culture on student satisfaction ($\beta = 0.448$; $T = 13.756$; $p \leq 0.001$) as per the Table 4.5. Thus, from these results, it can be inferred that academic culture has a pertinent role to play in enhancing student satisfaction of HEIs. Hence, ***H1.*** *There is a positive relationship between Academic Culture and Student Satisfaction* has been empirically supported. Academic culture mediated ($\beta = 0.448 * 0.380$; $p \leq 0.001$) through student satisfaction and has a significant impact on the public perception of the HEIs. Thus, *H2: There is a positive influence of Academic Culture with mediation of Student satisfaction on Public Perception* has been empirically supported.

4.3.2 Relationship between Transnational branding, Student satisfaction and Public Perception

The third objective of the study is:

O3: To analyze the relationship between Transnational Branding, Student Satisfaction and public perception.

The hypotheses formulated in Chapter 2, as reviewed in the literature, were subjected to testing and the results are illustrated in this section:

H3. There is a positive relationship between Transnational Branding and Student Satisfaction.
H4. There is a positive relationship between Transnational Branding and Public Perception.
H5: There is a positive influence of Transnational Branding with mediation of student satisfaction on public perception respectively.

Transnational Branding has three sub constructs viz i) Ranking and Reputation for recognition and perception surveys, ii) social media engagement and online presence and iii) Partnerships and collaborations. As shown in Table 4.5, the results supported that there is a positive relationship between transnational branding and student satisfaction (β =0.431; T=13.531 $p \leq 0.001$). *Hence H3: There is a positive relationship between Transnational Branding and Student Satisfaction* has been empirically supported. The next hypothesis H4: *There is a positive relationship among Transnational Branding and Public Perception* has been empirically supported as the Beta values are positive and also significant (β=0.300; T=11.073; $p \leq 0.001$). Next was to see the influence of Transnational Branding with mediation of student satisfaction on public perception. On looking at the indirect effect, i.e. Branding -> Student Satisfaction -> Public Perception. The results highlight that Student Satisfaction mediated between Transnational Branding and public perception (β=0.431*0.380; $p \leq 0.001$). Hence *H5: There is a positive influence of Transnational Branding with mediation of student satisfaction on public perception respectively* has been empirically supported.

4.3.3 Interrelationship between Transnational branding, employee attractiveness student satisfaction and Public Perception.

The fourth objective of the study is:

O4: To analyze the relationship between Employee Attractiveness and Public Perception.

The following hypotheses were formulated:

H6: There is a positive relationship between Employee Attractiveness and Public Perception.

The employee attractiveness construct consists of three subconstructs viz. i) EA1: Professional Development opportunities; ii) EA2: Employee recognition and rewards; and iii) EA3: Employee involvement in decision-making processes. As highlighted through Table 4.4 the factor loadings for all the sub-constructs of employee attractiveness are significant and result supports that the positive relationship of employee attractiveness and public perception (β=0.325; T=12.994; $p \leq 0.001$). Thus, *H6: There is a positive influence of Employee Attractiveness on Public Perception has been empirically supported.*

Next step was to examine relationship *between Student Satisfaction and Public Perception before*

creating a complete model for augmenting quality in higher education in Engineering Institutes in India. The related hypothesis *H7: There is a positive relationship between Student Satisfaction and Public Perception* empirically supported *as* β*=0.380 (p* $\leq$*0.001).* The effect size is medium (F2= 0.227).

4.3.4 Relation of Academic culture, Transnational branding, employee attractiveness and student satisfaction with Public Perception

The fifth objective of the study is:

O5: To design a model for augmenting quality in higher education in Engineering Institutes in India.

The final hypothesis related with all critical success factors considered in the study is:
H8: There is a positive influence of Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness on Public Perception which can be enhanced by AQHE model.

The next step in this research was to design a holistic model-Augmenting Quality in Higher Education (AQHE), which will help to augment the quality of Engineering Educational Institutes(EEIs) in India. Public perception is the measure of performance for understanding the perspectives of all the stakeholders of higher education takers like students, faculty, employers and society at large. The impact of higher education performance on society is measured throughthe sustainability approach. From a sustainability perspective, higher education quality parameters can encompass various aspects that promote environmental, social and economic sustainability. There is a positive influence of Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness on Public Perception.

The F-square is useful in PLS-SEM, as it helps to assess the importance and strength of the relationships between latent variables. It provides insights into the relative contributions of the exogenous variables in explaining the variation in the endogenous variable. F-square is calculated as the ratio of the explained variance to the total variance of an endogenous latent variable. F^2 $\geq$0.02 depicts small effect size; F^2 $\geq$0.15 depicts medium effect size and F^2 $\geq$0.35 depicts large effect size. (Cohen, 1988).

The results of Academic Culture -> Student Satisfaction (β =0.448; p $\leq$ 0.001). Hence, academic culture has a positive and significant relation with student satisfaction has been empirically

supported. As per Table 4.5 effect size of Academic Culture -> Student Satisfaction is medium. Also, Student Satisfaction -> Public Perception (β =0.380; $p \leq 0.001$) is also supporting the positive relationship between student satisfaction and public perception. In the case of Student Satisfaction -> Public Perception, the effect size is large. Next step was to examine the relationship between Employee Attractiveness -> Public Perception (β =0.325; $p \leq 0.001$), which is also supporting the positive relationship between employee attractiveness and public perception. Regarding Employee Attractiveness -> Public Perception, the effect size is medium. In the case of Branding -> Student Satisfaction the effect size is medium and for Employee Attractiveness -> Public Perception, the effect size is again medium.

Thus, the model is a good fit. Figure 4.5: AC-SS-EA-TB-P relationships depicts the Bootstrapping results. This can be validated through Adj. R^2=0.886. Thus, the study proves that all critical factors, considered in this study are important for improving Public Perception of HEIs. The direct impact of branding on public perception is (β =0.300; T: 11.073 and $p \leq 0.001$) is significant, but branding with student satisfaction as mediating variable, the indirect effect (β =0.431*0.380= 0.164) (T; 10.091 and $p \leq 0.001$) is significant too. As suggested by results, the value of R^2 (0.887) and adj. R^2 (0.886) and the designed PLS-SEM AQHE model explain 88.7 % of the variation. The SRMR value is 0.065, below the accepted range of 0.08. The Normed fitness index (NFI) is 0.761. Thus, *H8: There is a positive influence of Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness on Public Perception, which can be enhanced by the AQHE Model* has been empiricallysupported.

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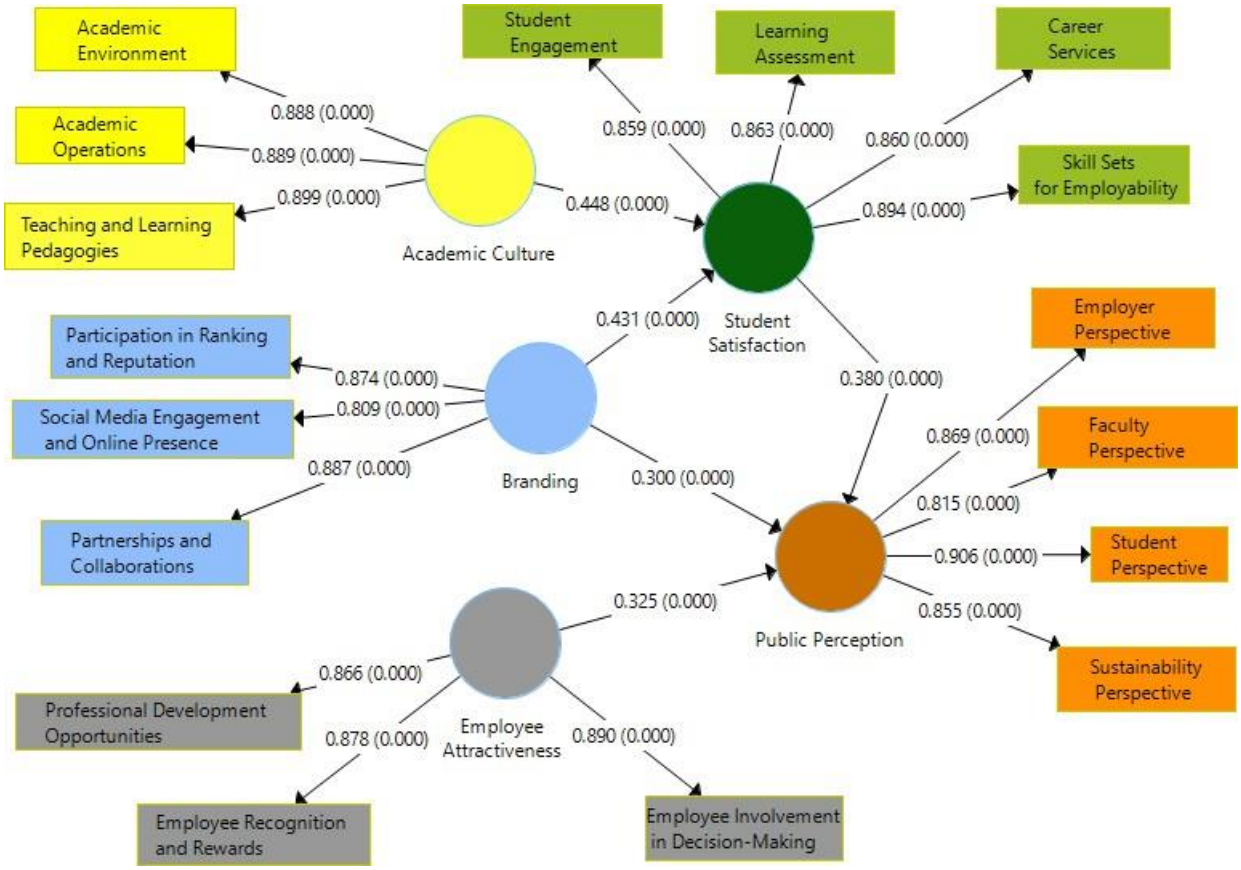

Figure 4.6: AC-SS-EA-TB-PP bootstrapping relationships

4.4 Discussion and major findings of the study

The proposed research model identified the critical success factors like academic culture, student satisfaction, transnational branding and employee attractiveness and empirically explored their relationship with public performance of the higher education institutes (Kanwar & Sanjeeva, 2022). Confirmatory Factor loading (CFA) was used to test whether student satisfaction is a multi-dimensional construct consisting of student engagement (SE), Learning Assessment (LA), Career Service (CS) and Skill Set for Employability (SSE). As highlighted through **figure 4.5**, the outer loadings for all sub-constructs of student satisfaction (SS) ranged between 0.859 to 0.894 and had $p \leq 0.001$. The measurement model revealed that student engagement (SE), Learning Assessment (LA), Career Service (CS) and Skill Set for Employability (SSE) all significantly contribute to student satisfaction scale (Bell, 2021). Among these, the parameter or sub-construct of skill set for employability emerged as the most significant factor in enhancing

student satisfaction which is in line with the study conducted by Scott & Willison, 2021 and Shekhawat, 2020.

Based on literature, the Academic Culture scale had three sub-constructs, viz. i) Academic environment (AE), ii) Academic Operations (AO) and ii) Teaching and learning pedagogies (TLP). As shown in Table 4.4, outer loadings of Academic environment (AE) was 0.888; ii) Academic Operations (AO) was 0.889 and that of iii) Teaching and learning pedagogies (TLP) was 0.899. All these sub-scales were significant with $p \leq 0.001$. Academic culture has been majorly impacted by the advanced teaching and learning pedagogies. Advanced teaching and learning pedagogies significantly influence academic culture by introducing innovative and effective approaches to education and that is in line with the various earlier studies (Behle, 2020; J. Khan & Hemsley-Brown, 2021). These pedagogies aim to enhance student engagement, improve learning outcomes and foster critical thinking skills. As a result, the academic culture is transformed, creating an environment that has the potential to enhance student satisfaction. The results of the study also support this notion, indicating that the implementation of advanced teaching and learning pedagogies positively impacts student satisfaction in accordance with the earlier research by (Mollo, 2021).

The construct of transnational branding referred to a branding as seen in figure 2 consists of three sub constructs viz B1 which refers to Institute's participation in Ranking and Reputation (for recognition and perception) surveys, B2 which refers to Institute's social media engagement and online presence and B3 refers to Institute's Partnerships and collaborations activities. The outer loadings of these sub constructs of branding were: 0.874; 0.809 and 0.887 and all vales were significant ($p \leq 0.001$). The activities related to partnerships and collaboration have been significantly contributing to the branding construct as per the loading values which is in line with the earlier research by (Klijn *et al.*, 2022) and (Mahmood & Bashir, 2020).

Employee Attractiveness (EA) scale has three sub scales, viz. i) EA1: Professional Development opportunities for faculty, ii) EA2: Employee recognition and rewards and iii) EA3: Employee involvement in decision-making processes. All these sub-constructs are significant as their loadings are: 0.866; 0.890 and 0.878. In this scale, EA3: employee involvement in decision

making had highest loading and contributed effectively to attracting the employees. When employees are actively involved in the decision-making processes of an organization, it creates a sense of empowerment, ownership and engagement. Organizations that prioritize employee involvement in decision making are more likely to retain top talent and attract new talent (Charles J. *et al.,* 2021). When employees feel valued, empowered and engaged, they are more likely to stay with the organization for the long term. Additionally, the reputation of an organization that promotes employee involvement can attract talented individuals who seek organizations with participatory and inclusive cultures. The results have also supported these findings (Ijeoma, 2020; Kumar & Saha, 2017; Tian & Zhai, 2019).

Next step was to check whether Public Perception was a multi-dimensional construct consisting of Faculty perspective, Student Perspective, Employer Perspective and the Sustainability Perspective. The results of factor loadings show that all dimensions, viz. Faculty perspective, Student Perspective, Employer Perspective and the Sustainability Perspective had loadings greater than 0.815, i.e., above the acceptable range of 0.70 and $p \leq 0.001$. The student perspective, as indicated by the highest loading in the study, highlights the significant role that students play in shaping the public perception of higher education institutions in today's scenariowhich is in line with the study conducted by Armellini *et al.,* 2021and Cinkir *et al.,* 2022. This finding emphasizes the importance of considering and addressing students' perspectives to enhance the overall reputation and public perception of these institutions. Recognizing the valueof student perspectives allows institutions to understand their needs, preferences and experiences,leading to tailored improvements and initiatives that resonate with current and prospective students (Arsenis *et al.,* 2021; Mistry, 2021; Sokhanvar *et al.,* 2021). By prioritizing the student perspective, higher education institutions can better meet student expectations, enhance their satisfaction and positively influence public perception through a student-centered approach (Benjamin, 2006; Gencoglu *et al.,* 2021; Pacursa *et al.,* 2023; Varouchas *et al.,* 2018).

According to the study findings, the significance of student perspectives for its role in public perception is followed by the employer perspective and sustainability perspective, while the faculty perspective has the lowest loadings. This implies that students' viewpoints are highly influential in shaping the public perception of higher education institutions, followed by the

perspectives of employers and the institution's commitment to sustainability. On the other hand, the faculty perspective seems to have a relatively lower impact on public perception. The student perspective reflects the priorities and expectations of students when evaluating the quality of HEIs. The faculty perspective reflects the priorities and expectations of faculty members when evaluating the quality of higher education institutions (Wang *et al.,* 2019). Institutions that effectively address these parameters are more likely to attract and retain high-quality faculty members (Pattnaik & Pattnaik, 2021). Employer perspective reflects the priorities and expectations of employers when evaluating the quality of higher education institutions. Institutions that effectively address these parameters and maintain strong connections with the job market are more likely to produce graduates who meet employer expectations (Kaur, 2006) and (Okolie *et al.,* 2021). Through sustainability perspective, the higher education institutions can evaluate and improve their public perception in terms of sustainability, fostering a culture of sustainability among students, faculty and staff and contributing to the broader goal of creating a more sustainable society (Leal Filho *et al.,* 2021; Žalėnienė & Pereira, 2021).

The subsequent section deliberates the findings of the study in greater depth to address the articulated research hypotheses. The results lend support to the finding that there is a significant effect of academic culture on student satisfaction (β =0.448; T=13.756; $p \leq 0.001$) as per the table 4.5. Thus, given these results, it can be inferred that academic culture has a pertinent role to play in enhancing student satisfaction of HEIs (Bell, 2021; J. Khan & Hemsley-Brown, 2021; Zalazar-Jaime *et al.,* 2021) and Academic culture mediated (β=0.431* 0.380; $p\leq 0.001$) through student satisfaction has a significant impact on the public perception of the HEIs (Ayanbode *et al.,* 2022; J. Khan & Hemsley-Brown, 2021; Seyfried & Pohlenz, 2018).

These results suggest that institutions should prioritize student satisfaction viz student engagement, learning assessment, career service and enhancing skill sets for employability when considering strategies to enhance their public perception (Bowden *et al.,* 2019; Rajabalee & Santally, 2021; Tani *et al.,* 2021). This involves understanding and addressing the needs and expectations of students, ensuring that programs and services align with industry demands and fostering sustainability practices. While the faculty perspective may have a comparatively lower impact, it is still essential to ensure the faculty's engagement, satisfaction and professional

development, as they play a crucial role in delivering quality education and fostering a positive learning environment (Bilal *et al.*, 2019; Raina & Khatri, 2015; Steinert *et al.*, 2019).

Overall, by recognizing the relative importance of different perspectives, higher education institutions can tailor their efforts to effectively enhance public perception, focusing on the key stakeholders who have the most significant influence in shaping the institution's image and reputation which is also focused on in various studies (Chankseliani *et al.*, 2021; Gulden *et al.*, 2020; Jongbloed *et al.*, 2018).

Student satisfaction is followed by Employee attraction and branding to influence the public perception of HEIs. The direct impact of branding is lowest on the public perception compared to the other indicators as it has lowest beta value (0.264). However, the indirect impact of branding mediated by student satisfaction has a better impact on public perception as in line with the earlier studies (Chen, 2022; Sultan & Wong, 2019).

Partnerships and collaborations are a crucial aspect of branding, as they play a significant role in expanding reach, enhancing reputation, fostering innovation, engaging with industries, making a positive social impact and driving research excellence. Recent studies have highlighted the importance of this subconstruct in bolstering branding efforts (Chen, 2022; Fransman *et al.*, 2021; Fu *et al.*, 2022; Ibáñez-Sánchez *et al.*, 2022; Sriram *et al.*, 2021). Studies also reveal collaborating with industry partners fosters strong connections between academia and the professional world (Fransman *et al.*, 2021b; Fynn *et al.*, 2022; Payumo *et al.*, 2021; Vogel *et al.*, 2022). These activities shape public perception, positioning the institution as a respected and influential entity within the community and beyond. These collaborations can lead to internships, joint research projects, guest lectures and industry involvement in curriculum development. Such engagement enhances the institution's reputation for producing job-ready graduates and strengthens its public perception as an institution with industry relevance. The results thus support the findings that branding has a direct impact on public perception but significantly more influential when it mediated through student satisfaction (Rua & Santos, 2022).

This reveals that engineering institutes need to focus on developing strategies to improve branding and thus enhance outreach and visibility of the institutes (Chattopadhyay & Nandi,

2011). A strong and well-executed branding strategy can help institutions differentiate themselves from competitors, attract prospective students, engage with industry partners and build a positive reputation (Rua & Santos, 2022). Institutes need to define a clear brand identity. This includes defining the institute's mission, vision, core values and positioning in the market. Institutes must identify unique selling points and develop compelling messages that resonate with prospective students, parents and industry partners (Best Practices in Improving Reputation And Brand Recognition In Higher Education, 2015). Utilizing various marketing channels such as digital marketing, social media, print media and events must be used to increase visibility and attract attention (Al-Qaysi *et al.,* 2023). Cultivating industry partnerships, showcasing student success, featuring their accomplishments in various forms, such as testimonials, case studies and alumni profiles, on the institute's website, social media platforms and marketing materials help in enhancing public perception (Suhan *et al.,* 2022). By implementing these strategies, engineering institutes can improve their branding efforts, increase outreach and enhance their visibility among prospective students, industry partners and the wider community (Paydas Turan, 2021). A well-executed branding strategy can lead to increased interest, improved reputation and sustained growth for the institute (Subbarayalu, 2022).

Hence, the final structural model indicates the importance of various critical success factors, like academic culture viz academic environment, academic operations and advanced teaching learning pedagogies; student satisfaction viz student engagement, learning assessment, career service and skill set for employability of students; employee attractiveness special by involving employees in decision making and branding focusing on partnerships and collaboration of the institution with outside world. Student satisfaction is the most important significant indicator to enhance the public perception of Higher Education institutes as per the results.

4.5 Chapter Summary

This chapter undertakes an in-depth analysis of the collected data from faculty members representing 50 institutes of higher education across Northern India. It commences with a graphical representation of the demographic profile of respondents. The focus of the chapter lies in the examination of academic culture, student satisfaction, transnational branding, employee

attractiveness and institute public perception, all within the context of enhancing higher education (HE) performance.

The analysis endeavors to establish three distinct constructs as sub-dimensions of academic culture, namely academic environment, academic operation and teaching and learning pedagogies. A significant portion of the analysis is directed towards exploring the correlation between student satisfaction and the public perception of the HEI, with the aim of elevating the performance of engineering institutes. In this context, the analysis further delves into the establishment of four sub-constructs of student satisfaction: student engagement, learning assessment, career services and employability skill set.

Moreover, the role of transnational branding in shaping HEI public perception is extensively examined, both directly and indirectly through the mediation of student satisfaction. The analysis also focuses on delineating three sub-constructs of transnational branding: participation in ranking and reputation surveys, social media engagement and online presence.

Furthermore, the chapter delves into the scrutiny of the employee attractiveness construct, aiming to establish three sub-constructs: professional development opportunities, employee recognition and rewards and employee involvement in decision-making processes.

The culmination of the chapter encompasses a comprehensive analysis of the relationship between selected critical success factors and the public perception of HEIs, categorized as private and public institutions.

CHAPTER 5

CONCLUSION, IMPLICATIONS AND LIMITATIONS OF THE STUDY

The current study aims to address two significant global paradigm shifts. Firstly, it focuses on the transition towards prioritizing student satisfaction and employee attractiveness. Secondly, it examines the growing emphasis on branding. The research endeavors to identify critical success factors and investigate their impact on the performance of higher education institutions in relation to shaping public perception, by considering faculty, students, employers and sustainability perspective. In the face of diminishing resources, higher education worldwide is facing scrutiny, leading to initiatives such as strategic performance measurement, the development of performance indicators and the triple helix model.

Through their leadership, academic leaders can shape and influence the educational experiences of students, ensuring that they receive the best possible learning opportunities. One of the primary objectives of effective academic leadership is to prioritize student satisfaction. Academic leaders actively seek ways to enhance student satisfaction by promoting student engagement and involvement in various academic activities. This may include encouraging student participation in class discussions, group projects and extracurricular activities that support their overall development. Furthermore, academic leaders recognize the importance of learning assessment. They implement effective assessment strategies that enable students to demonstrate their knowledge and skills. These leaders are committed to providing fair and accurate evaluations, ensuring that students receive constructive feedback that supports their growth and improvement. By promoting a culture of continuous assessment, academic leaders help students to realize their full potential and achieve academic excellence. Additionally, effective academic leadership places a strong emphasis on employability. Academic leaders understand the evolving demands of the job market and the skills required for students to succeed in their chosen fields. They collaborate with industry professionals to identify the skills and competencies that are highly valued by employers. Academic leaders then incorporate these skills into the curriculum, ensuring that students are equipped with the knowledge and capabilities necessary for successful career

paths.

In essence, effective academic leadership is a driving force behind quality teaching and learning practices. It fosters a high-quality academic culture that prioritizes student satisfaction, engagement, learning assessment and employability. Through their guidance and vision, academic leaders inspire and motivate both the students and the educators, thus creating an environment where educational excellence thrives. Their efforts contribute to the holistic development of students, preparing them for a successful future in their chosen endeavors.

This study concluded that effective academic leadership plays a vital role in promoting quality teaching and learning practices, which encompass a high-quality academic culture and provide the best possible student experiences, including student satisfaction, student engagement, learning assessment and employability. In recent times, branding has also emerged as a noteworthy trend in the realm of higher education quality standards, demanding the attention of educators and policymakers on a global scale. Higher education institutions (HEIs) are now compelled to adopt transparent systems and meet the expectations of all stakeholders to establish a positive reputation and perception. It has been seen that public perception plays a pivotal role in gauging and perpetuating the efficacy of quality management strategies and processes, thereby fostering an ongoing enhancement of the quality standards within Higher Education Institutions (HEIs).

The present chapter delves into the insights and observations accrued throughout the research endeavor, offering a comprehensive portrayal of the study's outcomes. Section 5.1 unveils the noteworthy findings derived from the research, while section 5.2 reevaluates the research objectives, scrutinizing the responses pertaining to the key research inquiries. In section 5.3, the chapter expounds upon the implications of the current research for stakeholders within the higher education sector, industry and academic domains. Concluding the chapter in section 5.4, the limitations of the present study are outlined, accompanied by recommendations for futureresearch directions.

5.1 Findings of the study

- The proposed research model investigated the crucial factors contributing to the success of

higher education institutes by examining their impact on public performance. The study identified several critical success factors, including academic culture, student satisfaction, transnational branding and employee attractiveness. These factors were empirically analyzed in relation to their influence on the perception of higher education institutes by the public.

- Student satisfaction, a multidimensional construct encompassing student engagement, learning assessment, career services and employability skill sets, was found to be particularly influential in shaping the public perception of higher education institutes. Student-centered approaches, such as student engagement, student-centered learning assessment practices and robust career services, contributed significantly to enhancing the public's perception of these institutions. Notably, possessing the necessary skill set for employability emerged as the most significant factor in bolstering student satisfaction.
- The study also highlighted the impact of advanced teaching and learning pedagogies on academic culture. The adoption of innovative and effective educational approaches positively influenced academic culture, which, in turn, had a substantial effect on student satisfaction. Partnerships and collaborations were identified as significant contributors to the branding construct, with employee involvement in decision making playing a vital role in fostering employee attraction.
- Moreover, the study emphasized the pivotal role of students in shaping the public perception of higher education institutions. By prioritizing the student perspective and adopting a student-centered approach, these institutions can better meet student expectations, enhance satisfaction levels and positively influence public perception.
- Student perspectives had the most substantial impact, followed by employer perspectives and sustainability perspectives. In contrast, the faculty perspective had the lowest influence on public perception.
- Notably, the study showed that academic culture significantly influenced student satisfaction, indicating its relevance in enhancing satisfaction levels in higher education institutes. Furthermore, it was evident that student satisfaction had a direct influence on public perception and academic culture played an important role in this relationship, strengthening its overall impact.
- Among the various factors, student satisfaction had the most significant direct impact on public perception, followed by employee attraction and branding. While the direct impact of branding

on public perception was relatively low, its indirect impact through student satisfaction had a more substantial effect.

- In conclusion, the final structural model highlighted the importance of critical success factors such as academic culture, student satisfaction, employee attractiveness and branding in influencing the public perception of higher education institutes. Student satisfaction emerged as the most crucial indicator for enhancing the public perception of these institutions. By understanding and addressing these factors, higher education institutes can improve their public image and overall performance.

5.2 Evaluation of Objectives

An essential evaluation involves determining the extent to which the study has achieved its intended objectives. The current study was initiated with the following set of aims:

O1: To analyze the relationship between Academic Culture and Student Satisfaction.
O2: To analyze the relationship among Academic Culture, Student satisfaction and Public Perception.
O3: To analyze the relationship between Transnational Branding and Student Satisfaction.
O4: To analyze the relationship among Transnational Branding; Employee Attractiveness and Public Perception.
O5: To design a model for augmenting quality in higher education in Engineering Institutes in North India.

To develop a model and evaluate the hypotheses corresponding to the aforementioned objective, Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) through Smart PLS were employed. The outcomes of the hypotheses tested for this specific segment of the study are summarized in Table 5.1.

Table 5.1 Hypotheses testing

	Hypotheses	Beta value, p-value and Adj. R-Square	Result
H1	There is a positive relationship between Academic Culture and Student Satisfaction.	β=0.448 ($p \leq 0.001$) F^2= 0.226 (Medium)	Empirically Supported
H2	There is a positive influence of Academic Culture with mediation of Student satisfaction on Public Perception.	β=0.170 ($p \leq 0.001$)	Empirically Supported
H3	There is a positive relationship between Transnational Branding and Student Satisfaction.	β=0.431 ($p \leq 0.001$) F^2= 0.209 (Medium)	Empirically Supported
H4	There is a positive relationship between Transnational Branding and public perception.	β=0.300 ($p \leq 0.001$) F^2= 0.219 (Medium)	Empirically Supported
H5	There is a positive influence of Transnational Branding with mediation of student satisfaction on public perception.	β=0.164 ($p \leq 0.001$)	Empirically Supported
H6	There is a positive relationship between Employee Attractiveness and public perception.	β=0.325 ($p \leq 0.001$) F^2= 0.362 (Large)	Empirically Supported
H7	There is a positive relationship between Student Satisfaction and Public Perception	β=0.380 ($p \leq 0.001$) F^2= 0.227 (Medium)	Empirically Supported
H8	There is a positive influence of Academic Culture, Student Satisfaction, Transnational Branding and Employee Attractiveness on Public Perception which can be enhanced by AQHE model.	Adj. R^2=0.886	Empirically Supported

It was determined that academic culture and student satisfaction encompass multiple aspects. Academic culture is composed of various elements: i) academic environment, ii) academic operations and iii) advanced teaching and learning pedagogies. The analysis revealed that the most influential component of academic culture is the adoption of advanced teaching and learning pedagogies, as indicated by higher factor loading (0.899). Concerning student satisfaction, the most significant contributing factor is the development of skills for employability, as evidenced by a loading of 0.894. The results also lend support to the finding that there is a significant effect of academic culture on student satisfaction. Hence, prioritizing the factor like advance teaching and learning pedagogies will contribute to enhancing student satisfaction and, consequently prioritizing skill set for employability, will enhance the overall performance of engineering

institutes considering the perceptions of students and employers. Academic culture exerts a noteworthy influence on student satisfaction, thereby subsequently impacting the overall performance of higher education institutes. Academic culture encompasses the learning environment, which includes factors such as classroom atmosphere, infrastructure, resources and support services (Bell, 2021; Keržič *et al.*, 2021; J. Khan & Hemsley-Brown, 2021; Zalazar-Jaime *et al.*, 2021). A positive and conducive learning environment fosters student engagement, motivation and a sense of belonging. When students feel supported, comfortable and inspired in their academic environment, their satisfaction levels increase, leading to improved performance (Amerstorfer & Freiin von Münster-Kistner, 2021; Cents-Boonstra *et al.*, 2020; Chu, 2022; Monteiro *et al.*, 2021; Rusticus *et al.*, 2023).

Academic culture influences the quality of teaching and learning pedagogies employed by the institution. Innovative and effective teaching methods, such as active learning, practical applications and interactive discussions, contribute to student satisfaction (Surenderkumar & Priya, 2017). When students feel that they are receiving a high-quality education and are actively involved in their learning process, their satisfaction levels rise, positively impacting their overall academic performance (Liem, 2019). Academic culture also encompasses the operations of the institution, including administrative processes, faculty-student interactions and support mechanisms (Strike, 2018). Clear and efficient administrative processes, timely feedback, approachable faculty members and academic support services contribute to student satisfaction. When students feel that their needs are being met, their concerns are addressed and they have access to necessary resources, their satisfaction increases, leading to improved performance. A positive academic culture supports student success and prepares them for future endeavors. When institutions focus on providing relevant and up-to-date curriculum, practical experiences and opportunities for skill development, students feel empowered and confident in their abilities (Chhokar, 2010; O'Byrne *et al.*, 2015; Simm & Marvell, 2017). Academic culture that prioritizes student success and employability increases student satisfaction as they perceive theireducation to be valuable and relevant (Shekhawat, 2020; Tomlinson, 2012). Consequently, these satisfied students are better equipped for success in their careers, positively impacting the overall performance and reputation of the institution.

A positive academic culture promotes student satisfaction, leading to positive word-of-mouth, a

strong reputation, alumni engagement, favorable employer perceptions and increased engagement with external stakeholders. All these factors contribute to a positive public perception of the institution, elevating its standing and enhancing its overall performance in the eyes of the public (Ostojić & Leko Šimić, 2021). On the basis of results highlighted through Table 5.1 H1There is a positive relationship between Academic Culture and Student Satisfaction [β=0.448($p \leq 0.001$) has been accepted and the effect size is medium [F2= 0.226 (Medium)]. Further, *H2:There is a positive influence of Academic Culture with mediation of Student satisfaction on PublicPerception.* β*=0.170 (*$p \leq 0.001$*)* has been empirically supported as the indirect effect is significant. In summary, academic culture significantly influences student satisfaction, which in turn affects the overall performance of higher education institutes in relation to public perception.

The construct of Branding as seen in Table 4.4 and as explained in previous section had three sub constructs, i) B1: participation in Ranking and Reputation (for recognition and perception) surveys, ii) B2: social media engagement and online presence and B3: Partnerships and collaborations. Their factor loadings were in the range of 0.809-0.887. Partnerships and collaborations emerged as a significant parameter. It is evident from outcomes of the study that branding has a direct and positive relationship with student satisfaction [β=0.431; $p \leq 0.001$] and the effect size is medium (F^2= 0.209). However, branding mediated by student satisfaction, also has a positive and significant effect on public perception (β=0.164; $p \leq 0.001$).

Branding through student satisfaction can have a significant impact on public perception, consequently enhancing the performance of higher education institutions (Ashour, 2018; Mahmood & Bashir, 2020). When students have a satisfying experience with an institution, they are more likely to develop a positive perception of it. This perception is then communicated to the public through various channels, such as word-of-mouth recommendations, online reviews and social media interactions. A strong emphasis on student satisfaction builds a positive brand image, signaling to the public that the institution is committed to providing a high-quality education (Varouchas *et al.*, 2018).

A positive brand image cultivated through student satisfaction contributes to building a strong reputation for the institution (Amzat, 2016). Public perception is influenced by an institution's

reputation, which is shaped by the experiences and opinions of students, alumni, faculty and staff. When an institution is known for delivering a satisfying educational experience, it gains the trust and confidence of the public, attracting prospective students, partners and stakeholders (Rusticus *et al.*, 2023). Positive public perception resulting from branding through student satisfaction can enhance the visibility of the institution (Chen, 2022). Prospective students, employers and industry professionals are more likely to be attracted to an institution with a strong brand reputation. This increased visibility leads to higher enrollment rates, improved recruitment opportunities and greater recognition within the academic community and beyond (Amerstorfer & Freiin von Münster-Kistner, 2021).

Student satisfaction can foster a stronger engagement with various stakeholders, such as employers, industry partners and funding organizations. When an institution is perceived favorably by the public, stakeholders are more inclined to collaborate, invest and support its initiatives. This engagement can lead to enhanced opportunities for internships, research collaborations, industry partnerships and funding, ultimately benefiting the institution's overall performance (“Research Collaborations Bring Big Rewards: The World Needs More,” 2021). Differentiating an institution through a strong brand built on student satisfaction can provide a competitive advantage in the higher education landscape. It sets the institution apart from its peers, attracting top talent, resources and opportunities. A positive public perception resulting from effective branding can elevate an institution's standing, positioning it as a preferred choice among students, faculty and partners.

In summary, branding through student satisfaction influences public perception by building a positive brand image, reputation, trust and visibility. This, in turn, enhances an institution's performance in higher education by attracting and retaining students, fostering stakeholder engagement and providing a competitive advantage in a crowded marketplace. These results highlighted the importance for engineering institutes to prioritize strategies that improve branding, thereby increasing their outreach and visibility to enhance public perception.

The construct of Employee Attractiveness (EA) covers: EA1: Professional Development opportunities, ii) EA2: Employee recognition and rewards and iii) EA3: Employee involvement

in decision-making processes. All these sub-constructs are significant as their loading range is between 0.866 to 0.890. Student satisfaction is followed by Employee attraction and branding to influence the public perception of HEIs. The employee attractiveness construct has been most highly impacted by employee involvement in decision making followed by employee recognition and reward and professional development opportunities respectively as per the values of factor loading. Employee attractiveness significantly influences the overall performance of higher education institutes in relation to public perception (Yameen *et al.,* 2020). It impacts faculty quality, teaching excellence, research output, institutional reputation and student success. By attracting and retaining talented employees, institutions enhance their brand image, reputation and public perception, which ultimately contributes to their overall performance and standing in the eyes of the public.

This study aimed to develop a quality model for higher education institutions by utilizing indicators such as academic culture, student satisfaction, employee attractiveness and branding. The findings revealed that these indicators play a crucial role in enhancing the public perception of HEIs, consequently improving their overall performance. Student satisfaction is followed by Employee attraction and branding to influence the public perception of HEIs. The direct impact of branding on public perception is low as compared to the other indicators but is significant. However, the indirect impact of branding mediated by student satisfaction is also significant. This reveals that engineering institutes need to focus on developing strategies to improve branding and thus enhance outreach and visibility of the institutes (Chattopadhyay & Nandi, 2011; Amzat, 2016). The critical success factors of the AQHE model can thus be categorized as principles and enablers where academic culture, student satisfaction, employee attractiveness are the principles and branding can be considered as enabler.

Public perception was assessed through multiple dimensions, including Faculty Perspective, Student Perspective, Employer Perspective and Sustainability Perspective. The results indicated that all dimensions, namely Faculty Perspective, Student Perspective, Employer Perspective and Sustainability Perspective, exhibited factor loadings greater than 0.815, surpassing the acceptable threshold of 0.70 ($p \leq 0.001$). Notably, the student perspective emerged as the most significant sub-construct, greatly influencing public perception. Among the critical success factors identified in the AQHE model, student satisfaction proved to be the most influential construct, positively

impacting the student perspective parameter and, subsequently, public perception performance. The significance of student perspective parameter is followed by sustainability and then employer perspective. The least significant parameter comes out to be faculty perspective (Benjamin, 2006).

The sustainability perspective plays a significant role in shaping the public perception and overall performance of Higher Education Institutions (HEIs) (Parusheva *et al.*, 2023). Emphasizing sustainability practices and values enhances the public perception of HEIs. When institutions demonstrate their commitment to environmental, social and economic sustainability, they are seen as responsible and forward-thinking organizations. This positive perception can attract prospective students, faculty, staff and funding opportunities. The sustainability perspective provides HEIs with a competitive advantage in an increasingly environmentally and socially conscious world. Institutions that prioritize sustainability differentiate themselves and appeal to students and employees who seek educational and employment opportunities aligned with their values. This advantage can lead to increased student demand, higher-quality faculty applicants and improved recruitment outcomes. The integration of sustainability practices can positively impact various performance metrics of HEIs (Chhokar, 2010). For example, energy-efficient measures and sustainable infrastructure can reduce operational costs and improve resource management, contributing to financial performance.

In summary, the sustainability perspective plays a vital role in shaping public perception and performance in HEIs. By integrating sustainability into their strategies, operations and communication efforts, institutions can attract stakeholders, enhance their reputation, achieve competitive advantages, improve performance metrics and build long-term resilience (Sahu *et al.*, 2013). Institutions can use this information to develop performance management systems, implement quality assurance frameworks, improve student retention rates and successfully implement new technologies. Hence, the study furnishes an empirically validated model that equips stakeholders in the higher education sector with a strategic framework focused on targeted critical success factors, aiming to elevate the comprehensive performance of Higher Education Institutions (HEIs).

5.3 Limitations and future research

While conducting research to design a quality model for higher education institutions using indicators such as academic culture, student satisfaction, employee attractiveness and branding, there are few limitations to consider. Firstly, Public perception indicators are often subjective and can be influenced by various factors such as personal experiences, biases and individual expectations (Brooks & Freeman, 2019). It can be challenging to objectively measure and quantify subjective aspects like academic culture or employee attractiveness. Public perception can change over time and the research may provide only a snapshot of opinions at a particular moment. Longitudinal studies or regular assessments may be necessary to capture changes in public perception and track trends effectively. The findings of the research might not be universally applicable to all higher education institutions. Different institutions have distinct missions, target audiences and contextual factors that can influence public perception differently (Dieckmann et al., 2021). The results may be more relevant to specific types of institutions or regions. Indicators like academic culture, student satisfaction, employee attractiveness and branding encompass multiple dimensions and cannot be adequately captured by a single metric or measurement. It can be challenging to design a comprehensive model that accurately reflects the complexity and interrelationships among these indicators.

Public perception of higher education institutions can be influenced by external factors such as economic conditions, political climate, media coverage and societal trends. These external influences may not be fully captured or controlled in the research, limiting the ability to attribute changes in public perception solely to the identified indicators. To mitigate these limitations, future researchers can employ a combination of qualitative and quantitative research methods, utilize diverse data sources and consider multiple perspectives. Longitudinal studies, benchmarking against peer institutions and triangulation of data from different stakeholders can provide a more comprehensive and nuanced understanding of the indicators and their impact on public perception.

5.4 Implications

Theoretical Implication

Understanding the perspectives and experiences of various stakeholders, such as students, faculty, administrators and policymakers, regarding the model can be valuable. Qualitative research methods, including interviews, focus groups and surveys, can be employed to gather data on stakeholders' perceptions, attitudes and expectations. This research can provide insights into the acceptance and adoption of the model from different perspectives. Research can be conducted to examine the long-term impact and sustainability of the model for augmenting quality in higher education. This would involve assessing its durability, scalability and ability to adapt to changing educational landscapes.

Theoretical implications of a research study on augmenting the quality of higher education, particularly in engineering institutions, considering critical success factors such as academic culture, student satisfaction, branding and employee attractiveness can have significant implications for the field of education and academia. Here are some potential theoretical implications of such a study:

Enhanced understanding of Critical Success Factors: The research can help establish a clear understanding of the critical success factors that directly impact the quality of higher education in engineering institutions. By identifying and analyzing factors like academic culture, student satisfaction, branding and employee attractiveness, the study has shed light on their interrelationships and relative importance in shaping the overall quality of education (Al-Sheeb *et al.,* 2018; Cents-Boonstra *et al.,* 2020; Chen, 2022).

Model Development and Validation: The study may lead to the development of a comprehensive theoretical model that demonstrates how academic culture, student satisfaction, branding and employee attractiveness are interconnected and influence the quality of education in engineering institutions (Bell, 2021d; Zalazar-Jaime *et al.*, 2021). This model can serve as a framework for designing interventions and strategies to improve education quality.

Causality and Relationships: The research study has explored the causal relationships between different critical success factors and the quality of higher education. For example, does a positive academic culture lead to higher student satisfaction and does student satisfaction, in turn, affect branding and employee attractiveness? Understanding these causal links can provide valuable insights for institutions to prioritize their efforts in enhancing education quality.

Benchmarking and Best Practices: The study may involve benchmarking various engineering institutions to identify those that excel in specific critical success factors. By understanding the best practices of these institutions, other colleges can learn from their successes and adapt relevant strategies to augment their own quality of education.

Longitudinal Studies: Longitudinal studies that track changes in critical success factors and education quality over time may be undertaken in future to provide more insights into the dynamics of higher education improvement, taking the framework of the current study as base. Such research can help institutions understand the long-term impact of their initiatives and adapt their strategies accordingly.

Cross-Cultural Perspectives: Comparative studies across different regions or countries can reveal how cultural factors influence the critical success factors and education quality. Understanding cross-cultural differences can be valuable for designing context-specific interventions and policies.

Policy Implications: The theoretical implications of the study can inform policymakers about the key factors that need to be addressed to enhance the quality of higher education in engineering institutions. This can lead to the development of evidence-based policies and reforms aimed at improving the overall education system.

Interdisciplinary Insights: The research study might involve interdisciplinary perspectives to understand and address the complexity of higher education quality. It can draw on fields such as psychology, sociology, marketing and management to gain a comprehensive understanding of the factors influencing education quality.

In summary, a research study on augmenting the quality of higher education in engineering institutions, focusing on critical success factors like academic culture, student satisfaction, branding and employee attractiveness, can contribute significantly to the theoretical knowledge base in the field of education. The implications of such a study can guide institutions, policymakers and stakeholders in designing effective models and strategies to elevate the quality of engineering education.

Practical implications:

The practical implications of a research study on augmenting the quality of higher education in engineering institutions, considering critical success factors like academic culture, student satisfaction, branding and employee attractiveness, can have a tangible impact on the strategies and initiatives implemented by educational institutions. Here are some practical implications of such a study:

Curriculum Development and Enhancement: The research study can provide valuable insights into the specific areas of improvement needed in the curriculum to align it with industry demands and changing technologies. This can help engineering institutions design relevant and up-to-date courses that equip students with the necessary skills and knowledge (Shekhawat, 2020).

Faculty Training and Development: Understanding the role of academic culture and its impact on education quality can lead to targeted faculty training programs (Bilal *et al.*, 2019). By promoting innovative teaching methodologies, effective mentoring and research-oriented practices, institutions can enhance the overall quality of education.

Improving Student Engagement: Insights from the study can guide institutions in creating a more engaging and supportive learning environment. By focusing on factors that enhance student satisfaction, such as interactive classrooms, personalized attention and extracurricular activities, institutions can foster a positive educational experience (Amerstorfer & Freiin von Münster-Kistner, 2021; Rivera & Garden, 2021; Thornberg, Forsberg, Chiriac, *et al.*, 2020).

Building a Strong Brand Identity: The research study can help institutions identify the elements that contribute to a strong brand identity. By developing a positive reputation, institutions can attract more students and better faculty, creating a virtuous cycle that enhances the overall quality of education (Hemsley-Brown *et al.*, 2016).

Strengthening Industry Collaboration: Understanding the critical success factors that impact employee attractiveness can guide institutions in building stronger ties with industries. Collaborative research projects, internships and guest lectures by industry experts can bridge the gap between academia and real-world applications (Laal & Laal, 2012; "Research Collaborations Bring Big Rewards: The World Needs More," 2021).

Performance Metrics and Assessment: The study can inform the development of performance metrics to evaluate the effectiveness of various initiatives. Regular assessment of critical success factors, education quality and student outcomes can help institutions track progress and make data-driven decisions.

Student Support Services: Recognizing the importance of student satisfaction, institutions can invest in comprehensive support services, including counseling, career guidance and academic advising, to ensure students' well-being and success (Irfan & Kee, 2013).

Quality Assurance and Accreditation: The findings from the research study can inform the criteria for quality assurance and accreditation processes. Institutions can use this information to align with recognized standards and ensure continuous improvement (Hasbun & Rudolph, 2016; Jasti *et al.,* 2022).

Promoting a Diverse and Inclusive Environment: The study can highlight the significance of fostering a diverse and inclusive academic culture. By promoting diversity in the student body and faculty, institutions can create a rich learning environment that nurtures creativity and critical thinking (Closs *et al.,* 2022; Rusticus *et al.,* 2023).

Policy Recommendations: The practical implications of the study can serve as the basis for policy recommendations at the institutional, regional, or national level. Policymakers can use this research to frame guidelines and funding initiatives aimed at improving the quality of higher education.

Overall, the practical implications of a research study on augmenting the quality of higher education in engineering institutions can drive actionable changes that positively impact students, faculty and stakeholders. By addressing critical success factors like academic culture, student satisfaction, branding and employee attractiveness, institutions can work towards providing a high-quality educational experience that prepares graduates for success in the professional world.

This research can also explore the effectiveness of various educational technologies, online learning platforms, learning analytics and digital assessment tools in supporting the model's objectives. The current research can provide valuable insights to policymakers and educational leaders about the potential policy implications of implementing the model for augmenting quality in higher education. This could include recommendations for policy changes, funding priorities and regulatory frameworks that support the implementation of effective quality enhancement models. By addressing these research implications, scholars and educational researchers can contribute to the knowledge base on quality enhancement in higher education and support evidence-based decision-making for educational institutions and policymakers.

Integrating sustainability into the core mission and operations of HEIs contributes to building a strong reputation. Institutions known for their sustainability initiatives are often regarded as leaders in their field, attracting attention and recognition from stakeholders, including students, parents, employers and the community. A favorable reputation can positively impact student enrollment, faculty recruitment and collaboration opportunities.

Social sustainability initiatives, such as diversity and inclusion programs, can lead to higher student satisfaction, retention rates and academic success. Institutions that incorporate sustainability research and innovation can achieve better research outcomes and rankings. The sustainability perspective fosters meaningful engagement with stakeholders, including students, faculty, staff, alumni, industry partners and the local community. Engaging stakeholders in sustainability efforts can lead to increased support, collaboration and participation in institutional initiatives. This engagement contributes to a positive institutional climate, enhances relationships and strengthens the overall performance of HEIs.

By embracing sustainability principles, HEIs can enhance their long-term resilience. Environmental sustainability practices help institutions adapt to climate change and mitigate risks associated with resource scarcity. Social sustainability initiatives promote inclusive and supportive learning environments that foster student success and well-being. Economic sustainability measures ensure financial stability and adaptability to changing market conditions

(Nauriyal *et al.,* 2017); (Memon *et al.,* 2022) These factors contribute to the long-term sustainability and performance of HEIs.

5.5 Conclusion

Effective academic leadership in the form of quality academic culture and best student experiences through student satisfaction, including student engagement, learning assessment and employability, envelop quality teaching and learning practices in higher education institutions (HEIs). A recent trend observed in higher education quality standards is the increasing significance of branding, demanding attention from educationalists and policymakers on a global scale. HEIs are now compelled to adopt transparent systems and respond to stakeholders' expectations to establish goodwill and positive perception. Public perception acts as a measuring technique for sustaining quality management-controlled strategies and procedures, ultimately enhancing the quality standards of HEIs.

The research study on enhancing the quality of higher education, particularly in engineering institutions, considered critical success factors such as academic culture, student satisfaction, branding and employee attractiveness, yielding valuable insights to significantly improve education in these institutions.

The study underscores the importance of taking a holistic approach to enhance the overall quality of higher education. The interconnection among academic culture, student satisfaction, branding and employee attractiveness emphasizes their collective impact on the education experience. To meet evolving industry demands, engineering institutions must regularly update their curricula, incorporating practical learning experiences, internships and industry collaborations to bridge the gap between theory and real-world application of knowledge. Prioritizing student satisfaction, providing robust support services and creating a positive learning environment lead to better learning outcomes and increased student engagement.

Establishing a strong brand identity becomes critical for engineering institutions, as a positive reputation attracts talented students and faculty, fosters industry partnerships and contributes to institutional growth. Faculty play a pivotal role in delivering quality education, necessitating

continuous professional development, research opportunities and mentoring to create an enriching learning experience for students.

Engaging with industries enhances students' employability and career prospects. Thus, fostering strong ties with the corporate world, offering relevant skill development and creating an attractive learning environment become essential. Data-driven decision-making is emphasized as institutions must regularly assess critical success factors and education quality, identifying areas for improvement and measuring the impact of implemented strategies. Embracing a culture of continuous improvement ensures long-term success in providing high-quality education.

The study's findings provide a foundation for policy recommendations aimed at enhancing the quality of higher education in engineering institutions. Policymakers can use this research to formulate guidelines, standards and funding initiatives that support continuous improvement.

In conclusion, the research study offers valuable insights into the critical success factors that significantly impact the quality of higher education in engineering institutions. By considering academic culture, student satisfaction, branding and employee attractiveness, educational institutions can develop a comprehensive model for enhancing education quality and preparing graduates for the dynamic demands of the modern world. Implementing the study's recommendations has the potential to shape the future of engineering education, contributing to the overall growth and development of the nation's technical workforce.

Institutional Review Board Statement: The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of Thapar Institute of Engineering and Technology (protocol code TIET/EC/2023-06; Approved on 2 May 2023).

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ANNEXURE 1

Construct and measurement details of Academic Culture

Factors	Academic Culture, Measurement Items	Items
Academic Environment	**Source:** (Divaris *et al.,* 2008); (Closs *et al.,* 2022)	
	1. The institution is fully dedicated to offering a welcoming academic environment that prioritizes the safety and security of all students.	AE1
	2. Significant guidance is provided to the student about academic support services	AE2
	3. Faculty is approachable and willing to provide guidance and assistance.	AE3
	4. Organized teaching and learning environment is maintained.	AE4
Academic Operations	**Source:** (Shrivastava & Shrivastava, 2022); (Strike, 2018)	
	1. Institute ensures a fair and transparent admissions process to maintain the integrity.	AO1
	2. Classroom management is maintained fostering an inclusive learning environment and encouraging active student participation.	AO2
	3. Institute maintains well-equipped classrooms, laboratories, libraries and other facilities.	AO3
	4. Wi-Fi facility is available all over the institute campus embracing technology in academic operations	AO4
	5. Effective financial management ensuring the allocation of resources to support academic programs, faculty development and student scholarships.	AO5
Advanced Teaching and Learning Pedagogies	**Source:** Patfield *et al.,* 2022	
	1. Use of smart gadgets for tasks like teaching, designing question papers, assessment of student, feedback and research methodology.	TLP1
	2. Laboratories with advanced equipment are available for conducting lab sessions	TLP2
	3. Continuous development and training of teachers is provided to ensure their ability to implement advanced teaching methods effectively.	TLP3
	4. A well-designed and up-to-date curriculum to encourage innovation and research.	TLP4

Construct and measurement details of Student Satisfaction

Factors	Student Satisfaction, Measurement Items	Items
Student Engagement	**Source:** (Han *et al.,* 2022); (Cents-Boonstra *et al.,* 2020);(Tani *et al.,* 2021)	
	1. There are sufficient extra and co-curricular activities for students to improve their academic and personality skills.	SE1
	2. Active learning through discussion and participation is promoted.	SE2
	3. Curriculum is continuously monitored to erive desired learning outcomes.	SE3
	4. Institute focuses on experiential learning.	SE4
	5. Academic resources are easily accessible to students.	SE5
	6. Students are involved in entrepreneur activities.	SE6
	7. Teachers demonstrate concern for student learning.	SE7
	8. Cordial relation is maintained between faculty and students.	SE8
	9. Collaboration and Peer Interaction among students is encouraged to learn from each other, exchange ideas and work together on projects.	SE9
	10. Graduating student feedback survey is conducted effectively.	SE10
Learning Assessment	**Source:** (Baghdadi, 2021)	
	1. Course is well structured.	LA1
	2. Course is well focused.	LA2
	3. Well-defined course learning objectives (CLOs).	LA3
	4. Measurable course learning objectives (CLOs).	LA4
	5. Institute implements authentic assessment methods	LA5
	6. Students are involved in the assessment process, such as self-assessment and peer assessment.	LA6
	7. Institute is providing timely and constructive feedback to students.	LA7
Skill set for employability	**Source: (**Bennett & Ananthram, 2021) (SaliHerdlein & Furner, 2015; 017; Herdlein & Furner, 2015; Khan & Hemsley-Brown, 2021; & Keržič *et al.,* 2021).	
	1. Focus on learning in team as well as independently.	SSE1
	2. Improved Critical thinking	SSE2
	3. Improved Creative thinking.	SSE3
	4. Improved Communication (written and spoken).	SSE4
	5. Focus on Emotional Intelligence	SSE5
	6. Demonstrating value of ethical decision making.	SSE6
	7. Improved ability to solve complex problems.	SSE7
	8. Students possess entrepreneurial mindset.	SSE8
Career Services	**Source:** (Cheng *et al.,* 2021); (Hassock & Hill, 2022; Terzaroli & Oyekunle, 2019).	
	1. Graduating student feedback survey is conducted effectively.	CS1
	2. Placement cell functions effectively.	CS2
	3. Career counselling is provided.	CS3

	4. Effective Institute-Industry Partnerships.	CS4
	5. Effective partnership with international employers	CS5
	6. Institute organizing career-related workshops, seminars and networking events enabling students to interact with professionals and gain industry insights.	CS6
	7. Institute conducts workshops and training sessions to develop essential employability skills.	CS7
	8. Institute collects data on student outcomes, employment rates and employer feedback.	CS8
	9. Institute maintains continuous engagement and follow-up with the graduating students.	CS9

Construct and measurement details of Transnational Branding

Factors	Transnational Branding, Measurement Items	Items
	Source: (Da Camara, 2007); (Mahmood & Bashir, 2020); (Amzat, 2016; Clark *et al.*, 2020).	
Participation in ranking and reputation surveys	1. Programs are accredited by national and international regulatory bodies.	BR1
	2. Institute is accredited by national and international regulatory bodies.	BR1
	3. Institute is committed to earn a brand image.	BR1
	4. Institute take part in national and international ranking surveys.	BR1
Social media engagement and online presence	5. Institute focuses on advertising campaigns through printed publications; websites; stationery; signatures; media bulletins; and posters and signs.	BR2
	6. Institute maintains a strong digital presence through user-friendly websites, interactive content and social media engagement enhances brand visibility.	BR2
Partnerships and collaborations	7. Institute invites experts from reputed organisations.	BR3
	8. Institute is fostering an international outlook to attract students and faculty from around the world.	BR3
	9. Institute has tie-ups with national and international funding agencies.	BR3
	10. Academic audit is conducted by international experts to check effectiveness of academic programs.	BR3
	11. Institute focuses on establishing international franchise/collaborations	BR3
	12. Institute demonstrates a commitment to social responsibility, sustainability and community engagement.	BR3

Construct and measurement details of Employee Attractiveness

Factors	Employee Attractiveness, Measurement Items	Items
	Source: (Phuong & Duong, 2022); (Yameen *et al.*, 2020); (Nwagbara, 2020).	
Professional Development Opportunities	1. Institution conducts seminars/workshops/conferences.	EA1
	2. There is continuous assessment of faculty development.	EA1
	3. Faculty has access to research resources for career development	EA1
	4. Foreign travel facility is available to faculty	EA1
Employee Recognitions and Rewards	5. Faculty performance is recognised through Performance-Based Bonuses	EA2
	6. Faculty members are granted sabbatical leaves to for extended periods to pursue research, scholarly activities.	EA2
	7. Providing leadership opportunities for faculty who exhibit potential.	EA2
Employee Involvement in Decision Making	8. Decisions are taken through departmental meetings.	EA3
	9. Institute seek employee feedback and input before implementing significant organizational changes	EA3
	10. Establishing participatory governance structures, such as faculty senates, staff councils and committees.	EA3

Construct and measurement details of Public Perception of Higher Education

Factors	Public Perception, Measurement Items	Items
	Source: (C. White & Park, 2010); (Amado Mateus & Juarez Acosta, 2022); (Torelli, 2021).	
Student Perspective	1. There is an increase in the demand for educational services provided by institute.	SP1
	2. Research scholars are offered stipends/teaching assistantship.	SP2
	3. Students are satisfied with facilities and campus environment.	SP3
	4. Students are satisfied with the quality of academic programs offered to them.	SP4
	5. Students are satisfied with internships, job placements, or entrepreneurial ventures.	SP5
Sustainability Perspective	1. Institute can attract and retain outstanding faculty/staff.	SUS1
	2. There is significant annual increase in funded research projects.	SUS2
	3. Institute provides adequate research facilities.	SUS3
	4. There is a significant increase in number of publications of research papers in reputed journals	SUS4

	5. Institute focuses on optimization of expenditures	SUS5
	6. Institute maintains adaptability and flexibility.	SUS6
	7. Institute supports integrity and service to community.	SUS7
	8. Institute promotes environmental sustainability.	SUS8
	9. Institute maintains strong relationships with alumni	SUS9
	10. Management maintains financial stability and resource management.	SUS10
	11. Continuous improvement and assessment in developing programs.	SUS11
	12. Institute focuses on establishing startups under entrepreneurial initiatives.	SUS12
	13. Institute is engaged in global collaboration and partnerships.	SUS13
	14. Ethical Practices and Transparency is maintained.	SUS14
Faculty Perspective	1. Salary and compensation are attractive and at par with peer universities	FP1
	2. Institute offers opportunities for research Collaborations and Partnerships.	FP2
	3. Institute offers regular promotions to the employees	FP3
	4. Institute offers professional development opportunities to faculty.	FP4
	5. There is great concern for well-being of employees and overall campus life.	FP5
Employer Perspective	1. High level of Industry-Institution Interaction.	EP1
	2. The institute has high graduate employability rate.	EP2
	3. The recruiters offer best average salary (CTC) to the students.	EP3
	4. Good number of companies are revisiting for campus placement.	EP4

ANNEXURE 2

Questionnaire

Objective: In connection with my research project (Ph.D.), I wish to elicit some information pertaining to your institute related to the key components of academic culture, student satisfaction, employee attractiveness and branding and their effects on the public perception of your institute. Kindly take few minutes to fill up this questionnaire. You can answer questions by ticking against the correct responses.

The information being collected is purely for research and academic purpose and will be kept confidential. Your cooperation is appreciated.

General information about the respondent

1. Name of respondent…….
2. Job Title

(a) Lecturer
(b) Assistant Professor
(c) Associate Professor
(d) Professor
(e) Any others (please specify)

3. Age:

(a) 25-30
(b) 30-35
(c) 35-40
(d) Above 40

4. Nature of university:

(a) State
(b) Private
(c) Central

5. Number of years of service in the current Institute (in years):

(a) Less than 1
(b) 1 to 3
(c) 3 to 5
(d) More than 5

6. Maximum qualification:
(a) Graduation
(b) Post Graduation
(c) Doctorate
(d) Any other

7. Research experience (in years):
(a) 0 to 5
(b) 5 to 10
(c) 10 to 15
(d) More than 15

Below are some questions about the Academic Culture aspects of your Institute. Please answer the following questions by ticking on the relevant box. Instructions: **5= strongly agree, 4= somewhat agree, 3= neither agree nor disagree, 2= somewhat disagree, 1= strongly disagree**

1.	There is a welcoming academic environment that prioritizes the safety and security of all students.	5	4	3	2	1
2.	Significant guidance about academic support services is provided to the students.	5	4	3	2	1
3.	Faculty is approachable and willing to provide guidance and assistance to students.	5	4	3	2	1
4.	There is an organized teaching and learning environment.	5	4	3	2	1
5.	There is a fair and transparent admissions process to maintain the integrity.	5	4	3	2	1
6.	There is efficient classroom management fostering an inclusive learning environment and encouraging active student participation.	5	4	3	2	1
7.	There are well-equipped classrooms, laboratories, libraries and other facilities.	5	4	3	2	1
8.	There is Wi-Fi facility available all over the institute campus embracing technology in academic operations	5	4	3	2	1
9.	There is an effective financial management ensuring the allocation of resources to support academic programs, faculty development and student scholarships.	5	4	3	2	1
10.	Use of smart gadgets for tasks like teaching, designing question papers, assessment of student, feedback and research methodology.	5	4	3	2	1
11.	Laboratories with advanced equipment are available for conducting lab sessions	5	4	3	2	1
12.	Continuous development and training of teachers is provided to ensure their ability to implement advanced teaching methods effectively.	5	4	3	2	1
13.	A well-designed and up-to-date curriculum to encourage innovation and research.	5	4	3	2	1

Below are some questions about the Student Satisfaction aspects of your Institute. Please answer the following questions by ticking on the relevant box. Instructions: **5= strongly agree, 4= somewhat agree, 3= neither agree nor disagree, 2= somewhat disagree, 1= strongly disagree**

1.	There are sufficient extra and co-curricular activities for students to improve their academic and personality skills.	5	4	3	2	1
2.	Institute promotes active learning through discussion and participation.	5	4	3	2	1
3.	Curriculum is continuously monitored to derive desired learning outcomes.	5	4	3	2	1
4.	Institute focuses on experiential learning.	5	4	3	2	1
5.	Academic resources are easily accessible to students.	5	4	3	2	1
6.	Students are involved in entrepreneur activities.	5	4	3	2	1
7.	Teachers demonstrate concern for student learning.	5	4	3	2	1
8.	There is cordial relation between faculty and students.	5	4	3	2	1
9.	Collaboration and Peer Interaction among students is encouraged to learn from each other, exchange ideas and work together on projects.	5	4	3	2	1
10.	Graduating student feedback survey is conducted effectively.	5	4	3	2	1
11.	Courses are well structured.	5	4	3	2	1
12.	Courses are well focused.	5	4	3	2	1
13.	Well-defined course learning objectives (CLOs) are created by academic staff.	5	4	3	2	1
14.	Course learning objectives (CLOs) are measurable.	5	4	3	2	1
15.	Institute implements authentic assessment methods.	5	4	3	2	1
16.	Students are involved in the assessment process, such as self-assessment and peer assessment.	5	4	3	2	1
17.	Institute is providing timely and constructive feedback to students.	5	4	3	2	1
18.	There is focus on learning in team as well as independently.	5	4	3	2	1
19.	Student show improved Critical thinking.	5	4	3	2	1
20.	Students show improved creative thinking.	5	4	3	2	1
21.	Students show improved Communication (written and spoken).	5	4	3	2	1
22.	There is focus on improving emotional intelligence among students.	5	4	3	2	1
23.	Faculty demonstrate value of ethical decision making.	5	4	3	2	1
24.	Students show improved ability to solve complex problems.	5	4	3	2	1
25.	There is a focus on improving entrepreneurial mindset in students.	5	4	3	2	1
26.	Graduating student feedback survey is conducted effectively.	5	4	3	2	1
27.	Placement cell is effective in its functioning.	5	4	3	2	1
28.	Career counselling is provided to students.	5	4	3	2	1
29.	There is an effective Institute-Industry Partnerships.	5	4	3	2	1
30.	There is an effective partnership with international employers	5	4	3	2	1
31.	Institute organizing career-related workshops, seminars and networking events enabling students to interact with professionals and gain industry insights.	5	4	3	2	1
32.	Institute conducts workshops and training sessions to develop essential employability skills.	5	4	3	2	1
33.	Institute collects data on student outcomes, employment rates and employer feedback.	5	4	3	2	1
34.	Institute maintains continuous engagement and follow-up with the graduating students.	5	4	3	2	1

Below are some questions about the Employee Attractiveness aspects of your Institute. Please answer the following questions by ticking on the relevant box. Instructions: **5= strongly agree, 4= somewhat agree, 3= neither agree nor disagree, 2= somewhat disagree, 1= strongly disagree**

1.	There are significant number of seminars/workshops/conferences organised in the institute.	5	4	3	2	1
2.	There is continuous assessment of faculty development.	5	4	3	2	1
3.	There is easy access to research resources by faculty for career development	5	4	3	2	1
4.	Foreign travel facility is available to faculty	5	4	3	2	1
5.	Faculty performance is recognised through Performance-Based Bonuses	5	4	3	2	1
6.	Faculty members are granted sabbatical leaves to for extended periods to pursue research, scholarly activities.	5	4	3	2	1
7.	Faculty is provided with leadership opportunities on the basis of their potential.	5	4	3	2	1
8.	Decisions are taken through departmental meetings including heads and faculty of departments.	5	4	3	2	1
9.	Institute seek employee feedback and input before implementing significant organizational changes	5	4	3	2	1
10.	Institute establish participatory governance structures, such as faculty senates, staff councils and committees.	5	4	3	2	1

Below are some questions about the Transnational Branding aspects of your Institute. Please answer the following questions by ticking on the relevant box. Instructions: **5= strongly agree, 4= somewhat agree, 3= neither agree nor disagree, 2= somewhat disagree, 1= strongly disagree**

1.	Institute programs are accredited by national and international regulatory bodies.	5	4	3	2	1
2.	Institute is accredited by national and international regulatory bodies.	5	4	3	2	1
3.	Institute is committed to earn a brand image.	5	4	3	2	1
4.	Institute take part in national and international ranking surveys.	5	4	3	2	1
5.	Institute focuses on advertising campaigns through printed publications; websites; stationery; signatures; media bulletins; and posters and signs.	5	4	3	2	1
6.	Institute maintains a strong digital presence through user-friendly websites, interactive content and social media engagement enhances brand visibility.	5	4	3	2	1
7.	Institute invites experts from reputed organisations.	5	4	3	2	1
8.	Institute is fostering an international outlook to attract students and faculty from around the world.	5	4	3	2	1
9.	Institute has tie-ups with national and international funding agencies.	5	4	3	2	1
10.	Academic audit is conducted by international experts to check effectiveness of academic programs.	5	4	3	2	1

11.	Institute focuses on establishing international franchise/collaborations	5	4	3	2	1
12.	Institute demonstrates a commitment to social responsibility, sustainability and community engagement.	5	4	3	2	1

Below are some questions about the Public Perception of Institute. Please answer the following questions by ticking on the relevant box. Instructions: **5= strongly agree, 4= somewhat agree, 3= neither agree nor disagree, 2= somewhat disagree, 1= strongly disagree**

1.	There is an increase in the demand for educational services provided by institute.	5	4	3	2	1
2.	Research scholars are offered stipends/teaching assistantship.	5	4	3	2	1
3.	Students are satisfied with facilities and campus environment.	5	4	3	2	1
4.	Students are satisfied with the quality of academic programs offered to them.	5	4	3	2	1
5.	Students are satisfied with internships, job placements, or entrepreneurial ventures.	5	4	3	2	1
6.	Institute can attract and retain outstanding faculty/staff.	5	4	3	2	1
7.	There is significant annual increase in funded research projects.	5	4	3	2	1
8.	Institute provides adequate research facilities.	5	4	3	2	1
9.	There is a significant increase in number of publications of research papers in reputed journals	5	4	3	2	1
10.	Institute focuses on optimization of expenditures	5	4	3	2	1
11.	Institute maintains adaptability and flexibility.	5	4	3	2	1
12.	Institute supports integrity and service to community.	5	4	3	2	1
13.	Institute promotes environmental sustainability.	5	4	3	2	1
14.	Institute maintains strong relationships with alumni	5	4	3	2	1
15.	Management maintains financial stability and resource management.	5	4	3	2	1
16.	Continuous improvement and assessment in developing programs.	5	4	3	2	1
17.	Institute focuses on establishing startups under entrepreneurial initiatives.	5	4	3	2	1
18.	Institute is engaged in global collaboration and partnerships.	5	4	3	2	1
19.	Ethical Practices and Transparency is maintained.	5	4	3	2	1
20.	Salary and compensation are attractive and at par with peer universities	5	4	3	2	1
21.	Institute offers opportunities for research Collaborations and Partnerships.	5	4	3	2	1
22.	Institute offers regular promotions to the employees	5	4	3	2	1
23.	Institute offers professional development opportunities to faculty.	5	4	3	2	1
24.	There is great concern for well-being of employees and overall campus life.	5	4	3	2	1
25.	There is high level of Industry-Institution Interaction.	5	4	3	2	1
26.	The institute has high graduate employability rate.	5	4	3	2	1
27.	The recruiters offer best average salary (CTC) to the students.	5	4	3	2	1
28.	Good number of companies are revisiting for campus placement.	5	4	3	2	1

List of Publications

S.NO	Name of the Journal	Title of Paper	Status of Publication	Journal Coverage
1	Sustainability	The Technology Interface and Student Engagement Are Significant Stimuli in Sustainable Student Satisfaction	Available online *Sustainability* **2023**, *15*(10), 7923. *https://doi.org/10.3390/su15107923*	*SSCI **Impact Factor:** 3.889 (2021); 5-Year Impact Factor: 4.089 (2021)
2	Sage open	Tapping the potential of academic leadership, experiential learning and employability of students to enhance higher educational institute performance	Available online *SAGE Open 2023* *https://doi.org/10.1177/21582440231183932*	*SSCI Impact Factor: 2.032 5- 33Year Impact Factor: 2.100
3	Journal of Public Affairs	Employee experience through academic culture emerges as the strongest predictor of overall performance of higher education institutes.	Available online https://doi.org/10.1002/pa.2672	Indexed in: Scopus; ABDC Category B Impact Factor: 2.5 (WoS)
4.	Journal of Applied research in Higher Education	Examining critical success factors augmenting quality of higher education institutes in India. A SEM_PLS approach	Available online https://doi.org/10.1108/JARHE-06-2020-0183	Indexed in: Scopus; ESCI Category Impact Factor: 1.7 (WoS) Scopus :3.1 (2022)

Paper presented at conference.

S.NO	Author(s)	Year	Title of Paper	Name and Place of conference
1	Pandita Alka & Kiran Ravi	2018	Designing a model depicting relationship between academic culture, student and employee experience, employability and branding with the overall performance of Engineering Institutes in India	International Conference - ICBAI 2018 at IISc Bangalore

sustainability

MDPI

Article

The Technology Interface and Student Engagement Are Significant Stimuli in Sustainable Student Satisfaction

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Abstract: The technology interface and student engagement are important factors that can contribute to sustainable student satisfaction. Technology has become an integral part of the recent teaching–learning setup and it can significantly impact student satisfaction. Additionally, student engagement is vital for sustainable student satisfaction. Engaged students are more likely to take an active role in their education, participate in discussions, and ask questions. When students are engaged, they feel a sense of ownership over their learning experience, which can lead to higher levels of satisfaction. Therefore, educational institutions should strive to provide students with technology that is intuitive and easy to use and create an environment that fosters engagement and collaboration. By doing so, institutions can increase student satisfaction and improve overall academic outcomes. This research study was primarily conducted to understand the potential of the technology interface (TI) and student engagement (SE) in enhancing student satisfaction (SS). The study uses a survey to collect responses from 400 respondents from higher educational institutions (HEIs). PLS-SEM has been used to test the proposed hypothesis. Three dimensions of the technology interface (TI) include cyber infrastructure, quality of e-content, and technology-assisted facilities. It is essential to understand how the technology interface influences student engagement (SE) through three dimensions, viz. new skills development, active involvement, and academic achievements. The student satisfaction scale has an employability perspective, teaching perspective, and learning perspective as subscales. Initially, the study examines the influence of the technology interface on student engagement. The findings support a positive impact on student engagement. The next step was to study the direct effect of the technology interface on student satisfaction. The results lend support to a positive influence. An attempt was also made to investigate the mediation of student engagement between the technology interface and student satisfaction. The findings highlight that with the mediation of student engagement, the influence of the technology interface on student satisfaction is improved. This study is one of the pioneering empirical studies highlighting the importance of the technology interface on the mediation of student engagement in student satisfaction. Technology may be a prerequisite, but it needs to be translated to student satisfaction by using it with student engagement (new skills development, active involvement, and academic achievements). The study has meaningful implications for policymakers at universities to enable them to strategize around practices conducive to the implementation of technology, and for student engagement activities to enhance student satisfaction in higher education institutes (HEIs).

Keywords: technology interface; student engagement; student satisfaction; higher educational institutions

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1. Introduction

To enhance the learning process, the use of emerging technologies has been enumerated time and again [1]. There is sufficient evidence from global researchers regarding ever-increasing technology applications in areas such as learning management systems [2], online course enrolment and attendance [3], and academic administration [4]. The benefits of emerging technologies include shortening paperwork, tackling distance challenges [5,6],

and improving learning procedures [7]. As an outcome of these benefits, HEIs are embrac- ing and embedding new technologies. In 2018, as highlighted by D'Angelo [8], technologyplays a prominent role in promoting student engagement and facilitating academic success. Applying technology to the curriculum enhances the opportunity for student engagement (SE) and promotes academic success. Regarding SE, students, through digital platforms, would be able to interact actively with peers and be more creative using new software and new technology. Active enquiry-based learning synthesizes information and enhances learning interaction. Implementing technology in the curriculum shifts the learning environment to be more learner-centric, where instructors play a facilitating role to assist students attain their learning goals. Both students and teachers consider technology to have a positive impact on learner satisfaction. For instance, Edmodo, an educational social media platform, functions to improve the learning process by improving awareness about the technology and assists in communication with instructors beyond teaching hours [9]. Technology-based learning (TEL) endorses the transfer of content and supports e-assessment approaches. Further, in 2019, as opined by David Baneres and Denise Whitelock [10], TEL contributes to developing the analytical thinking and problem-solving skills of learners. Teachers' efficiencies improve as they also aspire to know the learner's status quickly and, thus, organize the feedback system.

Restrictions on physical gatherings during the COVID-19 pandemic have also compelled higher education institutions to embrace digital technologies to support teaching and learning [11]. While the use of digital technologies offers an apparent solution, this also calls for understanding the appropriateness of pedagogies to understand how students engage and learn in the spaces supported by these technologies.

When students have access to up-to-date technology and user-friendly interfaces, they are more likely to be engaged and interested in their coursework. Technology can provide students with a range of interactive and multimedia learning opportunities, which can enhance their learning experience and improve their understanding of complex concepts. Technology has become an integral part of modern education, and it can significantly impact student satisfaction [12]. In this paper, we have analysed whether the technology interface with SE enhances student satisfaction (SS). Moreira et al. [13] highlighted that SE is positively correlated with emotional well-being. Teng et al. [14] suggested that educational technology has a positive influence on SE. More specifically, new technologies, such as the learning management system (LMS), influence SE significantly and have surpassed social networking systems (SNS). The LMS provides an effective platform for both teachers and learners. Teachers can upload lectures, assignments, videos, and teaching materials, besides using the LMS for discussion activities. Students have this active platform for peer learning and uploading their project assignments and videos.

According to Aldhafeeri et al. [15], technology-embedded curricula provide instructors with an opportunity to enhance SE through enquiry-based learning [16]. This may not be feasible without the active role of teachers [17]. Another aspect that needs to be considered is whether the technology interface always leads to student satisfaction. Technology-driven learning has a positive influence on SS [18]. Active learning increases student satisfaction (SS) [19]. Following the outcomes of [20], technology-based applications encouraged SE, leading to enhanced SS. Understanding the need for carrying out research in this area, this study was undertaken to understand how the technology interface and student engagement impact student satisfaction. There is a need to examine the direct impact of technology on student satisfaction. However, there is also a need to understand whether the technology interface, with the mediation of student engagement, enhances student satisfaction.

2. Theoretical Framework and Hypotheses Development

Student satisfaction refers to the extent to which students feel content, fulfilled, and pleased with their educational experience. It is a measure of overall well-being and can be influenced by factors such as academic success, social experiences, and the quality of instruction and resources provided by the educational institution. Student satisfaction is

important because it can impact retention rates, academic performance, and overall success in college or university.

2.1. Technology Interface and Student Engagement

The technology interface refers to the way in which users interact with technology, which includes the design, functionality, and usability of software, hardware, and other digital tools [21]. In education, the technology interface can refer to the design of learning management systems, online course platforms, and other educational technology tools [22]. The level of involvement, interest, and motivation that students have in their learning is referred to as student engagement. Engaged students are more likely to retain information, perform well academically, and feel satisfied with their learning experience. These engaged students participate actively in class, ask questions, and seek out opportunities to learn [23].

A technology interface (TI) refers to the point of interaction between users and technology systems or applications [24]. It is the bridge that allows users to access and interact with technology effectively and efficiently. TI encompasses various components, including cyber infrastructure, e-content, and technology-assisted facilities, which are factors or variables that contribute to the availability of information technology.

The cyber infrastructure underlying technological infrastructure supports the functioning of technology systems. It includes the hardware, software, networks, and other technical components that enable the transfer and processing of data and information. The availability and reliability of the cyber infrastructure are crucial for a seamless technology interface [25]. Cyber infrastructure refers to the underlying physical and virtual resources that are necessary for the proper functioning of information technology systems. The availability of a robust cyber infrastructure is essential for the smooth operation of information technology systems [25].

E-content refers to digital content such as electronic books, online courses, and multimedia resources that can be accessed through information technology systems. The availability of high-quality e-content is critical for enabling users to access relevant information and learn new skills through online platforms. The quality of e-content is the digital content that is accessed and consumed through technology systems. The quality of e-content plays a significant role in the effectiveness of a technology interface [26]. E-content should be accurate, relevant, up-to-date, and user-friendly, providing a meaningful experience for users. The quality of physical facilities or resources enabled by technology improves the overall user experience. The technology-enabled classrooms, laboratories, or other facilities that are equipped with advanced tools and resources support learning, research, or other activities.

Technology-assisted facilities include hardware and software systems that are designed to support specific activities or functions, such as video conferencing systems, virtual classrooms, and online collaboration tools. The availability of these facilities can enhance the effectiveness of information technology systems and enable users to work more efficiently and collaboratively. Technology-assisted facilities contribute to the availability and accessibility of information technology, enhancing the technology interface for users [27]. In general, a technology interface encompasses the interaction between users and technology systems, and factors such as cyber infrastructure, quality of e-content, and technology-assisted facilities play critical roles in determining the availability and effectiveness of information technology. These factors contribute to the availability of information technology by providing the necessary infrastructure, resources, and facilities for users to access and utilize technology effectively.

H1. *The technology interface is a multidimensional construct, consisting of cyber infrastructure, quality E-content, and technical-assisted facilities.*

A dominant aspect of higher education recently is digital technology, and it is touching all aspects of the student experience [28]. This latest technology has also been connected to an increase in affective, behavioural and cognitive student engagement. It is noticed when

students are engaged within their learning community, they will undoubtedly be able to give rise to their learning levels, thus leading to a variety of outcomes. The Internet of Things (IoT) stands to change the way universities work by enhancing student learning in many disciplines [29]. The IoT has a huge prospect for universities or any other educational institution. The IoT enhances learning outcomes by providing more successful learning know-how, better competence, and the attainment of a real-time understanding of student performance [15].

A digital tool 'Nearpod' combines formative assessment and active learning in digital environments and it has improved student engagement [30] significantly. Such digital tools help students to be involved in shared knowledge creation [31,32], such as digital quizzes, polls, and open-ended questions, which have improved student engagement to a greater extent. The use of WhatsApp has also promoted student engagement and learning [33]. On the other hand, it is understood that access to technology is a forthcoming problem, which may impact a student's level of confidence [34]. However, this basic problem can be eased through preliminary sessions on technology usage [35] or by having a continuous support team. Additionally, providing explanations of how technology is to be used [36] and why technology is being introduced in a specific course setting is also helpful [37–39], and letting students choose the type of technologies to be used [40] also makes them comfortable with its usage. The glitches of low technology confidence [41] can be removed by using recognized technology, and it is also mentioned in studies that out-of-class technology arrangements in the evaluation process also improve student engagement [39,42].

Technology engages students behaviourally, emotionally, and cognitively. Students are given more chances to engage themselves and interact with the faculty in the learning process [43], which is technologically integrated. Digital games, as new learning arrangements, followed by web-conferencing, impact different types of student engagement. Computer-based technologies such as discussion forums, websites, LMS, and on-campus software also influence student engagement (SE) [28,43]. The student also gets access to the entire course material, assignments, assessment reports, and other appropriate information around the clock because of the computer-based technology used in teaching. Thus, technology plays an important role in higher education and acts as an influential factor to engage students [32]. Numerous studies have set up an affirmative association between student engagement and technology usage. There is also a survey that suggests a positive association of computer use for educational purposes with GPA. Information technology, when used for learning purposes, is linked to student engagement, which is demonstrated in active and collaborative learning [44–46]. The study highlights that the use of electronic devices for educational purposes is beneficial for academic performance [45,47]. SE also assists in achieving holistic learning. The strong association between engagement forms and learning has possible value for planning systems to check student engagement. Observing engagement might be used to identify irregularities and differences in the behaviour of students and also to assist teachers in providing support and care to these students [48,49].

Technology has a positive impact, but university stakeholders are also of the view that operational challenges may not allow the complete benefits of technology to appear in educational institutions [50]. The most important challenge is to train the existing faculty in how to adopt new technology. The significant upgrading of skills may be expensive as well as a challenging process [51]. The adoption of new ERP, HRM, or CRM practices poses a severe threat [52]. Technology is also disruptive, e.g., the increase in plagiarism, cheating, etc., due to mobile technologies [53]. Adopting the latest technology and imparting training for new software is also very expensive. Despite these challenges, there is increasing evidence that the benefits are much greater than the cost, hence educational institutions are adopting new technologies at a faster pace in developing economies such as India [54]. The common scenario is that higher education is responding to globalization [55]. The need for a global presence will soon be the need of most universities. Institutions either already have foreign campuses or are planning to come up with an off-campus in a foreign land in the next few years. Distance education is also becoming progressively global.

Universities are leveraging progressive technologies to place education within the range of many more people around the world [56]. With the latest technology, new developments are appearing every day along with the new hopes of all stakeholders, particularly teachers and learners [57]. Enhanced technology is helping to develop new teaching methodologies, and researchers have examined the impact of digital capabilities, self-organization, and self-learning abilities on the student acceptance of digital learning and the results were considerably encouraging [58].

Some new policies implemented by the Indian government, which include "Diksha, Swayam Prabha Channel", "Shiksha Van, E-Pathshala", and "National Repository of Open Educational Resources", help bring changes in the Indian education system. Each state government also has numerous online education initiatives that are customized to the needs [59] of students and overall higher education.

H2. *The technology interface has a positive influence on student engagement.*

2.2. Technology Interface, Student Engagement, and Student Satisfaction

To enhance student-centeredness, cognitive skill-enhancing activities may be embedded in the curriculum [60]. Weimer [61] weighs highly on the student-centred approaches where the focus is on learning, viz. what, how, and the condition under which the student is learning [62]. Flipped classrooms are correlated with the perception of increased motivation, active engagement, and learning, and are positively conceived by the students. Low achievers reported considerably more positively compared to high achievers regarding attitudes towards the use of technology learning tools, perceived learning, and the perception of more active learning [63].

Thus, HEIs need to continuously upgrade their technological facilities in keeping with the latest trends. The curriculum needs to embed and synchronize with the new e-learning environment. Even basic reading, writing, logic, and arithmetical skills have tobe upgraded with the latest technology, and skills need to be imparted to students to sustain themselves in the competitive setting [64]. Although online methods of teaching facilitate learning–teaching activities, there is a need to evaluate the pros and cons of technology and harness its potential [65]. Students generally show a positive response towards online classes, especially during the era of the COVID-19 pandemic, and were found to be helpful as they provided both convenience and flexibility. However, to optimize the learning experience, students also showed the necessity for shared sessions through quizzes and group assignments. It is seen that online learning also has some cons associated with it, such as technological limitations, late feedback, and the incapability of the coach to handle ICT effectively. This demands that education systems use online platforms in a blended mode with regular classes [66].

Assessment has an important role in this changing e-learning environment. Technology proposes new scenarios for assessment. ICT has facilitated the assessment process starting from designing assignments to marking, recording, and keeping the results and the statistical analyses [67]. For improving the assessment processes, the technology used includes multichoice tests [68–70], rubric-based assessments [71], peer reviews [72], etc. Wong and Chapman [73] suggested numerous features of student satisfaction and confirmed that the most important are "teaching, contentment with the program, campus facilities, self-learning, and overall university experience". Technology is a powerful contributor to student support to learn if it is used to deepen students' engagement in a significant and intellectually genuine curriculum [74–77]. Students perform well when they learn in the classroom with technology-enhanced facilities, whereas those who were deprived of these facilities [78] were lower achievers. It has also been seen that technology integration has a positive impact on student satisfaction, promotes active engagement, and facilitates academic success in the entire course [78,79]. Educational social media platforms assist in promoting the learning process and allow students to be technology conversant. This enables students to achieve goals focused on learning and to also collaborate with peers and teachers, even after classes. It is seen that technological applications can be applied

in numerous ways in the curriculum to boost the quality of the teaching and learning process [8].

Some direct benefits could be derived from high levels of student satisfaction with the quality of services [80], which is driven by exceptional learning processes followed by a great level of agreement with the services. The loyalty of students is one of these benefits. It is a value-added aspect for HE institutions as these loyal students are more likely to engage in alumni activities, bring in financial support, and could also help create occupation opportunities for graduating students [77,81]. Quality of service is an important feature of HE institutes that sets them apart from competitors [76]. As shown in research studies, student satisfaction has been connected to the achievement of learning outcomes and also affects outcomes such as student motivation, retention, and educational accomplishment [80,82–84].

The learning outcomes and overall student performance also have a great impact on student satisfaction. The practice of active learning pedagogical techniques has greater acceptance from students and thus improves their total learning experience. However, this indeed requires greater effort by the instructors to plan, execute and strategize the teaching and learning process. The pedagogical techniques of active learning can considerably back the teaching and learning process, displaying it to be a possible substitute for reducing failure in learning.

Generally, students and teachers feel that technology integration has positive impacts on learner satisfaction, endorses engagement, and enables academic success. They have affirmative attitudes toward technology integration [8]. However, there is a persistent gap between education research and practice in the design of educational technology. The related hypotheses are:

H3. *The technology interface and student satisfaction are positively associated.*

H4. *The technology interface, with a mediating role in student engagement, enhances student satisfaction.*

This study proposes that it is essential to understand how the technology interface (TI) influences student engagement (SE) and further affects student satisfaction. The technology interface (TI) covers three dimensions, viz. cyberinfrastructure, quality of e-content, and technology-assisted facilities. SE covers three dimensions, viz. new skills development, active involvement, and academic achievements. Student satisfaction (SS) refers to the extent to which students feel content, fulfilled, and pleased with their educational experience [85]. It is a measure of overall well-being and can be influenced by factors such as academic success, social experiences, and the quality of instruction and resources provided by the educational institution. Student satisfaction is important because it can impact retention rates, academic performance, and overall success at university [86]. Broadly, student satisfaction has three dimensions: employability perspective, teaching perspective, and learning perspective. Initially, the study examines the impact of TI on SE. The results highlight that the technology interface (TI) influences student engagement (SE). The next stage was to explore the direct effects of the technology interface (TI) on student satisfaction SS. The results again support that the TI influences SS. In HEIs, a lot of focus is being imparted to SE, thus this study tried to examine how the TI, through the indirect effect with the mediation of SE, impacts SS.

Higher educational institutions should strive to provide students with technology that is intuitive and easy to use and to create an environment that fosters engagement and collaboration [87]. By doing so, institutions can increase student satisfaction and improve overall academic outcomes. The technology interface, student engagement, and student satisfaction are all important factors in the field of education because they can have a significant impact on student success and academic outcomes. The technology interface can affect how easily and effectively students use digital tools and resources for learning. When technology is intuitive, user-friendly, and accessible, it can enhance the learning experience, promote greater engagement, and improve academic outcomes [88].

Student engagement promotes deeper learning, greater retention of information, and improved academic performance. Engaged students are more likely to take an active role in their education, seek out opportunities for growth and development, and remain motivated throughout their academic careers. Students are satisfied with their learning experience, they are more likely to continue their education, perform well academically, and achieve their personal and professional goals. A study by Wijaya et al. [89] indicated the usefulness of technology for stimulating student satisfaction, even for mathematics, through micro-lectures covering video-based learning mediums. Overall, technology interface, student engagement, and student satisfaction are interconnected and can have a significant impact on the success and outcomes of students in the field of education. The significant influence of personal factors, engagement of teachers in their work, and the role of environment factors on distance learning technology (DLT) usage are supported by other studies in the field of primary teacher training implemented during the COVID-19 pandemic [90].

3. Research Design and Methods

3.1. Proposed Model

In this research study, the TI indicator is measured through cyberinfrastructure, quality of the E-content, and technology-assisted facilities. The scale items under TI include the availability of internet accessibility all over the campus and the quality of IT resources, technologically equipped systems and spaces, and organised teaching and learning in terms of advanced technology development. To measure students' engagement in online learning environments [91], the scale developed by Sun and Rueda [91] in 2012 has been used. This scale was also applied by Ergun and Usluel in 2015 in their research study on the analysis of density and degree-centrality according to the social networking structure formed in an online learning environment [92]. The aspects of the scale are behavioural engagement, cognitive engagement, and emotional engagement. This scale had a five-point Likert-type rating structure. The reliability and Cronbach's alpha reliability coefficient were acceptable. Some items from the scale adopted in this study are as follows: "Active learning in online classes through discussion and participation is promoted.", "continuously monitoring to derive desired learning outcomes", "Feedback is provided in a way that helps the student to learn", "Teachers demonstrate concern for student learning", etc. The other scale items considered for the measurement of the SE parameter include involving students in experiential learning and entrepreneur activities. Active learning helps students to be engaged with the content through engaging in discussions and learning by doing [93]. In web-enabled technologies in 1:1 classrooms, students can search for information online. The concept of being constantly online forces instructors to implement completely different strategies of active learning, both online as well as in hybrid formats, especially before COVID-19 [94]. The SE indicator covers learning new skills, active involvement in the learning process, and academic achievements. Research studies highlighted educational technology as a positive factor influencing student engagement. The students are allowed to take part in collaborative problem-solving activities and discussions, expand their digital competencies, and develop higher-order thinking due to the use of technological applications [43].

The indicators for student satisfaction include employability perspective, learning perspective, and teaching perspective. Incorporating technology into the curriculum increases student skills and thus success, academically. It also makes students ready for real-world problems. The satisfaction of students is measured using three dimensions of satisfaction [95] defined as the content of learning, which means the satisfaction felt by students in their chosen preferred courses; the conditions of learning, which means student satisfaction with the terms and conditions of the academic programs; and personal coping with learning, which is student satisfaction with their self-ability to cope with academic stress. These scale items are considered in the current study also. The acknowledgement that student satisfaction (SS) is a multidimensional construct is also obvious in the records of numerous studies that compensate for HE students' complete satisfaction

levels. Academic aspects related to reflections such as the "perceived quality of teaching", "teaching styles of instructors", "feedback provided by instructors", and "quality of learning experiences" [74,77,82,84,85,96,97]. So, the academic facet is one such set of significant contributors to student satisfaction in higher education. Based on the literature, another set of contributors to student satisfaction is employability skills. Although employability skills such as communication skills, team working, problem-solving and technical skills are a must to be possessed by students, most of the predictable employability skills in the future will be dominated by technological skills [98].

To summarize, this study attempts to inspect the factors inducing the satisfaction of HEI students via a model associating the parameter of TI with SE. The satisfaction of students is the measure of employability skills achieved and the enhanced teaching and learning perspectives. Employability skills are measured through several companies revisiting campus placement, the salaries offered to students, and the graduate employability rates of the institute. The literature indicates the prominence of active learning plans in higher education. Active learning increases student performance and improves student outcomes [99,100]. Active learning methods are effective, improve student outcomes, and narrow achievement gaps in engineering learning programs [101].

3.2. Sample

This is a perception-based study that obtained inputs through a survey. The study used multistage sampling. Initially, for short-listing engineering institutes, the National Institutional Ranking Framework (NIRF) was used. NIRF is a ranking framework that was set up on 29 September 2015, and approved by the Minister of Human Resource Development (MHRD), Government of India. In the first stage, the top 50 ranked institutions located in North India were selected. From these 50 Institutions, in the next stage, 15 engineering institutions in North India were selected. Finally, responses were collected from these 15 engineering institutions. Six institutes were public and nine were private. In total, 400 respondents were included in the sample, which covered 150 faculty members and 250 student respondents from top-rated public and private higher education institutes. Informed consent was taken from the respondents. The respondents were duly informed about the reason for undertaking this research. This research has been carried out to design a model for embracing a balanced emphasis on the necessity for quality technology infrastructure and facilities, creating the basics for SE in a learning environment leading to enhanced SS. Data were collected in two waves, from Sept 2020 to June 2021 and from January 2022 to June 2022. In the first wave, data were collected from 230 respondents through Google Forms. In the second phase, data were personally collected from selected institutions. There was not much difference in data collected in both waves (Wave 1 Mean: S.D., Wave 2 Mean: S.D.). Before proceeding further, we employed Harman's common method bias test to see if the data were free from bias. Common method bias (CMB) occurs when variations in responses are caused by the instrument rather than the actual predispositions of the respondents that the instrument attempts to uncover. This may affect the results and there may be inflated variation. Harman's single-factor score suggests loading all items (measuring latent variables) into one common factor. We applied this and the total variance for a single factor was less than 50% (43.5), suggesting that CMB does not affect the data [102].

3.3. Scales

The study uses structured scales for student engagement, the technology interface, and student satisfaction. A pilot review was conducted on 50 respondents to finalise the scales. Moreover, the scales were validated by 20 experts and faculties from engineering institutions. The student engagement scale had three subconstructs, viz. academic involvement, academic achievement, and new skills development. The technology interface scale comprised cyber infrastructure, technology-assisted facilities, and e-content quality. The student satisfaction scale covered satisfaction in terms of teaching expertise; learning

environment and employability perspective. The details of the scales are provided in Appendix A.

3.4. Research Methods

Partial least squares structural equation modelling (PLS-SEM) was applied as it has high statistical power and is an alternative to CB-SEM, which has many restrictive assumptions, as suggested by [103]. PLS-SEM combines principal components analysis with ordinary least squares regressions [104]. While CB-SEM (AMOS) is covariance-based, PLS-SEM is variance-based. The latter applies total variance to estimate parameters, thus leading to its increasing acceptance among researchers [105–107]. As the current research is based on numerous constructs with several items and complex relationships, PLS-SEM was chosen. PLS-SEM is a nonparametric procedure; a bootstrapping procedure was also applied to examine the loadings and to interpret the indirect effect of a construct. Wehave used Smart-PLS in this study. Bootstrapping is a resampling procedure used to assess the precision of the estimates [108]. Figure 1 exhibits the conceptual framework, depicting the associations of the independent variables with the mediating variable and outcome variables.

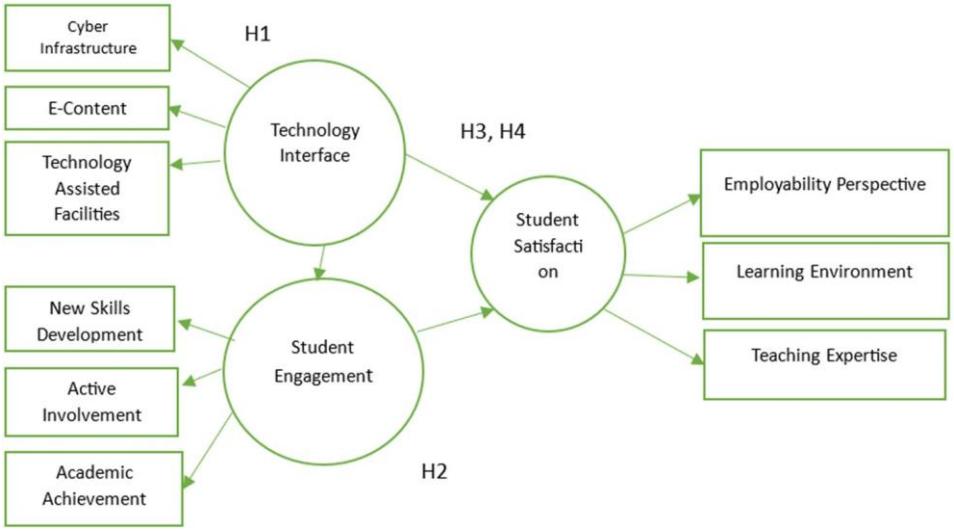

Figure 1. Conceptual Framework.

4. Analysis

4.1. Measurement Model

The model adequacy is measured by the reliability of items and internal consistency between items. The mean, standard deviation, and factor loadings for all variables are provided in Table 1. Cronbach's alpha, average variance extracted (AVE), and composite reliability, along with the correlations of all constructs, are depicted in Tables 2 and 3. Cronbach's alpha of all constructs is beyond the acceptable range of 0.70, reflecting good internal consistency [109].

Table 1. Reliability.

	Cronbach's Alpha	rho_A	Composite Reliability	(AVE)
Technology Interface	0.687	0.708	0.825	0.613
Student Engagement	0.870	0.874	0.921	0.795
Student Satisfaction	0.845	0.853	0.906	0.763

As shown in Table 2, discriminant validity is good, composite reliability is greater than 0.6, and AVE (average variance) is ≤0.50. In addition, the square root of the AVE

(latent variables) value is greater than the absolute value of the correlation coefficient among latent variables. Moreover, as shown in Table 2, the diagonal values are higher than the squared inter-construct correlations, indicating that discriminant validity is in an acceptable range. The HTMT ratio (Table 3) also suggests that AVE was within the suggested limits.

Table 2. Fornell–Larcker Criterion.

	Student Engagement	Student Satisfaction	Technology Interface
Student Engagement	0.874		
Student Satisfaction	0.850	0.892	
Technology Interface	0.298	0.334	0.854

Table 3. HTMT Ratio.

	Student Engagement	Student Satisfaction	Technology Interface
Student Engagement			
Student Satisfaction	0.586		
Technology Interface	0.406	0.451	

Since, in this study, survey participant responses were used, the common method bias problem must not be reflected in the results. Common method bias (CMB) occurs when variations in responses are caused by the instrument, rather than by the actual predispositions of the respondents. This may result in inflated variation. Harman's single-factor score, which suggests loading all items (measuring latent variables) into one common factor, was applied, and the total variance for a single factor was less than 50%, thus reflecting that CMB does not affect the data [102]. The occurrence of a VIF greater than 3.3 is proposed as an indication of pathological collinearity, and also as an indication that a model may be contaminated by common method bias. We also checked whether all VIFs from a full collinearity test were less than 3.3, thus indicating the absence of common method bias. The details provided in Table 4 depict that all VIF values for variables used in the model were also less than 3.3, thus, we proceeded with the analysis.

Table 4. Outer VIF Values.

	VIF
Cyber Infrastructure	1.870
e-content Quality	1.549
Technology-Assisted Facilities	1.274
New Skills Development	3.084
Academic Achievement	2.081
Active Involvement	2.380
Employability Perspective	1.817
Learning Environment	2.449
Teaching Expertise	2.098

Factor loadings (Table 5) for all subdimensions were greater than 0.70 for all except e-content quality ~~the~~ technology interface. In this case, it was 0.696 and close to 0.070. As all subdimensions of all scales, viz. TI, SE, and SS were as per the defined statistical criteria, we were able to validate the measurement model. This was enough to suggest moving further with the structural model to find the status of the proposed hypotheses.

Table 5. Factor loadings.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	*p*-Values
Cyber Infrastructure ← Technology Interface	0.871	0.864	0.036	24.312	0.000 ***
E-content Quality ← Technology Interface	0.696	0.683	0.086	8.062	0.000 ***
Technology-Assisted Facilities ← Technology Interface	0.772	0.776	0.051	15.128	0.000 ***
New Skills Development ← Student Engagement	0.929	0.929	0.008	114.073	0.000 ***
Academic Achievement ← Student Engagement	0.865	0.865	0.018	48.417	0.000 ***
Active Involvement ← Student Engagement	0.880	0.879	0.014	61.913	0.000 ***
Employability Perspective ← Student Satisfaction	0.831	0.832	0.048	17.362	0.000 ***
Learning Environment ← Student Satisfaction	0.907	0.908	0.011	86.067	0.000 ***
Teaching Expertise ← Student Satisfaction	0.881	0.881	0.015	58.458	0.000 ***

*** $p \leq 0.001$.

4.2. Structural Model

The current research study pointed not only to deliver a more in-depth exploration of different features of HE student satisfaction in the HEIs of India but also to provide a more nuanced analysis of associations between these aspects of student satisfaction and different forms of engagements in which HE students are engaged. The association between satisfaction and engagement is significant and positively correlated (See Figure 2), as per the earlier research, which is in line with the findings of this study [110].

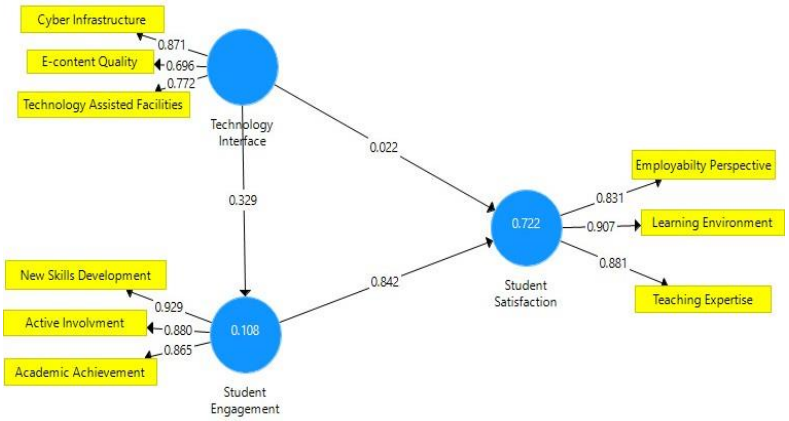

Figure 2. TI–SE–SS relationships.

The subsequent section deliberates the findings of the study in greater depth to address the three articulated research queries. The results lend support to the mediation effect of SE which enhances the impact of TI on SS. Thus, given these results, it can be inferred that TI has a pertinent role to play in assisting SE, which leads to student satisfaction.

The research study examines how TI and SE can enhance the satisfaction level of students. The results of TI highlight that the outer weights of cyberinfrastructure, e- content quality, and technology-assisted facilities lie in the range of 0.696 and 0.871 and all of these are significant. Thus, *H1: The technology interface is a multidimensional construct consisting of cyberinfrastructure, e-content quality, and technology-assisted facilities that have been*

empirically supported, and hence accepted. Cyber infrastructure, e-content, and technology-assisted facilities are key factors that contribute to the availability of information technology. Cyberinfrastructure emerges as the key dimension from these three dimensions, followed by technology-assisted facilities and e-content quality. The availability of robust and reliable infrastructure, such as telecommunications networks, internet connectivity, data centres, and power supply, is crucial for the availability of TI. Without adequate infrastructure, TI systems may not function optimally or may not be available at all [111].

TI also has a positive significance in enhancing SE, as per the results seen. Thus,*H2: The technology interface has a positive influence on student engagement, which is supported by an earlier study by Bond et al., highlighting that digital technology has become a central aspect of higher education, affecting all aspects of the student experience* [28]. There is a lot of evidenceto show that the importance of course organisation and structure, SE, learner interaction, and instructor presence have accounted for enhanced SS and perceived learning in online learning environments [112]. Among the three dimensions of student engagement, new skill development emerged as a key dimension, followed by active involvement and academic achievement. *H3: The technology interface has a positive influence on student satisfaction, as shown by the values, is also accepted*.

The direct impact of TI on SS is 0.22 (with T: 0.643 and *p*: 0.521), which is insignificant (See Table 6). For TI with SE as a mediating variable, the indirect effect is (0.329 × 0.842 = 0.277).As suggested by the results, TI–SS explains a 72% variation in SS. Thus, *H4: The technology interface, with the mediating role of student engagement, enhances student satisfaction statement has been empirically supported*. The SRMR value is 0.078, which is below the accepted range of 0.08. The normed fitness index (NFI) is 0.920. Thus, the model is a good fit. Hence, it can be inferred that the technology interface, with a mediating role of student engagement, enhances student satisfaction.

Table 6. The mean, STDEV, T-Values, and *p*-Values for TI, SE and SS.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	*p*-Values
Technology Interface → Student Satisfaction	0.022	0.021	0.034	0.643	0.521
Technology Interface → Student Engagement	0.329	0.336	0.056	5.882	0.000 ***
Student Engagement → Student Satisfaction	0.842	0.843	0.022	38.976	0.000 ***
Indirect Effect					
Technology Interface → Student Engagement → Student Satisfaction	0.277	0.281	0.049	5.633	0.000 ***

*** $p \leq 0.001$

	R Square	R Square Adjusted
Student Engagement	0.108	0.106
Student Satisfaction	0.722	0.720

5. Discussion

This research was undertaken to find answers to questions such as how the technology interface and student engagement impact student satisfaction. The results indicated all three dimensions of the technology interface (TI), viz. cyberinfrastructure, technology-assisted facilities, and e-content quality [26] had high loadings, and these were significant [25]. Cyberinfrastructure emerges as the key dimension from these three dimensions, followed by technology-assisted facilities and e-content quality. As per the findings, the availability of reliable infrastructure is crucial for the availability of a technology interface (TI). Without adequate infrastructure, TI systems may not function optimally or may not be available at all [111]. This is in agreement with the research studies, where the education sector has been

positively affected by technological progress and its rapid evolution. The education sector has benefited the most from technological advancements, as published in the education and technology overview [113].

To find a link between TI–SE, the findings supported that there is a positive and significant relationship and TI influenced SE. This bears testimony to the fact that technology, without its application for SE, will not be important in educational development. The development of new skills in students is the key dimension of student engagement that is significantly impacted by the technological interface, followed by active involvement and academic achievement. This is supported by the report of Education 4.0 in the application of the latest technologies along with advanced pedagogical procedures and top practices including components such as competencies, learning methods, information and communication technologies, and infrastructure. These four core components of Education 4.0 are used as a reference for the planning of fresh projects in the educational revolution [114]. According to the research, the framework of technology for resources transformation includes technoware (object-embodied), humanware (person-embodied), inforware (document-embodied), and orgaware (institution-embodied) [115].

The next research focus was to understand how the technology interface directly influences student satisfaction (SS). SS, as a construct, had three dimensions, viz. employability perspective, learning environment, and teaching expertise. A direct positive relationship emerged; however, it was not statistically significant. Our SS scale was an improved scale that focussed on holistic satisfaction covering learning to enhance employability complete- ness. Students also are conscious of their role and want to learn from tech-savvy teachers who wanted feedback for enhancing their role by actively involving the learners using digi- tal technologies. The students aspired to a rich learning environment with well-structured courses and clearly defined outcomes and assessment strategies used.

As the direct relationship between TI and SS was not significant, we tried to measure TI–SE–SS with the mediating role of SE. The related question was "Does the technology interface, with the mediation of student engagement, enhance student satisfaction"? This emerged as statistically significant. The technologies offer answers and substitutes for the functions such as delivery methods, teaching approaches, collaborative work, knowledge improvement, location, industry requirements, job-specific knowledge, etc., [116]. The use of technology in education has been shown to have a positive impact on student engagement and satisfaction. The technology interfaces with the mediation of student engagement can enhance the overall learning experience by providing opportunities for active learning, collaboration, and personalized instruction.

Technology-mediated engagement can take many forms, such as online discussion forums, virtual simulations, interactive multimedia resources, and personalized learning platforms. These technologies can help to create a more engaging and interactive learning environment that encourages students to take an active role in their own learning. This, in turn, can lead to increased student satisfaction as students are more likely to feel motivated and engaged with the course content.

In addition, technology can help to facilitate communication and collaboration be- tween students and instructors, which can also contribute to student satisfaction. For example, online discussion forums can provide a platform for students to ask questions, share ideas, and receive feedback from their peers and instructors. Virtual collaboration tools can enable students to work together on projects and assignments, even if they are not physically in the same location. Improvement and usage of intelligent educational infrastructure are essential for realizing the Education 4.0 concept [116]. Overall, the use of technology in education has the potential to enhance student engagement and satisfaction by providing opportunities for active learning, collaboration, and personalized instruction. However, it is important to note that the effectiveness of technology-mediated engagement depends on how well it is integrated into the overall teaching and learning experience.

6. Implications of the Study

Any research has significance if it leads to academic and practical implications. Similarly, the current research has theoretical as well as pragmatic implications.

6.1. Theoretical Implications

The theoretical contribution of this study helps in providing increased satisfaction and thus employability to students. Especially post-COVID-19, the scope of technology-assisted learning has increased. Thus, an important implication of this study would be that HEIs focus on enhancing the technology interfaces. This research extends the existing TI–SS relationship by suggesting the TI–SE–SS relationship, and, further, it confirms that, with SE as a mediator, the impact of TI on SS has accelerated. Extensive research has focused on an increased appetite from HEIs in embedding technology in education [114]; however, little attention has been paid to taking the indirect TI effect on SS with SE mediation. Hence this study fills the void by integrating TI with SS through the mediation of SE. Thus, it can be suggested to HEIs that mere investment in technology infrastructure is not the need of the hour, but rather that it is the interface through SE that will be of utmost priority for the students to considerably enhance their satisfaction.

It contributes to the knowledge of the HEI's role in the context of developing countries. There are many studies with diverse findings in developed nations; however, few have considered them from a developing country's perspective, such as India. HEIs have many takeaways from this study. HEIs need to focus on the SE perspective deeply to link TI to SS.

6.2. Practical Implications

The findings of the study suggest that cyberinfrastructure and technology-assisted facilities are important indicators; however, in terms of e-content quality, there is still a pecuniary need for improvement as it has fewer loadings. This suggests that developing countries such as India still rely more on cyberinfrastructure and ignore the quality focus. A shift towards e-content quality may help in increasing the rankings of HEIs in a global context. In the case of SE, all subconstructs, viz. new skills development, active involvement, and academic achievements have high loadings and, thus, are significant. The three aspects of SS, viz. learning environment, teaching expertise, and employability perspective all have high loadings, suggesting their perceived importance for SS. TI has an affirmative impact on SE; however, it has a wider role as a mediating variable TI–SE–SS as the indirect effect is stronger than the direct effect. Thus, to expedite TI–SS interaction, the state govt. may take initiatives to ensure that TI leads to new skills development, active involvement, and academic achievements. Due to recent uncertainties, such as the recession and COVID-19, the implications have been a severe decline in GDP to rising unemployment, and the relevance of TI–SE–SS cannot be under-gauged [117,118]. Since such studies will help in improving SS in HEIs, The TI–SE–SS link can go a long way in promoting job prospects too.

7. Limitations and Future Areas of Research

The study recommends conducting more research into the methods of successfully implementing technology into the course curriculum. It is true that educational technology shifts the learning environment from being teacher-centred to student-centred, but it is also important that teachers carefully exhibit effective methods of application. Currently, there are so many technological applications out there, each with a distinctive feature, so the most important job for teachers is to teach students the process of learning these technologies. It is also recommended that teachers also provide continuous feedback to students while using technology. Personalised metacognitive feedback based on learning analytics in online learning is a useful approach. It has a different value in probing the effect of personalized metacognitive feedback based on the learning analytics of student engagement [119]. Furthermore, the study has only examined the effectiveness of specific technologies or interventions, which may not apply to other educational settings or populations. Thus, developing further research on methods of effectively implementing technology into the

curriculum is needed. While this research has focused on the impact that technology has on SE, the research could be performed to understand methods that educators can use to accelerate this process. In addition, these findings are based on a cross-sectional design, and future research may examine this proposed model through a longitudinal study for validation and additional outcomes. Technology is constantly evolving and new technologies are continuously being introduced in educational settings. Future research could investigate the effects of emerging technologies, such as virtual reality, augmented reality, or artificial intelligence, on student engagement and satisfaction. Understanding how these technologies influence student experiences can inform the design of effective technology interfaces that promote student engagement and satisfaction.

8. Conclusions

The outcomes of this study support a need to redefine the role of technology. TI has to be linked with SE leading to new skills development, academic achievement, and active involvement. In addition, the mixed multifactorial scale for educational engagement [120] has displayed strong reliability levels for its factors linked to academic engagement, motivations, values, learning contexts, emotional state, and management strategies. There is an emergent need for the use of technology for interactive learning and experiential learning. Technology can offer realistic simulations and virtual experiences that allow students to apply what they have learned in real-world contexts. This can be particularly valuable in fields such as medicine, engineering, and business. This conclusion is in line with some recent research, e.g., the key challenge for decision makers is in their ability to harness the power of technology, learn the key lessons of the COVID-19 pandemic, and ensure that the world is better prepared for future waves of the virus or other states of emergency [121,122]. Technology can contribute to sustainable student satisfaction by providing consistent and reliable access to learning materials, facilitating communication between students and instructors [123], and promoting a sense of community and belong- ing among students [124]. Overall, technology can be a powerful tool for enhancing student satisfaction and success [125]. However, it is important to ensure that technology is used in a way that supports student learning and engagement, rather than as a substitute for quality teaching and personal interaction.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data for this study is available upon request from the corresponding author.

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Conflicts of Interest: The authors declare that the research was conducted without any commercial or financial assistance. The authors also declare no potential conflicts of interest.

Appendix A

Table A1. Scale Items.

S. No	Scales	Literature Support
	Technology Interface	
1.	Cyber Infrastructure ← Technology Interface	

Table A1. *Cont.*

S. No	Scales	Literature Support
	Academic infrastructure is updated frequently The institute offers new software and hardware facilities The institute has LMS platform for interactive learning IoT; ICTs; Data mining, DBMS are regularly updated	[15,32,126]
2.	E-content Quality ← Technology Interface	
	Recognised e-programs are offered to the students Quality e-support services are available to the students e-content is evaluated by peer-teams	[127]
3.	Technology Assisted Facilities ← Technology Interface	
	Technology assistance is provided by offering STTPs Technical expertise is available Technology assistance workshops are conducted.	[31,32,58]
	Student Engagement	
1.	New Skills Development ← Student Engagement	
	Students are helped to learn new skills The institute offers Industrial training programs The Institute offers start-up semester to enhance self-employment	[128]
2.	Academic Achievement ← Student Engagement	
	The institute offers Blended learning to engage students in various activities. Academic achievement is checked through a blend of offline and online assessments. The institute has continuous evaluation system	[18,39]
3.	Active Involvement ← Student Engagement	
	The programs offered have active involvement of teacher-learner. Experiential learning is offered as a part of curriculum. Entrepreneurship and Innovation courses are offered to engage students to learn entrepreneurial skills.	[43–46]
	Student Satisfaction	
1.	Employability Perspective ← Student Satisfaction	
	Students possess competencies required for job procurement. Employers possess good reputation of the institution. Meaningful partnership with employers. Active employer presence on campus viz careers fairs, company presentations or any other self-promoting activities Career development opportunities setup for the students.	[95,98].
2.	Learning Environment ← Student Satisfaction	
	Courses are well structured and focused Clear explanation on course learning outcomes (CLOs) Well-defined objectives of assessment of course learning outcomes to measure learning achievement Well-defined criterion for direct assessment and for in-direct assessment Feedback is provided to help student to learn	[19,78,79]
3.	Teaching Expertise ← Student Satisfaction	
	The Institute hires faculty from top rated Institution National/international accreditation is undertaken to focus on teaching quality. Teachers are provided new learning programs for academic excellence. Students-evaluation for teaching is undertaken foe all offered courses	[54]

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ACADEMIC PAPER

WILEY

Employee experience through academic culture emerges as a strongest predictor of overall performance of higher education institutes

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This research has been undertaken to examine the role of critical success factors (CSFs) for sustainability in quality of Higher Education Institutes in India. Sustainable development requires a holistic view being taken of all interests. The aspects considered here are: Branding, employability, employee experience, and student experience. The study tries to analyze their impact on overall performance. The results highlight that academic culture mediates between student experience and overall performance. The current research also indicates that academic culture mediates between employee experience and overall performance. Employee experience through academic culture emerges as a strongest predictor of overall performance. Student experience through academic culture emerges as an another important predictor of overall performance. Employability was next to follow. The beta values were low for branding. The results highlight that for improving performance, Indian higher educational Institutes need to focus on branding. Implementing this model will enable educational Institutions to focus on these predictors to boost overall performance and equip engineers with requisite skills through academic culture.

KEYWORDS
academic culture, employability, employee experience, HEIs, higher education quality, student experience, sustainability

1 | INTRODUCTION

Higher education was dominated by total quality management (TQM) methods and procedures in globalized environment, to improve, increase, and sustain quality. For improving quality of technical personnel, educational Institutes of India started embedding these in their strategies and ideas. A shift to student-centric education from teacher-centric education was witnessed, to help build a student who do not admit but are inquisitive and always curious. It was time to renovate the current structure of institutions offering engineering education to develop a spirit of inquiry and adopt research-based and project lead education.

The Integrated Educational Quality Management System (IEQMS) model has been used as a base model for the current research. This model used an interpretive structural modeling approach, and its main objective was to find the significance of success factors in the effective execution of the IEQMS model. Ten critical success factors (CSFs) were covered in the model. These are commitment of top management, systematic approach to management, involvement of employees and their training, effective team work, continuous improvement, customer satisfaction, corporate social responsibility, academic culture, and knowledge audit.

The major aim of educational institutions is to augment the services rendered to student to improve employability. This could be possible by offering research-based and project-lead education. The present study examines the engineering education scenario in Indian institutes particularly those who have acknowledged the significance of quality higher education and hence have implemented quality-enhancing strategies to improve the excellence in engineering education. The study covers the Institutes of National Importance

particularly which are ranked in top 50 list produced by The National Institutional Ranking Framework (NIRF) in the year 2018. Ministry of Human Resource Development (MHRD) has approved NIRF (launched by Honourable Minister of Human Resource Development in the year 2015). NIRF framework is used to rank Indian Institutions on broad parameters like: "Teaching, Learning and Resources," "Research and Professional Practices," "Graduation Outcomes," "Outreach and Inclusivity," and "Perception."

The proposed study of examining the role of critical success factors for augumenting quality of higher education institutes in India is an empirical study of institutes offering engineering education in India. The literature survey along with the performance indicators taken up by the various renowned national and international ranking agencies has helped in identifying and selecting the critical success factors (CSFs) for the study. A questionnaire for collecting the responses for the current study incorporated the parameters covered by NIRF along with other global ranking agencies like Times Higher Educational Ranking and QS ranking. The questionnaire is also based on exhaustive list of quality indicators covered by various quality models. A brief overview is given subsequently.

In this study, the interrelation of CSFs is tested and the structural equation modeling (SEM)–partial least square (PLS) is used to understand the relative relation among CSFs and overall performance of the engineering education institutes. Structural model highlights the critical factors that facilitate enhanced performance.

2 | PARADIGM SHIFT IN HIGHER EDUCATION SYSTEM

Contemporary practices like student engagement, learning assessment, student satisfaction, and employability of students constitute new teaching and learning pedagogies. These practices make for the overall student experience in an institute. Recently, branding of EEIs is gaining lot of prominence and needs enough of attention of the educationalists and policies makers at the global level. The branding is helping in increasing the outreach and reputation though public perception which acts as measuring technique to sustain the quality management-controlled strategies and procedures. In this study, a model based on these contemporary quality factors like academic culture, student, and employee experiences, employability skills of students, and branding is designed. Higher education needs a new expression. From being a discipline-specific inquiry assisted by tools of process, it has become a life movement to regulate the continuance of humanity.

3 | LITERATURE REVIEW

Literature has been categorized into two parts:

- Critical success factors considered in existing quality models for HEIs;
- Expectation of stakeholders.

3.1 | Critical success factors considered in existing quality models for HEIs

Spanbauer (1995) focused on TQM key elements of in education like leadership, education and training, organizational climate, customer service, scientific methods and tools, meaningful data, and team problem-solving Stanley.

Owlia and Aspinwall (1997) argued on the prominence of leadership and came up with conclusion that the use of leadership can be unfavorably affected by uniqueness between academic staff. It is similar for element of team work which is an essential component of TQM.

In 2007, a HE-TQM framework based on six core principles covers various quality elements like leadership, educational man- agement, HR management, information management, customer focus and satisfaction, and partnership development and manage- ment. A seven-step flow process to sustain quality was proposed by Venkatraman (2007).

Bayraktar et al. (2008) developed operational measures of 11 critical areas of TQM. These were used either individually or in concert to produce a profile of institution-wide quality management. The 22 HEIs were chosen from Istanbul, Turkey.

Few "indicators of quality" were identified and prioritized in assessing the performance of an undergraduate engineering programme in technical institutions in Kerala, India (Viswanadhan, 2009).

Pal Pandi, Surya Rao, & Jeyathilagar, (2009) used an integrated total quality management (ITQM) theory through stakeholders. In later study, Pal Pandi et al. (2013) compared the perception of students, faculty, and stakeholders. The results suggested that the ITQM concept was not practiced in a substantial manner in various technical institutions in Tamil Nadu, India.

Sayeda et al. (2017) examined the relation between performance of engineering institutes and TQM. Five critical factors were identified, namely, reputation and image of institutions, infrastructure quality, faculty excellence, research and industry exposure and stakeholders' satisfaction.

Nine TQM CSFs were explored which supported the booming performance of service organizations viz. banks, hotels, information communication and technology (ICT)/information technology (IT), and health (Talib & Rahman, 2010). Pal Pandi et al. (2016) deliberated that education is certainly included in the service sector, and hence, the proposed CSFs by Talib and Rahman (2010) can be applied to education. A few supporting CSFs have been considered for their study.

Burli et al. (2012) explored important dimensions of TQM and examined their interrelationships in ISO certified engineering institutes. A theoretical framework was derived from quality management principles for a sustainable management system. Leadership of the top management emerged as the main driving force for establishing an effective quality system (Kuei & Lu, 2013). Stakeholders' viewpoint and financial position were suggested as important enablers for improving quality (Victor *et al.*, 2015).

In order to match the developments in educational sector Paranitharan, Pal, and Jeyathilagar (2016) created an Integrated Educational

Quality Management System (IEQMS) model. It covered important quality dimensions, namely ISO 9001:2008 Quality Management System, ISO 14001:2004 Environmental Management System, Occupational Health and Safety Management System (18,001:2007) Six-Sigma, knowledge management, lean thinking, and TQM. The critical success factors (CSFs) that emerged from analysis were: top-management commitment, systematic approach to management, customer focus, employee involvement, training, teamwork, continuous improvement, corporate social responsibility, academic culture, and knowledge audit. All institutions in today's globally competitive environment have to focus on quality dimensions as highlighted in (IEQMS) model. The current study has also tried to cover many of these quality dimensions along with a few new indicators like employability and branding.

3.2 | Expectation

Research partners imagine HEIs to be innovative and responsive to evolving opportunities. From a strategy-making perspective, a study (Cavallone *et al.*, 2020) emphasizes that the tendency of students and academics to bring diverging value expectations toward HEIs and to report different value perceptions may undermine value co-creation, turning it into value co-destruction. A timely structural change, overcoming rigidities inborn from old-styled bureaucratic models and acceptance of openness in the design and co-delivery of educational services, should be supported. Importantly, HEIs should motivate academics to involve students' in the co-production of educational services. HRM tools are required for this purpose, ranging from ad hoc incentives to the creation of an academic culture which encourages value co-creation. More opportunities to exchange latest ideas to build a focus on research innovation among the students is appreciated by research partners. Likely, industry has genuine hope from HEIs to produce students who are techno-savvy along with strong team and communication skills. Important parameters which industry would like to look for in the new graduates are leadership, project management, and risk-taking approach.

3.3 | Understanding various performance indicators

3.3.1 | Higher education culture

Peters and Waterman (1982) emphasized on organizational development (OD) and components like environment, mission, socialization, information, strategy, and leadership are components of organizational culture which ultimately lead to the development of organization.

With time, total quality management (TQM) adopted organizational culture and is now adopted in practices like business re-engineering, organizational learning, and knowledge management. It is also linked to the competency-based management (Lewis, 2002). The extent of management structure and style (Newby, 1999) is the major quality issue of concern in higher education. Typically, an organization can be changed by shifting from "controlling" to "learning" various disciplines (Senge, 1994). These disciplines focus on how people think, what they want, and how people are related to each other. While acquiring these disciplines, culture in the organization transforms through employee empowerment. It was a matter of great concern whether university could decline to accept learning as an ideal. HEIs attain capability to build its future through learning and academic cultural norms.

It is being focused by researchers that to generate favorable academic culture in universities, one needs to change the arrangement of the relation between formal and informal learning processes. In formal learning setup, students learn through lectures, workshops, tests, etc. In traditional style, someone in the top management is deciding on the content of the curriculum. On the other hand, learning in informal style is where a student leans from asking queries, stories, watching someone doing a task or using internet, hit and try, discussions, etc. Most of learning is achieved in shared or collective style setup, that is, through informal learning practice. Actually, HEIs that consider informal learning casual are losing on the vital strength they have in their stock to meet the challenges of vast competition. The advocates of casual learning advice HEIs to understand the significance of casual learning but do not suggest the complete elimination of formal learning process (Figure 1).

HEIs focus on creating support centers for teaching and research which come up with innovative strategies for higher education institutes in front of intense challenges. For developing high-quality academic culture, these new entities support the institution on integration of information and communication technologies (ICTs) for learning and teaching. The relationship involving management and research is another parameter, where these centers can significantly have an impact. However, it is also true that technology by itself cannot implement innovation. Reasonably, institutes have to prepare students to be independent learners. The students should be able to apply the knowledge that they have gained. So the challenge is to create an environment in which change is not seen as a challenge but facilitates learning.

3.3.2 | Learning outcome assessment

Many students fail to master the core knowledge provided during the course, yet they achieve good grades in the core subjects and ultimately graduate within the required time of period. HEIs aim is to

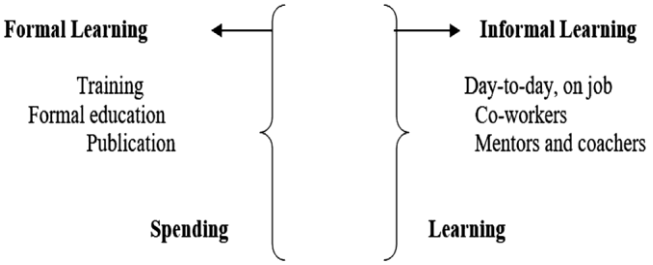

FIGURE 1 Formal and informal learning

ensure that no student shall be granted a pass grade who are lacking required levels of competencies. Course learning outcomes are measured through in-direct measurement of CLO's and subsequently though a direct measurement of student performance from the questions asked during exams, student assignments, and projects during the period of assessment as linked to learning outcomes. The combined scores from the direct and in-direct measures help to assess the overall attainment of course learning outcomes and objectives.

3.3.3 | Employee experience

There is a relation among employee involvement, commitment, and organizational productivity (Phipps *et al.*, 2013). Employee participation in decision-making connects individual performance to organizational performance and opportunities to grow in work-related knowledge (Butts *et al.*, 2009). Employee involvement may be a genuine method to place standards into practice and create organization which attracts jobseekers. The employees have to be involved as well as inspired to do the best (Levine, 1990). Employees must believe that they have concrete ways to add usefulness and they can have an impact. Employee ownership appears to be motivating when combined with effective employee involvement programs. Significant participation should result in the employees having an actual effect on the decisions (Pierce*et al.*, 1991). Employee attractiveness which forms a major componentof performance indicator for an institute includes various factors like teaching environment, compensation, research resources, career development, organizational integrity, work-life balance, commitment to quality, and recognition (Priyadarshini *et al.*, 2016). With positive interaction, employees become aware of the problems, create a number of choices to solve these problems, and implement solutions that lessen costs and increase quality.

3.3.4 | Student learning experience

The student as the main consumer of education is at the receiving end and gains knowledge/information (Sinclair & Zairi, 1995). Now students are more and more seeing themselves as customers, and education is considered as their venture to explore the globe for the excellent product offered and expect repay of their investment (Lawrence & Sharma, 2002). Recently, HEIs as a service industry is being given a greater importance on meeting the expectations of students (DeShields *et al.*, 2005). Student-centered education upgraded the student's satisfaction level by expanding their levels of critical thinking, self-learning, motivation, and interactive learning (Elliott & Reynolds, 2014; Frambach *et al.*, 2014; Hillyard *et al.*, 2010). Retaining of knowledge, high level of understanding, as well as a supportive learning setting in an academic framework are the highlights of student-centered systems (Frambach *et al.*, 2014; Remedios & Hawthorne, 2008).

The students are motivated to be the controller of the knowledge produced (Frambach *et al.*, 2014). There is an increased involvement and engagement encouraging students to acquire ideas from each other (Elliott & Reynolds, 2014; Hillyard *et al.*, 2010). Student's impact over knowledge necessitates less control and weak arrangement on one side and, on the other side, inferences of earlier research suggest student-centered learning is extremely context-dependent (Frambach *et al.*, 2014).

Studies revealed that there were two different approaches to promote quality in education: to have "good" teachers and students and to have mainly "good" teachers (Vroeijenstijn, 1995). If one wants to embrace teaching and learning methods where students have an active role, it is essential to promote the quality in education (Mazur,1997; Redish, 2003); it is also essential to change students' mentality and to encourage them to be more responsible in their learning process. Students are more attentive and cooperative; their motivation level to learn also increases when students' ideas and perspectives are valued (Allen, 2008).

3.3.5 | Employability

Greater attention than ever is being placed on how universities enable their graduates to achieve their career goals as a key return on significant private and public investment. Employment and education are hypothetically connected with the construct "employability" (Ashok Pandit & Wallack, 2016). In Slovenia, a higher education quality model was developed covering both an internal dimension of the quality along with an external dimension, that is, outcomes dimensions which otherwise have been unnoticed by the earlier quality models. The results suggest that stakeholders measure the quality of a HEI through employers. In Rodman's model, much importance is given to employers vis-à-vis- other aspects of quality of a HEI (Rodman *et al.*, 2013).

Strategically, employers have an important role in the managing the performance of HEIs (Owlia & Aspinwall, 1996). Employers are often ignored by policy makers with respect to defining quality (Lagrosen *et al.*, 2004; Niven, 2003). Ignoring the outcomes dimension is a realistic reason of weak higher education quality management. (Rodman *et al.*, 2013).

There is a proper difference between outcomes and outputs. It is the internal environment of HEIs that creates outputs, and outcomes become evident only in the external environment. Outcomes are realized as quality of the activities of a HEI. These become noticeable immediately when the graduate is out in the market to be hired by the employer. Various researchers have concluded that the analysis of the Balanced Scorecard (Lagrosen *et al.*, 2004; Niven, 2003) and ISO 9001 guidelines reveals that standards control processes until outputs are produced, however, are unable to measure the quality aspects like student competencies, level of knowledge and skills, etc. (Kaplan, 2001; Robert& Kaplan, 2000).

In 2014, author in her research emphasizes about the major concern of the Indian youth is lack of employability skills (Khare, 2014). In her research, she stressed that although uneducated and untrained show deficit of skills, the educated also lie below the estimated level of standards.

U R Rao Committee has anticipated that India needs over 10,000 PhDs and double the number of MTech degree holders for meeting its

huge research and development needs, but India produce hardly 400 engineering PhDs a year (FICCI & NMIMS, 2010).

The NASSCOM report of 2009: Perspective 2020: Transform Business, Transform India says industry players should undertake measures such as co-investing universities to drive primary research and organizing internships and collaborative projects. Government of India is planning to fund research institutes on the basis of patent generation or offering tax incentives for private R & D spending (NASSCOM, 2009). Government will focus on increasing innovation and igniting entrepreneurship by establishing incubators. According to this report, by 2020, industry is expected to grow fivefold and will need new players to capture this growth potential. NASSCOM in collaboration with industry and institutions will establish centres of excellence to develop pockets of expertise and innovation. Thus, a huge demand for employable graduates will be the need of the hour.

3.3.6 | Branding

The rise of international quality assurance was debated with opposing schemes and plans. It was deliberated that branding of higher education has a significant consequence in understanding its quality. It was mainly because higher education has become progressively internationalized (Harvey, 2004).

The international rankings reflect the quality of universities. Implementation of US accreditation outside that country is a developing tendency. Transnational branding is becoming important. Brands are created, traded, and consumed in the postmodern economy. Universities are collaborating with renowned universities across the world which influences their learning and development. Although, concepts of "McDonaldization" (Bush, 2006; Ritzer, 2004) of higher education have been argued (Altbach, 2015). Still many aspects of international branding are uncovered.

India has witnessed a growth in the number of universities and engineering institutions especially in the last two decades (Pal Pandi *et al.*, 2008). Updating stakeholders on the various developments is considered mandatory. Getting national and international ranking is increasingly becoming important in view of maintaining quality. Because of increased impetus, HEIs are struggling to maintain their ranking and accreditations. This is leading to enhanced competition in this sector (Nandi & Chattopadhyay, 2011). Public perception about the employer is determined by the "employer's attractiveness" and is closely related to the concept of "employer branding."

4 | IMPORTANT PREDICTORS OF QUALITY HIGHER EDUCATION

Table 1.

5 | RESEARCH GAPS

The literature study has highlighted some quality predictors/critical success factors (CSFs) that have a huge impact on the performance of the HEIs in view of recent developments in higher education. However, employability is still not given much importance. Similarly, earlier studies have paid deficient importance to leaning assessment and student engagement. Thus, although there are many studies covering quality of education; however, a holistic approach is lacking. The current research includes these less focused factors to present a holistic picture of HEIs performance.

Based on these gaps, the researchers have used academic culture, student experience, employee experience, employability, and branding as independent variables. Academic culture envelops academic environment and academic operations and covers the broad indicator, that is, teaching and learning environment. "Student experience" covering student engagement, learning assessment, and student satisfaction links to indicator, that is, experiential and research-based studies and international outlook. Employee experience on the other hand covering employee involvement and employee attraction directly influences research and its quality as well as reputation. We argued that employability refers to meeting the expectation of the employers and employer reputation. The proposed model for augmenting quality in higher education in India, specially the engineering institutes, is an empirical study of engineering institutes in India based on IEQMS model.

It is theorized that branding indicator specifies the overall reputation of the HEIs. The dependent variable, that is, overall performance indicator is categorized in four perspectives based on balance-scorecard method. The spokes of overall performance include customer perspective (student and parent), faculty perspective, financial perspective, and learning and innovation perspective. SEM-PLS approach is applied, and significant CSFs are identified.

The Table 2 shows the classification of various performance indicators under THE, QS, and NIRF rankings and their corresponding indicators undertaken in this research.

6 | OBJECTIVES OF THE STUDY

O1: To analyze the relationship between academic culture, student experience, and employee experience.

O2: To analyze the relationship among academic culture and overall performance of HEIs.

O3: To analyze the relationship among branding and overall performance of HEIs.

O4: To analyze the relationship among employability and overall performance.

7 | RESEARCH DESIGN

The study uses descriptive research design. A self-structured questionnaire is used for collecting the data from faculty of vari- ous National Institute of Technology (NIT) and Indian Institute of Technology (IIT). A survey is conducted, wherein 204 faculty members participated and provided inputs on the performance indicators.

TABLE 1 CSFs from TQM practices

Anderson et al. (1994)	Spanbauer (1995)	Owlia and Aspinwall (1997)	Rao et al. (1999)	Sathivel and Raju (2006)	Sathivel (2007)
Visionary leader ship	Leadership	Top mgmt. commitment	Employee training	Commitment of top mgmt. & leadership	Commitment of & leadership
Customer satisfaction	Education & training	Strategic planning	Strategic quality-planning	Customer focus	Customer focus
Process management	Organizational climate	Organization for quality	Quality citizenship	Course delivery	Course delivery
Employee fulfilment	Customer service	Employee involvement & team working		Communication	Communication
Learning	Scientific methods & tools	Training for quality	Internal/external quality results	Campus facilities	Campus facilitie
Continuous improvement	Meaningful data & team problem-solving	Design mgmt.	Benchmarking	Congenial learning environment	Congenial learni environment
Internal & external co-operation		Process mgmt.		Continuous assessment & improvement	Continuous asse &improvemer
		Supplier mgmt.		Congenial learning environment	
		Information & analysis		Customer value	
		Customer focus & satisfaction		Customer satisfaction	

Bayraktar et al. (2008)	Pal, Rao, and Jeyathilagar (2009)	Sayeda, Rajendran, and Lokachari (2010)	Asif et al. (2013)	Mehta et al. (2013)	Pal Pandi
Leadership	Top Mgmt.	Top mgmt. commitment & support	Leadership	Institutional resource mgmt.	Top mgmt commitr
Vision of HEI	System approach to mgmt.	Infrastructure	Vision	Long-term strategy & planning	Systematic mgmt.
Student focus	Customer satisfaction	Quality mgmt. systems	Measurement & evaluation	Excellence HRM	Customer
Other stakeholders focus	Employee involvement	Faculty & staff focus	Process control & evaluation	Continuous assessment & Imp.	Employee
Process design & resources	Training	Student focus	Program design & resource	Top mgmt. commitment & visionary leadership	Training
Measurement evaluation	Team work	Alumni focus	Other stakeholder focus	Student focus	Team wor
Employee involvement	Continuous improvement	Stakeholders focus		Employee focus	Continuou Improveme

TABLE 1 (Continued)

Bayraktar et al. (2008)	Pal, Rao, and Jeyathilagar (2009)	Sayeda, Rajendran, and Lokachari (2010)	Asif et al. (2013)	Mehta et al. (2013)	Pal Pandi et al. (2016)	Teeroovengadum et al. (2016)
Recognition & reward		Societal responsibility		Alumni focus	Corporate social responsibility	
		Industry interface		Information mgmt. system	Academic culture	
		Feeder institution partnership		Quality mission & vision statement	Knowledge Audit	
		Continuous improvement		Service culture		
		Measurement, information & analysis		Innovative academic philosophy & method		
		Benchmarking		Industry institution partnership		
		Knowledge mgmt.				
		Research & development				
		Healthy & innovative practices				
		Pedagogy (teaching-learning process)				

This research has been undertaken to design a holistic model for embracing a balanced emphasis among the different core functions of the organization to provide a basis for development of a culture conducive to their implementation. Ideal academic culture helps the organization to attain a capacity to create its future where student-centered learning will make student more autonomous. Students will become drivers of solutions rather than learners of problems. Employee experience leading to employee attractiveness and branding of the HEIs.

8 | HYPOTHESES

Student experiences are significantly impacted by quality learning environments, wherein HEIs take into account students' goals and make clear the relevance of what they are learning and deploy expert teachers who build rapport with students, also facilitate application/practice opportunities in authentic or simulated practice situations; give students opportunities to engage in experiential learning; give students opportunities to work with peers; and take into account students' own role in their learning, encouraging them to develop meta-cognition skills that underpin self-assessment, self-monitoring, and management of their own learning.

H1. Academic culture positively influences student experience.

Teachers' activating influence on students most efficiently predict student engagement in HEIs. The role of teachers and their competencies to use active learning techniques are perceived to be very influential in promoting student engagement. Faculty through training and development changes their roles from facilitators to mentors to support research, innovation, invention, and respond to the unanswered queries to develop student's learning quest. All this happens through "think-pair-share" concept of learning and other more innovative ways in a new teaching–learning environment.

H2. Academic culture positively influences employee experience.

Together student and faculty experiences can impact the overall performance of the Engineering Institutes.

H3. Student and employee experience is positively associated with overall performance of the engineering Institutes.

Higher education should be primarily directed at enhancing students' creativity and innovation, making them aware of their entrepreneurship opportunities. The involvement of business stakeholders as co-creators and co-producers of the HEIs' provides a boost to the achievement of quality education (Cavallone *et al.*, 2019).

H5. Employability of students is an importance factor for augmenting quality in higher education in India.

Branding should stay intact with stakeholders in terms of the sense of protecting the core value and mission of an organization as well as

TABLE 2 Ranking parameters

Parameters	The ranking	QS ranking	NIRF	This study
Teaching (the learning environment)	Reputation survey: 15% Staff-to-student ratio: 4.5% Doctorate-to-bachelor's ratio: 2.25% Doctorates-awarded- to-academic-staff ratio: 6% Institutional income: 2.25%	Academic Reputation (40%) Faculty/Student Ratio (20%)	Teaching, learning, and resources	Question No. 1 to18 (teaching and learning environment) 57 to 64 (academic reputation)
Research (volume, income and reputation)	Reputation survey: 18% Research income: 6% Research productivity: 6%	—	Research and professional practices	Question No. 21,22, 66, 67 Question No. 49–55
Citations (research influence)	30%	Citations per faculty (20%)		
industry interaction	2.5%	Employer reputation (10%)		
Internationalization	International-to-domestic-student ratio: 2.5% International-to-domestic-staff ratio: 2.5% International collaboration: 2.5%	International Faculty Ratio (5%) International Student Ratio (5%)	Graduation outcomes, outreach, and inclusivity	Question No. 57, 58, 59. 62, 63

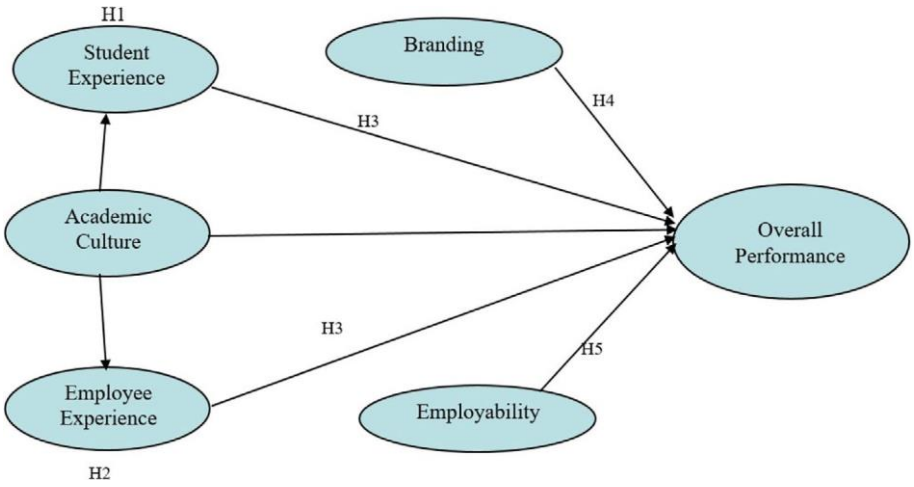

FIGURE 2 Proposed relation

maintaining this value through visual identity that will withstand all types of modern changes and circumstances throughout the lifetime.

H4. Branding positively influences performance of the institute.

9 | PROPOSED MODEL

See Figure 2.

10 | DATA AND METHODOLOGY

The study has been based on data collected through a survey of faculty working in selected engineering institutes in India, during the latter part of 2017. The online questionnaire captured are recorded in Excel, and PLS regression is applied on the data to extract the findings. Prior to launching the questionnaire, a pretest was by sending it to 50 faculties for review. Based on the feedback, the length of the questionnaire was reduced. The sample covered faculty from seven engineering institutes. The questionnaire was sent to 800 faculty members, and overall, we received 203 usable responses to our solicitations. Exploratory study has been done and partial least square (PLS) regression model has been applied. PLS regression technique is especially useful in common cases where the number of descriptors (i.e., independent variables) is compara- ble to or greater than the number of compounds (i.e., data points) and/or when there exist other factors leading to correlations between variables. In this case, the solution of classical leastsquares problem does not exist or is unstable and unreliable. Onthe other hand, PLS approach leads to stable, correct, and highly predictive models even for correlated descriptors.

11 | MODEL ESTIMATION AND RESULT EVALUATION

11.1 | Reflective measurement model assessment

It is a reflective model consisting of five indicator items. Since the proposed model has one reflective construct; therefore, the first step in the measurement model analysis entails the assess- ment of the reliability and validity of the construct. This involves assessing the internal consistency and the construct measures' indicator reliability as well as convergent and discriminant valid- ity. As for the construct measures' indicator reliability, all the reflective indicator items show a loading of above 0.70. As shownin Table 1, the composite reliability values of the reflectively measured construct are above 0.7 and the Cronbach's α above0.6, providing evidence of the construct's measure of internalconsistency reliability. Thus, indicators in the reflective measure- ment model show satisfactory levels of indicator reliability. Similarly, the average variance extracted (AVE) is higher thanthe critical threshold value of 0.50, lending support for the mea- sures' convergent validity. After having assessed the convergent validity, the discriminant validity of the reflective construct is assessed. The reflective construct exhibits discriminant validity (Tables 3–5).

Variance inflation factor (VIF) measures multicollinearity in regression analysis. The outer VIF values and Inner VIF values are given in Table 3. As depicted, all of the values are lower than the threshold limit of 5. Hence, VIF values are acceptable. Thus, the next step is to proceed with SEM-PLS.

12 | STRUCTURAL MODEL ASSESSMENT

A structural equation modeling-partial least square (SEM-PLS) model is developed depicting relation among CSFs and to analyze the importance of CSFs in successful implementation (Figure 3).

Overall performance is categorized in four perspectives namely CP—customer (student/parent) perspective, FP—faculty perspective, FinP—financial perspective, LP—learning perspective (Tables 6 & 7).

The coefficient of determination (R^2) value is a common measure on the basis of which the structural model is evaluated. This coefficient represents the combined effects of all independent variables on dependent variables. The R^2 value for the overall model here is strong (77.9%).

The strength of mediation is computed via variance accounted for (VAF), as suggested by Hair et al. (2014).

$$\text{VAF} = \frac{\text{Indirect effect}}{\text{Total effect}}$$

Calculation reveals VAF is between 20% and 80%, which suggests the academic culture partially mediates the relationship

TABLE 3 Cronbachs α, composite reliability and AVE

	Cronbach's α	Composite reliability	AVE
Academic culture	0.698	0.868	0.767
Branding	1.000	1.000	1.000
Employability	1.000	1.000	1.000
Employee experience	0.812	0.914	0.842
Overall performance	0.836	0.890	0.670
Student experience	0.858	0.914	0.780

TABLE 5 Outer VIF and inner VIF

	Outer VIF		Inner VIF
AE	1.575	Academic culture	3.644
AO	1.575	Branding	1.891
BR	1.000	Employability	2.308
CP	1.625	Employee experience	2.167
EA	2.058	Overall performance	3.121
EI	2.058	Student experience	2.167
EM	1.000		

Abbreviations: AE, academic environment; AO, academic operation; BR, branding; CP, customer perspective (overall performance); EA, employee attraction; EI, employee involvement; EM, employability.

TABLE 4 Fornell-Larcker criterion (discriminant validity)

	Academic culture	Branding	Employability	Employee experience	Overall performance	Student experience
Academic culture	0.876					
Branding	0.636	1.000				
Employability	0.622	0.543	1.000			
Employee experience	0.704	0.593	0.651	0.917		
Overall performance	0.711	0.661	0.724	0.837	0.819[a]	
Student experience	0.679	0.527	0.724	0.770	0.753	0.883

[a]0.819 is higher than the squared interconstruct correlations, thereby, indicating discriminant validity.

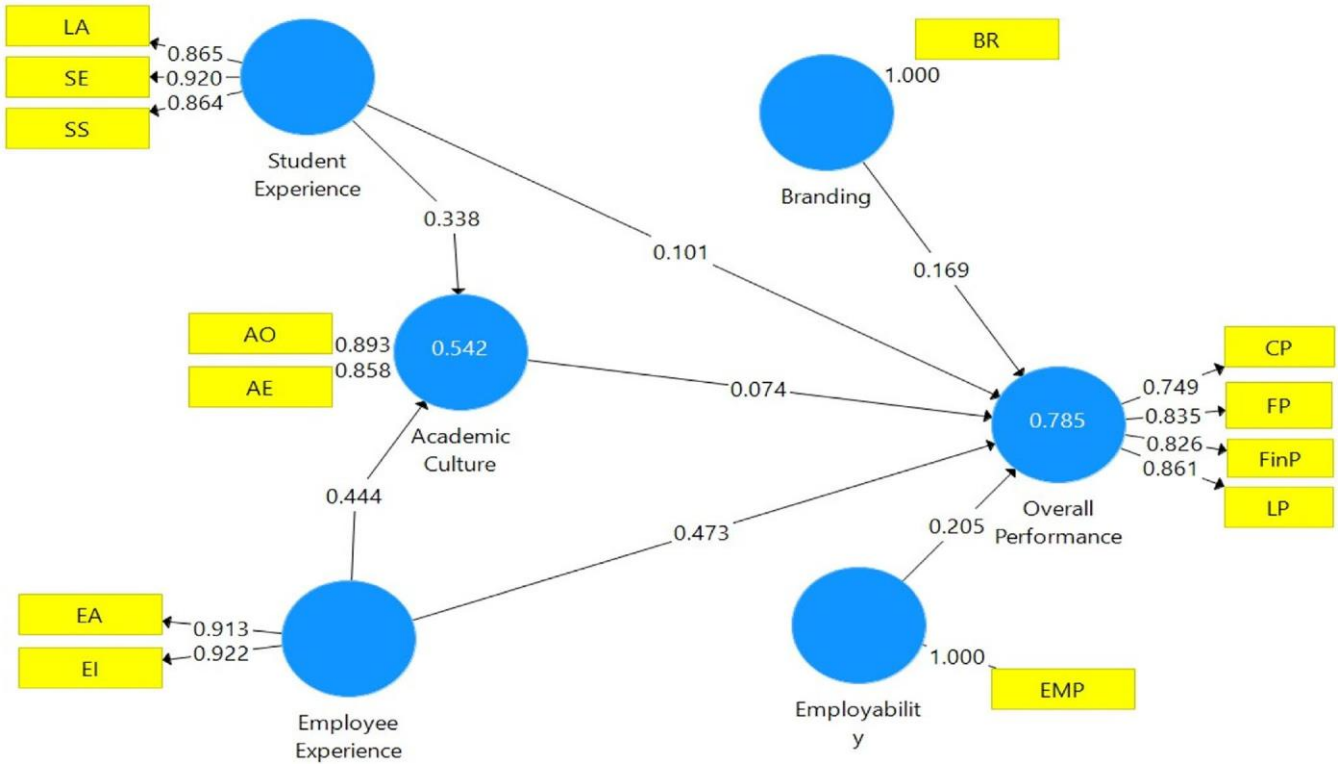

FIGURE 3 Structural model and PLS-SEM estimates

TABLE 6 *T* statistics and *p* values

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (jO/STDEVj)	*p* values
Student experience ≥ academic culture	0.338	0.344	0.089	3.802	0.000***
Employee experience ≥ academic culture	0.444	0.437	0.073	6.112	0.000***
Branding ≥ overall performance	0.169	0.167	0.047	3.591	0.000***
Employability ≥ overall performance	0.205	0.205	0.058	3.517	0.000***
Employee experience ≥ overall performance	0.473	0.472	0.053	8.932	0.000***
Academic culture ≥ overall performance	0.074	0.072	0.061	1.222	0.222
Student experience ≥ overall performance	0.101	0.106	0.062	1.634	0.103

***$p \leq 0.001$.

between student/employee experience and overall performance (Table 8).

TABLE 7 R^2 and R^2 adjusted

	R^2	R^2 adjusted
Academic culture	0.542	0.537
Overall performance	0.785	0.779

13 | DISCUSSION

The employeee experience is the most importance significant performance indicators to enhance the performance of the engineering institute when academic culture is taken a mediator (Andersonet *al.*, 1994; Owlia & Aspinwall, 1997; Pal Pandi *et al.*, 2016). The direct effect of student experience ($\beta = 0.101$) is less in comparison to the indirect effect ($\beta = 0.412$). The employee experience is followed by student experience to have a significant role to play in the overall performance. This is even more enhanced when academic culture acts

TABLE 8 Results of hypotheses testing

	Hypotheses	Results
H1	Academic culture positively influences student experience.	Supported
H2	Academic culture positively influences employee experience.	Supported
H3	Student and employee experience is positively associated with overall performance of the engineering Institutes.	Supported
H4	Branding positively influences performance of the Institute.	Supported
H5	Employability of students is an importance factor for augmenting quality in higher education in India.	Supported

as a mediator. On the other hand, employability of students (EM) (Ashok Pandit & Wallack, 2016) and branding (BR) play important role to influence the overall performance of the HEIs; however, brand-ing has least impact on the performance compared to the other indicators as it has lowest beta value (0.169). This reveals that engineering institutes need to focus on developing strategies to improve branding and thus enhance outreach and visibility of the institutes (Nandi & Chattopadhyay, 2011). This study showed that the academic culture is a critical pathway to reach the performance peak.

14 | CONCLUSION

Academic culture is base for quality teaching and education delivery. Standard academic culture is supposed to be achieved through curriculum harmonization. Curriculum requires to be is internationally attuned and matching the expectation of students one hand and developing a conducive environment for implementing the changes on the other hand. In tune to the earlier study (Vattøy *et al.*, 2020), institutions seeking to embed partnership might best adopt a multilevel approach of project-based and curricular, whole-class partnership models. Finally, whatever partnership approaches practitioners plan, we urge careful consideration of how projects or schemes are accessible to those students and staff who are currently least likely to engage in partnership, so that the benefits of partnership are equitably available to all. This study contributes to the existing research about academic integrity in higher education by demonstrating that professors are one of the most important factors for student outcomes: they are the prime movers of student learning, and the more engagement a professor creates, the better the conditions for students' learning. Branding needs the focus of policy makers, and it can highly impact the visibility of institute. Availing national and international accreditation titles leads to enhanced brand image of EEIs.

In future, empirical studies can also be conducted on the AQAR model by collecting data through questionnaires based on the perception of students, and it can be tested through hypotheses employing R software to determine the extent of implementation of AQAR in EEIs in India.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study will be made available from the corresponding author upon request.

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