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Empirical insights on quality education adoption and institutional loyalty

Anand Thakur, Kamini Singla, Kavita Singla, Lavudya Bablu
Department of Financial Administration, School of Management, Central University of Punjab, Bathinda, India

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ABSTRACT

The global education sector plays a pivotal role in achieving Sustainable Development Goals (SDGs), particularly in fostering inclusive and quality education for all. This study aims to investigate how adopting SDG-4 influences students' perceptions and fosters institutional loyalty in higher education institutions (HEIs) in Punjab, India. The study contributes to the understanding of how SDG-4 adoption shapes students' views on education quality and institutional engagement. Grounded in the stimulus, organism, response (S-O-R) framework, the study uses a quantitative survey-based approach and applies structural equation modelling (SEM) to analyze data from 302 students across various HEIs. The results indicate that SDG-4 adoption significantly improves students' perceptions of instructor effectiveness, community involvement, and digital trust, which in turn foster institutional loyalty, although affordability shows no significant effect. The study redefines institutional loyalty drivers, emphasizing instructor effectiveness and digital trust over affordability, and underscores the importance of robust digital learning environments and strong HEI community partnerships.

Corresponding Author:

Anand Thakur
Department of Financial Administration, School of Management, Central University of Punjab
VPO-Ghudda, Bathinda, Punjab, India
Email: anand.thakur@cup.edu.in

1. INTRODUCTION

Education plays a crucial role in achieving Sustainable Development Goals (SDGs), particularly in fostering inclusive and quality education for all [1]. It is instrumental in lifelong learning and poverty eradication, providing individuals with skills and knowledge to thrive in a rapidly changing world. The 2030 Agenda for Sustainable Development, adopted by the United Nations General Assembly in 2015 [2], includes SDG-4, which aims to ensure inclusive and high-quality education for all [3].

Globally, educational policies have demonstrated transformative potential [4]. For instance, free education in Malawi since 1994 dramatically increased enrollment by one million students, highlighting the impact of policy interventions [5]. However, the challenge remains to ensure that increased enrollment meets quality standards [6]. India's higher education system is the third-largest globally in terms of enrollment, benefiting from a young demographic [7]. The National Education Policy 2019 aims to provide outstanding education for national growth [8], while National Education Policy 2020 seeks to overhaul the system to align with economic development and improve quality of life. Despite a rich educational heritage, India faces challenges in access, equity, and quality. However, many higher education institutions (HEIs) have advanced sustainable development within their programs. Though India has a long heritage of quality higher education,

it has only recently begun effectively addressing problems of access, equity, and quality. Achieving this requires rigorous action plans [9].

HEIs are vital for sustainability, educating future leaders to implement the SDGs effectively [10]. They promote sustainable development through research, talent development, and public engagement. Globally, HEIs must align with the sustainability agenda, necessitating policy changes, curricula, and methodologies [11]. In the current scenario, it becomes imperative to develop a deeper understanding of the role of SDG-4 adoption in shaping students' perceptions and institutional loyalty. It is crucial to guide educational institutions in implementing strategies that enhance student satisfaction and loyalty. The study's findings can potentially guide policymakers, educational administrators, and stakeholders on the significance of incorporating SDG-4 principles into educational practices. This can lead to improved educational experiences, stronger community partnerships, and more robust digital learning environments, ultimately contributing to the achievement of SDGs.

While extensive literature [8], [12]–[16] addresses the importance of SDG-4 in shaping educational systems, but gaps persist in understanding specific dimensions such as instructor effectiveness, community involvement, affordability, digital experience quality, and digital trust, particularly within Punjab, India. Existing studies offer foundational insights into inclusive education and lifelong learning but lack focused empirical research on these critical aspects. This study bridges these gaps by providing localized evidence and strategic insights to strengthen SDG-4 implementation in Punjab's HEIs. The objectives are twofold: i) to investigate the perceived impact of SDG-4 adoption on student perceptions and ii) to assess how these perceptions influence institutional loyalty. Inspired by the stimulus, organism, response (S-O-R) paradigm [17], the conceptual framework, as in Figure 1 views SDG-4 compliance as the 'stimulus' measured through inclusive education and lifelong learning. Students' perceptions of instructor effectiveness, community involvement, affordability, digital experience quality, and digital trust act as the 'organism', and institutional loyalty is the final 'response'.

The present study offers a context-driven perspective on SDG-4 adoption in higher education, extending beyond traditional discussions on access and educational outcomes. It proposes a comprehensive framework that holistically relates SDG-4 adoption (stimulus) with students' perception (organism) and finally, with institutional loyalty (response). By integrating sustainability, digital transformation, and student engagement, this study offers a strategic approach for HEIs to enhance educational quality, foster institutional commitment, and build resilient, future-ready learning environments.

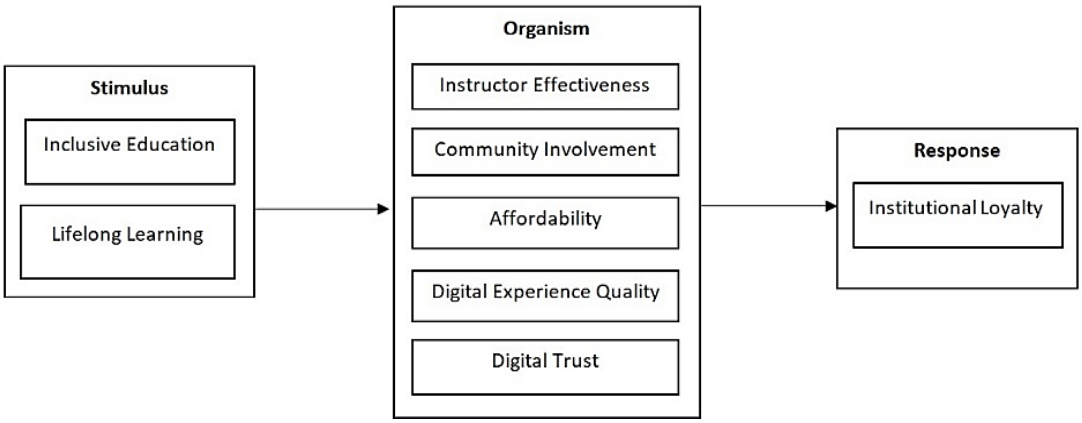

Figure 1. Conceptual framework

2. METHOD

This study employed an integrated approach combining exploratory and descriptive research designs. A cross-sectional survey with a self-administered questionnaire was conducted for data collection. An effective sample of 302 university students familiar with SDGs was generated through judgmental sampling. This sampling method was used to ensure that participants were adequately knowledgeable about SDGs, making them ideal for providing relevant and accurate data for this study [18]. The state of Punjab has been chosen for the study due to its diverse educational landscape and socio-economic challenges, making it ideal for assessing effective sustainability initiatives [19]. The majority of the respondents were male (62.3%) and aged 21-23 years (58.6%). Most respondents held a bachelor's degree (55.6%), with a predominant annual family income

of up to 5 Lacs (71.9%). Structural equation modeling (SEM) was used to analyze relationships between the study's variables. The constructs were measured (on a 5-point Likert scale) through adapted scales: inclusive education [20], lifelong learning [21], instructor effectiveness [22], community involvement [23], digital trust [24], digital experience quality [25], and institutional loyalty [26].

3. RESULTS AND DISCUSSION

During the analysis, the construct 'digital experience quality', was dropped due to its low factor loadings. This study was guided by the following hypotheses; i) H_1: inclusive education significantly impacts instructor effectiveness, community involvement, affordability, and digital trust; ii) H_2: lifelong learning significantly impacts, instructor effectiveness, community involvement, affordability, and digital trust; and iii) H_3: instructor effectiveness, community involvement, affordability, and digital trust significantly impact institutional loyalty.

3.1. Measurement and structural model

Confirmatory factor analysis (CFA) was computed using AMOS. Factor loadings were evaluated for every item to conduct a CFA. The overall goodness of fit of the model, as in Table 1 was evaluated using the model-fit metrics. The results demonstrate strong model validity, as indicated by the model fit indices normed Chi-Square (CMIN)/df=1.610, comparative fit index (CFI)=0.925, Tucker-Lewis index (TLI)=0.917, incremental fit index (IFI)=0.925, standardized root mean square residual (SRMR)=0.047, root mean square error of approximation (RMSEA)=0.047, which are well within the recommended thresholds [27], [28]. Hence, the model yielded an acceptable fit for the data. The high model fit values indicate that the measurement model is robust and accurately reflects the constructs being studied, ensuring that the data supports the hypothesized relationships.

Construct reliability as in Table 2 (see in Appendix) was assessed using Cronbach's alpha and composite reliability. Cronbach's alpha for each construct in the study was found to be over the required limit of 0.70 [29]. Composite reliability ranged from 0.757 to 0.878, above the 0.70 benchmark [30]. Hence, the construct reliability was established for each construct in the study. The convergent validity of scale items was estimated using the average variance extracted [31]. The values approximately reached the threshold value of 0.50 [32]. Therefore, the scales used for the present study have the required convergent validity.

Table 1. Model fit indicators in the measurement model

Fit indices	Recommended value	Source	Obtained value
CMIN/df	1-3	[31]	1.610
CFI	>0.80	[32]	0.925
TLI	>0.90	[32]	0.917
IFI	>0.90	[32]	0.925
SRMR	<0.08	[31]	0.047
RMSEA	<0.08	[31]	0.047

Discriminant validity in Table 3 was assessed using heterotrait-monotrait ratio (HTMT) [32]. All ratios were under the required limit of 0.85. Hence, discriminant validity was established. A structural model was created using AMOS. Acceptable model fit in Table 4 was achieved based on the criteria established by various scholars, including [27], [28].

Table 3. HTMT ratio

Variables	Digital trust	Institutional loyalty	Affordability	Community involvement	Instructor effectiveness	Lifelong learning	Inclusive education
Digital trust							
Institutional loyalty	0.77						
Affordability	0.69	0.64					
Community involvement	0.73	0.57	0.66				
Instructor effectiveness	0.68	0.66	0.71	0.85			
Lifelong learning	0.62	0.66	0.68	0.83	0.85		
Inclusive education	0.59	0.66	0.54	0.67	0.77	0.85	

Table 4. Model fit indicators in the structural model

Fit indices	Recommended value	Sources	Obtained value
CMIN/df	1-3	[31]	1.651
IFI	>0.80	[32]	0.919
CFI	>0.90	[32]	0.918
TLI	> 0.90	[32]	0.906
SRMR	< 0.08	[32]	0.0476
RMSEA	< 0.08	[32]	0.048

The results in Table 5 revealed significant relationships between these constructs. Specifically, the impact of inclusive education on instructor effectiveness (t=1.970, p=0.049), community involvement (t=2.947, p=0.003), affordability (t=2.490, p=0.013), and digital trust (t=2.096, p=0.036) were all found to be significant, supporting hypotheses $H_{1(a-d)}$. Additionally, the impact of lifelong learning on instructor effectiveness (t=6.191, p<0.001), community involvement (t=5.931, p<0.001), affordability (t=5.124, p<0.001), and digital trust (t=5.044, p<0.001) was significant, supporting hypotheses $H_{2(a-d)}$. Further, instructor effectiveness (t=2.816, p=0.005), community involvement (t=2.823, p=0.005), and digital trust (t=6.128, p<0.001) have a significant impact on institutional loyalty supporting hypotheses $H_{3(a)}$, $H_{3(b)}$, and $H_{3(d)}$, respectively. However, the impact of affordability on institutional loyalty (t=1.112, p=0.266) did not reach statistical significance, leading to the rejection of hypothesis $H_{3(c)}$.

Table 5. Hypotheses testing

Hypothesis	Path directions	Estimate	S.E.	t-value	p-value	Results
H1(a)	Instructor effectiveness<-inclusive education	-.330	.167	1.970	.049	Accepted
H1(b)	Community involvement<-inclusive education	-.623	.211	2.947	.003	Accepted
H1(c)	Affordability<-inclusive education	-.547	.220	2.490	.013	Accepted
H1(d)	Digital trust<-inclusive education	-.377	.180	2.096	.036	Accepted
H2(a)	Instructor effectiveness<-lifelong learning	1.486	.240	6.191	***	Accepted
H2(b)	Community involvement<-lifelong learning	1.719	.290	5.931	***	Accepted
H2(c)	Affordability<-lifelong learning	1.498	.292	5.124	***	Accepted
H2(d)	Digital trust<-lifelong learning	1.226	.243	5.044	***	Accepted
H3(a)	Institutional loyalty<-instructor effectiveness	.519	.184	2.816	.005	Accepted
H3(b)	Institutional loyalty<-community involvement	-.498	.176	2.823	.005	Accepted
H3(c)	Institutional loyalty<-affordability	.115	.103	1.112	.266	Rejected
H3(d)	Institutional loyalty<-digital trust	.822	.134	6.128	***	Accepted

Note: ***p < 0.001

3.2. SDG 4: adoption, students' perception and institutional loyalty

Although extensive literature [8], [12]–[16] highlights the significance of SDG-4 in shaping educational systems, there remain gaps in understanding key dimensions such as instructor effectiveness, community engagement, affordability, digital experience quality, and digital trust, particularly within the context of Punjab, India. While existing studies provide foundational insights into inclusive education and lifelong learning, they lack targeted empirical research on these vital aspects. Building on these identified gaps, the present study delves into the impact of inclusive education on addressing above mentioned dimensions.

The results indicate inclusive education enhances perceptions of instructor effectiveness, fostering institutional loyalty [33]–[36]. Instructors who practice inclusive teaching not only meet diverse student needs but also build a stronger emotional connection with their students, contributing to long-term loyalty. It also promotes community engagement [37] and affordability by optimizing resources [36] Lifelong learning boosts instructor effectiveness, community involvement, affordability, and digital trust by supporting professional development and practical learning opportunities [38]. Effective teaching practices significantly enhance student satisfaction and loyalty [39]–[41]. High instructor effectiveness correlates with better student engagement and achievement [20]–[22]. Community involvement enriches learning experiences and fosters civic responsibility, enhancing institutional loyalty [23]–[25]. Community-engaged universities attract students who value social responsibility, improving institutional reputation and retention [26]. Digital trust is crucial for institutional loyalty, as trust in digital platforms and instructor competence affects student satisfaction [39]. Institutions prioritizing digital trust can enhance their reputation [42] and attract students seeking reliable online learning. Affordability has a minor impact on institutional loyalty [43]. While important for enrollment, inclusive education, lifelong learning, and digital trust play more significant roles. High-quality educational environments that focus on holistic development can mitigate financial concerns. However, affordability's lesser impact suggests that institutions must address other critical aspects like instructor effectiveness and digital trust to cultivate sustained loyalty.

This study uniquely highlights digital trust as a critical, yet underexplored, driver of institutional loyalty, particularly in the context of increasing digitalization in education. These findings suggest that enhancing digital trust is crucial for increasing student loyalty, highlighting a shift in focus for educational institutions towards digital reliability and security. The present study focuses mainly on the students' perception of inclusive education, permitting scope for future studies to examine the perspectives of other stakeholders like tutors and parents. The study is limited to Punjab; future research may include diverse regions and qualitative methods to deepen understanding and assess the long-term impact of SDG-4 initiatives on students' academic and professional outcomes. Considering the emerging trends of digital technology, exploring the impact of artificial intelligence on SDG-4 adoption shall be instrumental in strengthening inclusive education. The present study reinforces the pivotal role of inclusive education, digital trust, and lifelong learning in cultivating a more resilient and loyal student community, driving a holistic approach to educational excellence in an increasingly digital world.

3.3. Implications

Theoretically, this study redefines institutional loyalty drivers, emphasizing instructor effectiveness and digital trust over affordability. It highlights the importance of digital trust, including reliable online platforms and data security, in educational experiences. The study also integrates community involvement into educational success theories, promoting an inclusive approach that involves diverse stakeholders. For marketers, enhancing community involvement is crucial for institutional loyalty. Forming partnerships with local communities and businesses may create practical learning opportunities. Promoting SDG-4 principles through curricula and digital platforms can foster global citizenship among students. Engaging in inclusive education and lifelong learning is essential for faculty. Administrators should adopt SDG-4-aligned quality assurance frameworks. Strengthening HEI-community partnerships will enrich learning experiences and foster institutional loyalty. Empowering students as SDG advocates through activism and dialogue on sustainability issues may enhance their impact and engagement.

4. CONCLUSION

This study explores the relationship between SDG-4 adoption and students' perspectives on institutional loyalty in Punjab's HEIs. It highlights how inclusive education, lifelong learning, instructor effectiveness, affordability, and community participation influence student loyalty. Findings emphasize the importance of diversity, continuous learning, and digital trust in enhancing educational experiences and institutional loyalty. The interplay of sustainability, education, and technological innovation can enrich students' lifelong learning journeys.

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Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Anand Thakur	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Kamini Singla		✓	✓		✓			✓	✓	✓				
Kavita Singla				✓	✓	✓	✓		✓	✓				
Lavudya Bablu				✓		✓	✓		✓					

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

Data availability is not applicable to this paper as no new data were created or analyzed in this study.

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APPENDIX

Table 2. Construct reliability and convergent validity analysis

Construct	Items	Factor loadings	Cronbach's alpha	CR	AVE
Inclusive education	IE1	0.774	0.759	0.762	0.49
	IE2	0.621			
	IE3	0.706			
	IE4	0.559			
Lifelong learning	LL1	0.657	0.751	0.735	0.43
	LL2	0.676			
	LL3	0.668			
	LL4	0.624			
Instructor effectiveness	IN1	0.714	0.875	0.875	0.47
	IN2	0.674			
	IN3	0.66			
	IN4	0.655			
	IN5	0.667			
	IN6	0.718			
	IN7	0.737			
	IN8	0.645			
Community involvement	CO1	0.745	0.878	0.878	0.47
	CO2	0.657			
	CO3	0.732			
	CO4	0.685			
	CO5	0.722			
	CO6	0.688			
	CO7	0.637			
	CO8	0.637			
Affordability	AA1	0.725	0.777	0.787	0.48
	AA2	0.724			
	AA3	0.759			
	AA4	0.556			
Digital trust	DT1	0.687	0.820	0.821	0.48
	DT2	0.736			
	DT3	0.678			
	DT4	0.711			
	DT5	0.648			
Institutional loyalty	IL1	0.733	0.757	0.757	0.51
	IL2	0.724			
	IL3	0.685			

BIOGRAPHIES OF AUTHORS

Anand Thakur is professor and ADSW at Central University of Punjab, Bathinda (India). He has 21 years of teaching and research experience. He has been granted a National Fellowship (JRF: 2003-2006) for Research from University Grants Commission (UGC), India. He also has 42 research publications in Scopus Indexed and other reputed International and National Journals of United States, Croatia, Philippines and India. He has participated in 32 national and international conferences. He has also supervised 3 PhD thesis and 13 M.Phil. Dissertations (full time) successfully. He was honoured with 'Research Appreciation Award' for best performance in management research at LPU in 2013. Besides, he is also reviewer for reputed international management journals of USA, Korea, Thailand and India. He can be contacted at email: anand.thakur@cup.edu.in.

Kamini Singla is presently working as a research scholar (SRF-UGC), School of Management, Central University of Punjab. Her research area is about sustainable marketing and spiritual tourism. She can be contacted at email: kaminisingla213@gmail.com.

Kavita Singla is presently working as a research scholar (SRF-UGC), School of Management, Central University of Punjab. Her research area is about sustainable marketing and integrated marketing communication. She can be contacted at email: kvsingla11@gmail.com.

Lavudya Bablu is M.Com. student at School of Management, Central University of Punjab. His research area is about sustainable marketing and sustainable education. He can be contacted at email: l.bablu3241@gmail.com.