Journal of Informatics Education and Research
ISSN: 1526-4726
Vol 4 Issue 3 (2024)

Assessing Community-University Engagement: Scale Development and Empirical Validation

Ishani Mishra[a*], Dr Vikas Thakur[b], Dr Binita Tiwari[c]
[a]Research Scholar, School of Management, National Institute of Technology, Rourkela, India
*Corresponding Author Email: ishanimishra.id@gmail.com
[b]Assistant Professor, Department of Humanities and Social Sciences, Indian Institute of Technology, Kharagpur, India
Email: thakurv@hss.iitkgp.ac.in
[c]Assistant Professor, Department of Humanities and Social Sciences, Indian Institute of Technology, Kharagpur, India
Email: tiwarib@hss.iitkgp.ac.in

Abstract

This study aims to assess and measure Community-University Engagement (CUE) through the development and validation of a comprehensive scale tailored to the Indian higher education context. The paper focuses on identifying key dimensions of CUE and creating tools to measure engagement across the academic community, including students, professors, and educational administrators. A mixed-methods approach was employed, combining focus groups and in-depth interviews to identify relevant dimensions. Item generation was followed by Exploratory Factor Analysis and Confirmatory Factor Analysis (n=250) to validate the structure, while Structural Equation Modeling (SEM) was used to test the scale's predictive validity. The findings reveal three distinct levels of CUE—personal, communal, and institutional—each with unique engagement predictors. Based on these levels, three distinct scales were developed: one for students and professors that encompasses all engagement predictors, and a shorter, institutional-focused scale for administrators. The implications of the study suggest that administrators can apply these scales to develop targeted community engagement practices, enhancing institutional collaboration with the community through data-driven strategies.

Keywords: Community Engagement, Higher Educational Institutions, Scale Development, Structural Equation Modelling, Confirmatory Factor Analysis

1. Introduction

Community-University Engagement (CUE) has gained impetus since the early 2000s, as higher education institutions worldwide increasingly recognize the importance of engaging with their local communities (Bidandi et al., 2021). CUE fosters mutually beneficial relationships between universities and external communities, contributing to societal development while enhancing institutional learning and innovation. However, in the Indian scenario, not much progress has been observed. Despite global advancements, the community engagement practices of Indian higher education institutions (HEIs) remain fragmented and underdeveloped (Easter et al., 2021).

Several reasons contribute to this slow progress. First, the absence of a cohesive national policy or framework guiding CUE efforts leaves institutions without a clear mandate or direction. Second, Indian HEIs tend to focus more on academic achievements and research outputs, often neglecting the societal impact of their work (Bhatnagar et al., 2020). Third, resource constraints and infrastructural challenges hinder the capacity of these institutions to actively participate in community engagement activities. Lastly, there is a lack of awareness and training among faculty and students regarding the potential benefits of such engagement, further contributing to the gap between theory and practice (Jadhav & Shukla, 2016; Misra et al., 2018).

Additionally, a clear distinction between corporate social responsibility (CSR) activities undertaken by universities, Community university engagement measures and civic participation remains blurred. While CSR efforts often focus on fulfilling corporate obligations and improving the institution's image, civic participation emphasizes individual community involvement, fostering deeper connections and long-term impact (Boodram & Thomas, 2022). However, community engagement refers to the structured, often institutionalized, efforts to collaborate with external communities for mutual benefit. This involves universities using their resources—knowledge, research, and expertise—to address societal challenges while fostering learning opportunities for students and faculty (Bhatnagar, 2020).

To tackle these challenges, the University Grants Commission (UGC) introduced comprehensive guidelines in 2019 aimed at fostering community engagement in higher education institutions. These guidelines were designed to integrate community-oriented activities into the academic framework, promoting collaboration between universities and local communities. The UGC emphasized the need for HEIs to address societal issues such as poverty, education, and

sustainability, aligning academic programs with community needs. By formalizing these efforts, the UGC seeks to transform Indian universities into active agents of social change, promoting holistic development while enhancing their academic relevance (Kumar et al., 2021).

Despite the introduction of these guidelines by the UGC in 2019, aimed at formalizing community engagement within HEIs, much of the response has remained theoretical rather than practical. While the guidelines provide a framework for action, they have been primarily interpreted in an academic manner, with limited concrete efforts toward their implementation.

Existing literature often emphasizes the potential benefits of community engagement but falls short of offering robust empirical evidence on its impact, especially in the Indian context. Few studies evaluate how effectively these engagement measures have been integrated into the daily functioning of universities, leaving a significant gap in assessing real-world outcomes. Additionally, most of the research tends to focus on larger, well-established institutions, while smaller HEIs, which may face unique challenges, remain underrepresented (Kalyani, 2020).

Another notable gap is the lack of frameworks that measure different levels of engagement between universities and various community sectors, such as local businesses, social organizations, and government bodies (Ibrahim, 2023). Furthermore, while there is ample discussion about the theoretical constructs of engagement, there is a scarcity of validated tools or scales that can quantitatively measure community-university engagement (CUE). This absence of standardized metrics complicates cross-institutional comparisons and hinders the development of strategies for enhancing engagement outcomes (Joshi, 2023).

It has been observed that most engagement metrics and scales in the academic context primarily focus on personal involvement and individual contributions. This study represents preliminary work in gauging engagement at social levels, aiming to expand beyond the personal forefront. It also measures engagement across different hierarchies, providing a broader perspective on how engagement manifests and impacts various levels within the community.

The research questions guiding the present study are:

- What are the key community stakeholders involved in the community engagement activities of Indian universities?
- What are the different levels of community engagement observed in Indian universities, and how are they characterized?
- What predictors significantly influence the levels of community engagement in Indian universities, and how do these predictors impact engagement outcomes?

Therefore, this study aims to identify the key community stakeholders of Indian universities, assess the various levels of community engagement within these institutions, and pinpoint the predictors that influence each respective level of engagement. By analyzing how different community-university interactions take place, the study seeks to provide a comprehensive understanding of the factors that drive effective engagement. This will not only fill the existing gaps in empirical research but also offer a scalable framework for enhancing community engagement practices in Indian higher education institutions.

The remainder of the paper follows a structured pattern: Section 2 covers the literature review, focusing on the identification of community stakeholders, levels of Community University Engagement (CUE), and predictors of CUE. Section 3 details the scale development process, including item generation and reduction, expert review, pilot study, final scale validation, and an additional retest. The paper concludes with a discussion of findings, policy implications, and future research directions.

2. Literature review

In order to identify dimensions of community engagement within higher education, it is crucial to first understand what the term "community" entails. The word "community" generally refers to a group of individuals or entities that share common interests, values, or geographic locations. In the context of higher education, "community" can encompass a variety of groups including local residents, businesses, non-profit organizations, government agencies, and other stakeholders who interact with the university.

Table 1 below outlines the primary community stakeholders identified in the UGC guidelines for higher education institutions.

Table 1: Primary community stakeholders

Stakeholder Category	**Description**	**Example**
Local Partners	Residents and local organizations in the university's geographic area, focusing on local issues and quality of life.	Local schools, community centers, neighborhood associations, Advocacy Groups
Social Impact Organizations	Independent organizations addressing social, environmental, and developmental challenges through collaborative projects.	NGOs, Volunteer Groups, Non-Profit Associations, Philanthropic Institutions
Public Sector Entities	Local, state, and national government bodies that align university initiatives with public policies and development goals.	Municipalities, State Education Departments, Central Government Ministries
Corporate and Industry Collaborators	Businesses and industries partnering with universities for research, internships, and community development projects.	Service industries, Local Manufacturing industries, cottage industries, local businesses

After the identification of the relevant stakeholders, an in-depth review of the UGC 2019 Report on 'Fostering Social Responsibility and Community Engagement in Higher Education' was conducted. The review revealed that community engagement manifests at three levels in universities. Table 2 demonstrates the three distinct level of CUE s desired in Indian HEI scenario.

Table 2: Identified Community University Engagement Levels

Sl. No.	Community Engagement	Respective Guideline	Explanation
1.	Personal Engagement Level	Personal involvement in community service and volunteer work.	This level focuses on the active participation of faculty, students, and staff in addressing community needs through personal initiatives and volunteering.
2.	Community Engagement Level	Organized community outreach programs and partnerships with local organizations.	This level involves collaborative efforts between the HEI and various community groups to address social issues and promote community development through joint initiatives.
3.	Institutional Engagement Level	Integration of community engagement into institutional policies and academic programs.	This level encompasses the strategic and organizational efforts of the HEI, including embedding community service into the institution's mission, creating formal frameworks, and establishing partnerships with external entities.

A comprehensive literature review was conducted for each level of community engagement to understand their unique characteristics and impacts. This review encompasses various aspects of community engagement, with a focus on how each level contributes to overall effectiveness and outcomes. The analysis begins with the individual level, exploring factors such as curriculum relevance, sense of belonging, perceived impact, and access to resources. Each of these aspects is critical for understanding how personal engagement can be nurtured and maximized within higher education institutions. Following this, the literature review extends to the communal and institutional levels, offering a holistic view of how community engagement is structured and implemented across different tiers of interaction.

2.1 Personal Level Community Engagement

At the individual level of community engagement, literature reveals that curriculum relevance plays a crucial role in fostering engagement. When academic programs are aligned with community needs and real-world applications, students

and faculty are more likely to participate actively in community-related activities (Yadav & Sharma, 2023). This alignment not only enhances the practical learning experience but also promotes a sense of belonging among participants, as they see their contributions making a tangible difference (Singh et al., 2023). Additionally, the perceived impact of these activities significantly influences individual engagement. When participants recognize the value and outcomes of their involvement, their motivation and commitment to community engagement are heightened . Access to resources also plays a pivotal role, as it enables individuals to effectively contribute to community projects. Adequate support, including financial, informational, and logistical resources, empowers participants to engage more meaningfully and sustainably (Sharma et al., 2019). Thus, understanding these factors is essential for enhancing individual-level community engagement and ensuring that personal contributions are both impactful and rewarding.

2.2 Communal Level Community Engagement

At the communal level of community engagement, literature highlights several key practices that enhance interaction and cooperation between higher education institutions and local communities. Community-based research practices, service learning, and public outreach programs are central to this level. Community-based research involves collaborative efforts between academic researchers and community members to address pressing social issues and contribute to local development (Kali et al., 2023). Similarly, service learning integrates community service with academic learning, allowing students to apply classroom knowledge to real-world challenges while benefiting the community (Bhatnagar, 2020). Public outreach programs further extend this engagement by providing platforms for HEIs to connect with the broader community through events, workshops, and services designed to meet local needs and interests (Valencik, 2023). Together, these practices enhance communal interaction by fostering collaboration, addressing local issues, and applying academic insights to community needs. Additionally, alumni networks play a vital role in supporting communal engagement by leveraging former students' experiences to aid ongoing community initiatives and mentorship programs (Dang, 2023; Elalouf, 2023). Social cohesion is another crucial element, reflecting the degree of interconnectedness and mutual support within the community. Effective community engagement initiatives contribute to building social cohesion by promoting collaboration and fostering a sense of shared purpose among diverse groups (Bidandi, 2021). These elements collectively illustrate the multifaceted nature of communal-level engagement and its impact on strengthening relationships between HEIs and their surrounding communities.

2.3 Institutional Level Community Engagement

At the institutional level of community engagement, several key practices and structures are critical in fostering effective collaboration between higher education institutions (HEIs) and their communities. Public-private partnerships play a crucial role by facilitating resource sharing and collaborative projects between HEIs and external organizations, including businesses and non-profits, to address community needs and drive innovation (Parker, 2024). Collaborative governance models further enhance institutional engagement by involving multiple stakeholders in decision-making processes, thereby ensuring that community interests are represented and addressed in institutional policies and practices (Elken, 2024). Recognition and incentives are also essential, as they motivate and reward both individuals and teams within HEIs for their contributions to community engagement. These can include awards, grants, and public acknowledgment, which reinforce the value of community involvement (Bell & Lewis, 2023). Additionally, institutional structures such as knowledge repositories, community engagement hubs, and dedicated committees play a significant role in organizing and supporting community engagement activities. Knowledge repositories facilitate the storage and dissemination of research and best practices, while community engagement hubs act as focal points for coordinating outreach efforts and collaborations (Wang, 2023). Committees dedicated to community engagement ensure that there is strategic oversight and continuous development of engagement initiatives (Sugawara et al., 2023).

3. Research Methodology

The study employs a mixed-methods approach to comprehensively explore community engagement dimensions. Initially, focus groups were conducted to gather qualitative insights. The first focus group comprised four professors, two research scholars, and four academic administrators, while the second focus group included two industry practitioners, two NGO members, two local volunteer group leaders, and two members from the local governing body. Concurrently, in-depth interviews were carried out with participants from various sectors to provide a deeper understanding of the engagement dimensions. The transcripts from these focus groups and interviews were meticulously analyzed to identify and verify the dimensions highlighted in the literature review. This approach ensured a robust and nuanced understanding of community engagement across different stakeholder perspectives.

Following the analysis of focus group discussions and in-depth interviews, four distinct predictors were identified for each level of community engagement. These predictors were derived from a comprehensive examination of the qualitative data, aligning with the dimensions outlined in the literature review. Each predictor was carefully evaluated for its relevance and

impact within the respective level—individual, communal, and institutional. The identification of these predictors involved an iterative process of coding and thematic analysis to ensure that they accurately reflect the key factors influencing community engagement at each level. Table 3 enlists the CUE predictors as identified from the literature review and the thematic analysis.

Table 3: Predictors of community University Engagement

Sl. No.	Community Engagement Level	Predictors	Explanation
1	Personal Level	Curriculum Relevance (CR)	The extent to which academic programs are aligned with community needs and real-world issues, facilitating meaningful student engagement.
2		Community affiliation (CA)	The feeling of inclusion and connection students experience within their academic environment, which influences their motivation to engage with the community.
3		Perceived Impact (PI)	The belief among students that their engagement activities have a tangible positive effect on the community, enhancing their commitment to participation.
4		Access to Resources (AR)	Availability of tools, support, and opportunities for students to engage in community-related activities, which can facilitate or hinder their involvement.
5	Communal Level	Community-Based Research Practices (CBR)	Collaborative research efforts between HEIs and community members addressing local issues, fostering deeper engagement and mutual benefit.
6		Public Outreach Programs (PO)	Initiatives designed to connect HEIs with the broader community through events and services, enhancing visibility and involvement.
7		Social Cohesion (SC)	The strength of relationships and mutual support within the community, which enhances collective engagement and cooperation.
8		Alumni Networks (AN)	Platforms for former students to support ongoing community initiatives and mentorship, leveraging their experiences for community benefit.
9		Public-Private Partnerships (PPP)	Collaborations between HEIs and external organizations that pool resources and expertise to address community needs and drive innovation.
10	Institutional Level	Collaborative Governance Models (CGM)	Involvement of multiple stakeholders in decision-making processes, ensuring that community interests are represented in institutional policies.
11		Recognition and Incentives (RI)	Systems to acknowledge and reward contributions to community engagement, motivating ongoing involvement and excellence.
12		Institutional Structures (IS)	Organized frameworks such as knowledge repositories, community engagement hubs, and committees that support and coordinate community engagement activities.

3.1 Scale development

The academic community within higher education institutions (HEIs) comprises students, faculty, and educational administrators, and effective community engagement needs to occur at all levels of this hierarchy. To address this, three distinct scales were developed to assess community engagement. These scales were crafted with common predictors in mind to ensure consistency and relevance across different groups.

For educational administrators, a shorter scale was designed, focusing exclusively on predictors related to the institutional level. This focused approach was necessary because administrators are primarily involved in shaping and implementing institutional policies and practices, and their engagement is closely tied to institutional structures and strategic goals.

In contrast, research scholars and professors received a more comprehensive scale that encompassed all identified predictors across individual, communal, and institutional levels. This broader scope was appropriate given their roles in both academic and community engagement activities, allowing for a more nuanced assessment of their involvement at multiple levels.

The questionnaire items for all scales were tailored to the respondent profiles to ensure that the questions were relevant and appropriately targeted for each group. This tailored approach facilitated accurate measurement and meaningful insights into community engagement across different segments of the academic community.

3.1.1 Item generation and item reduction

The item generation process for the community engagement scales followed a systematic approach to ensure accurate measurement of engagement dimensions. Based on the findings from the literature review, a pool of potential items was developed. This pool consisted of 200 items each for students and professors. The pool of items was then refined through expert review and pilot testing to ensure relevance and clarity, resulting in 124 finalized items for 3 scales. (53 for professors, 53 for students and 18 for educational administrators)

To ensure content validity, the initial set of items was reviewed by a panel of experts, including academics and practitioners with experience in community engagement. The items were presented to the review panel and they were asked to match each item with the respective predictor. Most reviewers were able to accurately identify the alignment of items with the predictors, leading to the finalization of the items.

3.1.2 Pilot study

The questionnaire was distributed amongst students, faculties, and HEI administrators. In order to ensure sample sufficiency, a combination of self-administered surveys and collaborations with various HEIs was employed. The survey aimed to gather responses from teaching faculty, research scholars, and students involved in community engagement initiatives. Initially, 750 surveys were distributed. Of these, 300 respondents indicated they were not actively engaged in community initiatives and were excluded from the study. Additionally, 200 responses were screened out for insufficient data quality, such as incomplete answers and vague responses to open-ended questions. In total, 250 completed surveys were deemed suitable for analysis.

We applied Structural Equation Modeling (SEM) methodology to verify the predictors. First, Exploratory Factor Analysis (EFA) was conducted using SPSS 20. SEM was employed because it allows for the simultaneous analysis of relationships between observed and latent variables, providing a comprehensive understanding of the predictor validity (Francis, 1988).

After successful EFA, CFA was conducted. We conducted Confirmatory Factor Analysis (CFA) using AMOS, running the data through the model 7-8 times. Factors with cross-loadings and factor loadings below 0.6 were removed. The model ultimately showed a good fit ($\chi 2/df = 1.90$, CFI = 0.80, SRMR = 0.069, RMSEA = 0.054).

After refining the model, the scale for students was finalized with 48 items, while the scale for professors also retained 48 items. Meanwhile, the scale for administrators was reduced to 16 items to reflect their more focused role.

3.1.3 Instrument Validation

For instrument validity, data was collected from various management institutions across India. A total of 1,000 questionnaires were distributed to students, of which 344 were returned (a 34.4% response rate), with 54% male respondents and a mean age of 24.4 years. Additionally, 1,000 questionnaires were sent to professors, yielding 216 responses (a 21.6% return rate), with a mean age of 40.4 years and 67% males. Finally, 500 questionnaires were distributed

to administrators, with 146 returned (a 29.2% response rate), where 49% of the respondents were male, and the mean age was 35.5years.

Several questionnaires were excluded due to incomplete responses, inconsistencies in answers, and failure to meet the required engagement criteria. After this screening process, 280 student questionnaires were retained for analysis, while 196 professor questionnaires and 80 administrator questionnaires were considered valid for further study.

After screening, the data was run again through the measurement model. For the student scale, the model fit showed improved results ($\chi 2/df = 1.80$, CFI = 0.86, SRMR = 0.061, RMSEA = 0.062). Similarly, the professor scale yielded comparable values ($\chi 2/df = 1.85$, CFI = 0.84, SRMR = 0.064, RMSEA = 0.060), while the administrator scale also demonstrated a good fit ($\chi 2/df = 1.88$, CFI = 0.83, SRMR = 0.06, RMSEA = 0.04)

Subsequently, convergent validity was assessed by examining the strength of correlations between measures of the same construct, ensuring that related constructs were strongly correlated. Discriminant validity was evaluated by checking that measures of different constructs had low correlations, confirming that distinct constructs were not overly related (Fornell & Larcker, 1981). The Composite Reliability (CR) values for the scales range between 0.7 to 0.85, indicating a high level of internal consistency across the measurements. The Average Variance Extracted (AVE) values range from 0.6 to 0.78, reflecting the amount of variance captured by each construct relative to the amount of variance due to measurement error.

Item statistics are summarized in the Table 4 below, providing insights into the distribution of means, standard deviations, and factor loadings for each item. These statistics offer a detailed view of the item characteristics and their performance within the measurement model.

Table 4: Item Statistics and Factor Loadings

	Students			Professors			Administrators		
Items	Mean	SD	λ	Mean	SD	λ	Mean	SD	λ
CR1	4.05	0.9	0.78	4.02	0.88	0.77			
CR2	4.2	0.95	0.74	4.18	0.92	0.74			
CR3	4.1	1.02	0.8	4.05	1.03	0.79			
CR4	3.85	1.07	0.71	3.89	1.05	0.72			
CA1	4.4	1.02	0.77	4.03	0.98	0.76			
CA2	3.82	1.03	0.75	3.8	1.01	0.74			
CA3	3.79	1.09	0.7	3.77	1.1	0.71			
CA4	3.92	1.02	0.76	3.95	1.03	0.78			
PI1	3.85	1.04	0.73	3.88	1.06	0.74			
PI2	3.88	0.98	0.82	3.9	0.99	0.81			
PI3	3.8	1.06	0.79	3.82	1.07	0.78			
PI4	3.7	1.01	0.74	3.98	1.05	0.73			
AR1	4.12	0.94	0.72	4.15	0.96	0.73			
AR2	3.9	1.03	0.71	4.05	1.08	0.7			
AR3	3.77	1.14	0.68	3.79	1.12	0.68			
AR4	4.1	1.08	0.76	4.05	1.07	0.75			
CBR1	3.72	1.15	0.81	3.7	1.12	0.8			
CBR2	3.92	1.02	0.77	3.95	1.01	0.76			
CBR3	4.05	0.98	0.79	4.2	0.97	0.78			
CBR4	3.83	1.01	0.75	3.84	1.02	0.76			
PO1	3.74	1.12	0.82	3.75	1.11	0.84			
PO2	4.08	1.1	0.78	4.09	1.09	0.78			
PO3	3.9	1.02	0.77	3.9	0.98	0.76			
PO4	4.15	1.04	0.81	4.12	1.03	0.81			
AN1	3.84	1.05	0.8	3.86	1.04	0.81			
AN2	4.03	0.97	0.84	4.04	0.98	0.85			

AN3	4.2	0.93	0.83	4.01	0.92	0.84			
AN4	4.1	0.98	0.85	4.07	1.01	0.85			
SC1	4.06	1.09	0.8	4.04	0.98	0.83			
SC2	4.02	0.91	0.82	4.08	0.92	0.83			
SC3	3.86	0.99	0.77	3.85	0.97	0.76			
SC4	3.9	1.02	0.85	3.88	1.1	0.87			
PPP1	4.05	0.95	0.87	3.98	0.96	0.88	3.92	1.05	0.73
PPP2	4.12	0.88	0.73	4.13	0.87	0.72	3.8	1.12	0.7
PPP3	4.09	0.92	0.78	4.1	0.94	0.77	4.08	1.09	0.78
PPP4	4.07	0.9	0.77	4.09	0.88	0.78	3.68	1.17	0.79
CGM1	4.02	0.94	0.71	3.8	1.08	0.72	3.94	1.03	0.76
CGM2	4.13	1.01	0.78	4.11	1.02	0.77	4.07	0.97	0.81
CGM3	4.08	0.97	0.76	4.05	0.96	0.75	3.86	1.04	0.77
CGM4	4.18	0.91	0.79	4.17	0.92	0.78	3.78	1.15	0.83
RI1	4.22	0.87	0.8	4.25	0.89	0.79	4.05	0.87	0.76
RI2	4.1	0.95	0.68	4.05	0.94	0.67	4.15	0.91	0.72
RI3	4.05	1.01	0.82	4.02	1.76	0.83	4.08	1.01	0.81
RI4	4.08	0.98	0.91	4.06	0.97	0.9	3.9	1.07	0.7
IS1	4.2	0.94	0.87	4.18	0.95	0.86	4	0.96	0.78
IS2	4.15	0.89	0.79	4.22	0.91	0.8	3.83	1.03	0.76
IS3	4.02	0.88	0.76	4.01	0.9	0.77	3.75	1.12	0.72
IS4	3.97	0.87	0.74	3.9	0.89	0.74	3.97	1.05	0.77

Table 5: Correlation amongst predictors (Students' CUE Scale)

	CR	CA	PI	AR	CBR	PO	AN	SC	PPP	CGM	RI	IS
CR	1											
CA	0.7	1										
PI	0.6	0.61	1									
AR	0.56	0.55	0.66	1								
CBR	0.5	0.53	0.62	0.69	1							
PO	0.47	0.45	0.56	0.62	0.82	1						
AN	0.51	0.53	0.55	0.66	0.72	0.79	1					
SC	0.45	0.49	0.56	0.61	0.71	0.68	0.73	1				
PPP	0.42	0.42	0.44	0.46	0.58	0.56	0.58	0.72	1			
CGM	0.39	0.47	0.41	0.46	0.6	0.57	0.56	0.69	0.75	1		
RI	0.38	0.48	0.46	0.48	0.61	0.56	0.6	0.68	0.63	0.71	1	
IS	0.3	0.35	0.39	0.43	0.5	0.48	0.54	0.56	0.62	0.7	0.68	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6: Correlation amongst predictors (Professors' CUE Scale)

	CR	CA	PI	AR	CBR	PO	AN	SC	PPP	CGM	RI	IS
CR	1											
CA	0.75	1										
PI	0.62	0.64	1									
AR	0.58	0.56	0.68	1								
CBR	0.52	0.54	0.63	0.7	1							
PO	0.48	0.46	0.58	0.64	0.85	1						
AN	0.52	0.54	0.56	0.67	0.73	0.82	1					

SC	0.46	0.5	0.58	0.62	0.72	0.7	0.74	1				
PPP	0.43	0.44	0.45	0.47	0.59	0.57	0.59	0.73	1			
CGM	0.4	0.48	0.42	0.47	0.62	0.58	0.57	0.7	0.77	1		
RI	0.4	0.5	0.47	0.49	0.62	0.57	0.61	0.69	0.65	0.72	1	
IS	0.32	0.37	0.42	0.45	0.51	0.5	0.56	0.57	0.63	0.71	0.69	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 7: Correlation amongst predictors (Academic administrators' CUE Scale)

	PPP	CGM	RI	IS
PPP	1			
CGM	0.72	1		
RI	0.65	0.71	1	
IS	0.57	0.66	0.75	1

** Correlation is significant at the 0.01 level (2-tailed).

3.1.4 Consistency and Reliability Metrics

Regression analysis as shown in Table 8, was conducted to evaluate the relationship between the independent and dependent variables and to determine the explanatory power of the model. The R^2 value of 0.58 indicates that 58% of the variance in the dependent variable is explained by the independent variables, highlighting the model's moderate explanatory power. The adjusted R^2 value of 0.54 accounts for the number of predictors in the model, providing a more accurate measure of fit. The standard error of the estimate is 0.45, which reflects the average distance that the observed values fall from the regression line, indicating the model's prediction accuracy.

Table 8: Results from the Regression analysis

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate
1	0.76	0.58	0.54	0.45

Following the regression analysis, a test-retest reliability assessment was conducted to evaluate the stability of the scales over time. Specifically, after a 6-month interval, a subset of 50 students and 50 professors was recontacted to provide their responses once again. This additional data collection allowed for the analysis of test-retest reliability. The data obtained from the retest were analyzed using t-tests to assess the consistency of responses over time. This approach helps ensure that the scales maintain their reliability and stability across different measurement points. The t-test results provide insights into the stability of the scales and validate their effectiveness as consistent measures of the constructs being assessed.

Administrators were excluded from the retest due to the long-term nature of institutional Community University Engagement (CUE) measures, which involve extended planning and implementation periods that are not suited for short-term assessments. Their roles in strategic oversight and policy development make their feedback less relevant for immediate reliability checks. Additionally, practical considerations such as their busy schedules and diverse responsibilities would complicate the retest process. The focus was on obtaining consistent feedback from students and professors, who engage more directly and frequently with the scales. This approach ensures that the scales' reliability is assessed based on the experiences of those more closely interacting with the day-to-day aspects of the measures.

Table 9: Analysis from Retest scores

T-Test scores		
Predictor	**Students**	**Professors**
CR	0.31	0.67
CA	0.85	0.66
PI	-0.22	0.59
AR	-0.31	0.36
CBR	0.55	0.81
PO	0.44	-0.23
AN	0.52	-0.31
SC	0.55	0.55
PPP	0.28	1.04
CGM	-0.49	-0.84
RI	-0.04	-0.16
IS	0.42	0.92

Eventually, Cronbach's Alpha values were used to assess the internal consistency of the scales, ensuring that they reliably measure the intended constructs. For each scale, Cronbach's Alpha values ranged between 0.76 and 0.85, indicating a high level of internal consistency. A value above 0.70 is generally considered acceptable, and values closer to 1.00 suggest excellent reliability. These results affirm that the scales are robust and consistent in capturing the constructs they are designed to measure. Consequently, the high Cronbach's Alpha values provide confidence in the reliability and stability of the scales across different contexts and time points (Brown, 2002).

4. Discussion

The present study makes a significant contribution by exploring Community University Engagement (CUE) measures within the Indian context. While existing research has primarily focused on individual-level aspects of CUE, this study distinguishes itself by examining these measures across hierarchical levels. This hierarchical approach allows for a more comprehensive understanding of how CUE operates at various organizational strata.

Although predictors of CUE are common across respondents, including students, professors, and administrators, it is important to recognize that perceptions and activities related to CUE can differ among these groups. Consequently, the study has developed three distinct scales to account for these variations. By addressing these differences, the study provides nuanced insights into how each group engages with and perceives CUE, thereby offering a more detailed and contextualized perspective on the dynamics of community engagement in Indian higher education institutions.

The study identifies three distinct levels of Community University Engagement (CUE): personal, communal, and institutional. As discussed by authors such as Conduit et al., 2016 personal-level engagement emphasizes individual contributions, such as students volunteering in local community projects. At the communal level, authors like Lai et al., 2021 highlight the importance of collective actions and partnerships between universities and local organizations to address community needs, as demonstrated by the University of California, Berkeley. At the institutional level, researchers such as Furco & Miller (2009) focus on the broader strategies integrated into the university's mission, exemplified by comprehensive community outreach programs at institutions like the University of Oxford. This hierarchical approach provides a nuanced understanding of how CUE operates and is perceived at various levels within higher educational institutions.

4.1 Theoretical Implications

This study contributes to the literature on Community University Engagement (CUE) by distinguishing it from corporate social responsibility (CSR) activities, which are often characterized by one-time initiatives. It also differentiates CUE from civic participation, which typically occurs on a voluntary basis. By extending the findings to the distinct levels of CUE

within the Indian higher educational context, this paper provides a nuanced understanding of how these levels operate and interact, offering valuable insights for both academic research and practical application in higher education.

This study further reinforces the importance of a hierarchical approach to Community University Engagement (CUE) by validating and identifying predictors at personal, communal, and institutional levels. This approach highlights the necessity for higher educational institutions to adopt a structured framework for defining and implementing CUE initiatives, ensuring that activities and outputs are effectively tailored and evaluated at each distinct level. By doing so, the study underscores the need for a comprehensive strategy that integrates various levels of engagement to achieve more meaningful and sustained community impact.

4.2 Managerial Implications

The managerial implications of this study are significant for the development and application of the CUE scales. The scales provide a structured and detailed framework for assessing community engagement initiatives, enabling institutions to tailor their strategies according to specific levels of engagement—personal, communal, and institutional.

The retest analysis reveals that while there are no significant changes in the overall values, there are slight variations in perceived impact, access to resources, collaborative governance, and rewards and incentives within the student scale. These variations suggest that, over a period of six months, perceptions of community engagement may evolve, though not drastically. This indicates that while the core constructs remain stable, minor adjustments in factors such as access to resources and rewards might be necessary to sustain engagement and optimize effectiveness.

The analysis further shows slight changes in perceived impact, which may be attributed to examination periods and curriculum pressures that students face, or possibly from performing well in exams. During these times, students may prioritize academic performance over community engagement, leading to fluctuations in how they perceive their involvement's impact.

Additionally, changes in collaborative governance can be explained by the nature of such initiatives, which often take place on an annual basis. While the background work for governance improvements may be ongoing at the administrative level, these efforts are not immediately visible to students in their daily interactions. As a result, the perceived impact of collaborative governance may temporarily lessen, even though the institutional groundwork is being laid for long-term improvements.

In the professors' scale retest assessment, it was found that public outreach programs, networking, collaborative governance, and reward initiatives showed slightly lower values compared to the initial assessment, although these changes were not statistically significant. This slight decline could be attributed to fluctuations in academic workload, such as increased research or administrative responsibilities, which may limit professors' participation in outreach and networking activities. Additionally, as discussed initially collaborative governance and reward systems may operate on longer cycles, leading to periods where their effects are not immediately felt. Thus impacting how professors perceive these aspects of community engagement over time. However, since the changes are minor, they suggest that the overall structure and influence of these initiatives remain relatively stable.

The observed changes highlight the dynamic nature of community engagement and the need for ongoing evaluation and refinement of engagement strategies to maintain their relevance and impact.

Administrators can leverage data from the CUE scale to tailor their campaigns by aligning community engagement with Curriculum Relevance, ensuring academic programs incorporate meaningful projects. They can enhance Sense of Belonging by organising inclusive, collaborative efforts that connect students and faculty to their communities. Small shifts in Perceived Impact can be addressed by regularly showcasing success stories and tangible outcomes, while improving Access to Resources ensures participants have the tools necessary for effective engagement. Promoting Community-Based Research Practices aligns academic research with community needs, and designing responsive Public Outreach Programs ensures greater relevance and impact.

Fostering Social Cohesion through initiatives that bring diverse groups together strengthens university-community ties. Engaging alumni via Alumni Networks enhances mentorship and outreach efforts. Expanding Public-Private Partnerships can bring valuable resources to community programs. Collaborative Governance Models can be made more inclusive by involving stakeholders in decision-making processes. Recognition and Incentives can motivate greater participation by rewarding contributions, and refining Institutional Structures makes engagement opportunities more accessible, promoting sustained involvement.

4.3 Policy Implications

The study identifies four distinct policy interventions that can be implemented across various dimensions: academic, economic, social, and environmental.

Academic Benefits: To boost academic engagement, universities can develop policies that integrate Curriculum Relevance and Community-Based Research Practices into academic programs. This alignment ensures that community engagement efforts are academically meaningful, providing students with real-world applications for their learning. Involving Collaborative Governance Models and incentivizing Recognition and Incentives can further motivate students and faculty to participate in community projects, enriching both academic and community outcomes.

Economic Benefits: Encouraging Public-Private Partnerships (PPP) through formal engagement policies can stimulate local economic growth by linking universities with businesses to collaborate on community development, workforce training, and entrepreneurship support. Additionally, policies that improve Access to Resources for students, faculty, and community partners can drive innovation and job creation. By sharing facilities, funding, and expertise, universities can play a key role in fostering economic development.

Environmental Benefits: Policies promoting Public Outreach Programs can focus on environmental sustainability initiatives, such as community-based recycling, conservation efforts, and local green projects. Universities can also support Community-Based Research Practices that address environmental issues like climate change and resource conservation. By integrating these practices into engagement strategies, universities not only enhance environmental awareness but also contribute to local sustainability solutions, benefiting both the institution and the community.

Social Benefits: Policies that strengthen Sense of Belonging and Social Cohesion can foster inclusivity and unity across the university and community. Initiatives that encourage collaborative projects, community-building events, and mentorship programs can create stronger social ties, reducing disparities and promoting equality. By designing programs that connect diverse groups, universities can enhance civic participation and build long-term social bonds within the community.

5. Limitations of the study and future research implications

One limitation of this study is the focus on a specific subset of higher educational institutions within India, which may limit the generalizability of the findings to other regions or types of institutions. Additionally, the study primarily relies on self-reported data, which could introduce biases such as social desirability or response consistency over time. The short-term nature of the retest, conducted after a 6-month interval, may not fully capture the long-term impacts of Community University Engagement (CUE) initiatives, particularly at the institutional level. Lastly, the study's focus on hierarchical levels (students, professors, administrators) may overlook other stakeholder groups such as community partners and external organizations.

Future research could expand on these findings by conducting longitudinal studies to explore the evolving nature of CUE over extended periods Additionally, future studies could include more diverse stakeholder groups such as local communities, industry partners, and policymakers to capture a broader understanding of engagement dynamics. Further research could also examine the role of digital and virtual platforms in enhancing CUE, especially given the increasing reliance on online education and remote engagement strategies.

References

1. Bell, M., & Lewis Jr, N. (2023). Universities claim to value community-engaged scholarship: So why do they discourage it?. Public Understanding of Science, 32(3), 304-321.
2. Bhatnagar, K. (2020). Cultures of Service and Intersubjective Struggles-The Quest for Meaningful Interactive Service Work.
3. Bhatnagar, S., Agrawal, S., Sharma, D., & Singh, M. (2020). Perception on the community engagement of students of higher education institutions. Available at SSRN 3664052.
4. Bidandi, F. (2021). The responsibility of government and society towards social cohesion: A family perspective. The Strategic Review for Southern Africa, 43(1).
5. Bidandi, F., Ambe, A. N., & Mukong, C. H. (2021). Insights and current debates on community engagement in higher education institutions: Perspectives on the University of the Western Cape. Sage Open, 11(2), 21582440211011467.
6. Boodram, C. A. S., & Thomas, S. O. (2022). Social work and community engagement: A case study of a university/community collaborative project in Trinidad and Tobago. The International Journal of Community and Social Development, 4(4), 396-410.

7. Brown, J. D. (2002). The Cronbach alpha reliability estimate. JALT Testing & Evaluation SIG Newsletter, 6(1).
8. Chandramohan, S., & Bhagwan, R. (2022). Insights into community engagement at a university of technology in South Africa: A qualitative inquiry with academics. Perspectives in Education, 40(2), 189-206.
9. Conduit, J., Karpen, I. O., & Farrelly, F. (2016). Student engagement: A multiple layer phenomenon. Making a Difference Through Marketing: A Quest for Diverse Perspectives, 229-245.
10. Dang, L. (2023). ALUMNI INFORMATION COLLECTION AND MANAGEMENT.
11. Dube, N., & Hendricks, E. A. (2023). The praxis and paradoxes of community engagement as the third mission of universities. a case of a selected South African university. South African Journal of Higher Education, 37(1), 131-150.
12. Easter, S., Ceulemans, K., & Kelly, D. (2021). Bridging Research-Practice Tensions: Exploring Day-to-Day Engaged Scholarship Investigating Sustainable Development Challenges. European Management Review, 18(2), 9-23.
13. Elalouf, A. (2023). Community Engagement and Outreach Programs. Economic Sciences, 19(1).
14. Elken, M. (2024). Collaborative design of governance instruments in higher education. Studies in Higher Education, 49(6), 1095-1106.
15. Fornell C, Larcker DF 1981 J. Mark. Res. 1 39-50
16. Francis, D. J. (1988). An introduction to structural equation models. Journal of Clinical and Experimental Neuropsychology, 10(5), 623-639.
17. Furco, A., & Miller, W. (2009). Issues in benchmarking and assessing institutional engagement. New Directions for Higher Education, 2009(147).
18. Ibrahim, S. S. (2023). NEP 2020: MAKING INDIA AS A VIBRANT KNOWLEDGE SOCIETY.
19. Jadhav, J., & Suhalka, V. (2016). University community engagement: Insights from field work practices. Indian Journal of Sustainable Development, 2(1).
20. Joshi, G. (2023). Opportunities and Challenges in Application of NEP 2020: A Meta-Analysis.
21. Kali, Y., Eylon, B. S., McKenney, S., & Kidron, A. (2023). Design-centric research-practice partnerships: Three key lenses for building productive bridges between theory and practice. In Learning, design, and technology: An international compendium of theory, research, practice, and policy (pp. 481-511). Cham: Springer International Publishing.
22. Kalyani, P. (2020). An empirical study on NEP 2020 [National Education Policy] with special reference to the future of Indian education system and its effects on the Stakeholders. Journal of Management Engineering and Information Technology, 7(5), 1-17.
23. Kumar, K., Prakash, A., & Singh, K. (2021). How National Education Policy 2020 can be a lodestar to transform future generation in India. Journal of Public affairs, 21(3), e2500.
24. Lai, H. M., Hsieh, P. J., Uden, L., & Yang, C. H. (2021). A multilevel investigation of factors influencing university students' behavioral engagement in flipped classrooms. Computers & Education, 175, 104318.
25. Misra, A., Misra, D. P., Mahapatra, S. S., & Biswas, S. (2018, May). Digital transformation model: analytic approach on participatory governance & community engagement in India. In Proceedings of the 19th Annual International Conference on Digital Government Research: Governance in the Data Age (pp. 1-7).
26. Parker, L. D. (2024). Public university research engagement contradictions in a commercialising higher education world. Financial Accountability & Management, 40(1), 16-33.
27. Sharma, N., Palo, S. K., Bhimarasetty, D. M., Kandipudi, K. L. P., Purty, A. J., Kumar, T., ... & Taneja Malik, S. (2023, January). Community dynamics and engagement strategies in establishing demographic development and environmental surveillance systems: a multi-site report from India. In Healthcare (Vol. 11, No. 3, p. 411). MDPI.
28. Singh, W., Bhatt, P., Singh, M., & Pareek, S. K. (2023). Community Engagement in Higher Education: Weaving the Threads and Future Directions. In Community Engagement in Higher Education (pp. 273-292). Routledge India.
29. Valencik, E. M. (2023). Harnessing Untapped Potential: A Theory for Engaging Recent Graduates in Alumni Advocacy to Support Institutional Advancement Goals.
30. Wang, L. (2023). Impact Of Spatial Proximity On Innovation Through University-Industry Collaboration: A Case Study From Higher Education Campus Perspective.
31. Yadav, M., & Sharma, M. (2023). Establishing University–Community Collaborations: Experiential Learning Initiatives at Manipal University, Jaipur. In Community Engagement in Higher Education (pp. 181-196). Routledge India.