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Facilitating Collaborative Research in Online Open Flexible Distance Learning Higher Education Institutions

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Abstract

This study examines the critical role of collaborative research in enhancing academic productivity and innovation within open online flexible distance learning institutions. Recognizing the significance of collaboration among academicians, the study explores how organizational culture, support, perceived benefits, and self-efficacy influence collaborative research, with attitude as a mediating factor. Data was collected using surveys, a widely recognized method for capturing nuanced perceptions and attitudes. A purposive sampling technique was employed, resulting in a robust sample size of 383 academicians, ensuring diverse representation across different academic ranks and experiences. For analysis, Partial Least Squares Structural Equation Modeling (PLS-SEM) was utilized to test the hypotheses, offering a comprehensive approach to examining complex relationships among the study variables. The hypotheses testing results revealed significant paths, such as the impact of organizational culture on attitude and the indirect effect on collaborative research through attitude, validating the mediation hypothesis. Similar patterns were observed for perceived benefits and self-efficacy, highlighting the substantial role of these constructs. Organizational

support emerged as a direct and indirect influencer of collaborative research, underscoring its importance in fostering a supportive academic environment. Based on these findings, suggestions for future research include longitudinal studies to track changes over time, qualitative inquiries to deepen understanding, and expanding the research to diverse cultural and geographical contexts. Moreover, investigating additional mediators like technological proficiency could offer further insights. The study's implications are multifaceted, emphasizing the need for institutions to enhance organizational support and promote a positive culture that values collaborative efforts. By doing so, they can improve research outcomes and foster a more united academic community.

Keywords: Organizational Culture, Perceived Benefits, Organizational Support, Self-Efficacy Attitude, Collaborative Research

Introduction

Collaborative research among academicians has become a cornerstone of advancing knowledge, fostering cross-cultural understanding, and addressing complex global challenges (Gredig et al., 2021). Academics worldwide increasingly recognize the value of pooling their intellectual resources, diverse perspectives, and specialized skills to produce research outcomes that transcend individual capacities (Park & Simpson, 2021). Collaborative research facilitates interdisciplinary approaches, allowing academicians from different fields to converge their expertise on multifaceted issues (Kebah et al., 2019). This accelerates the pace of discovery and promotes the development of comprehensive solutions to global challenges, ranging from climate change and public health crises to technological innovation (Dusdal & Powell, 2021). Digital communication technologies have significantly eased the collaboration process, enabling academics to engage in real-time discussions, share data, and contribute to joint projects regardless of geographical distances (Björck, 2022). This interconnectedness enhances the speed and efficiency of research and nurtures a global academic community where ideas and insights flow seamlessly across borders (Kebah et al., 2019). Furthermore, collaborative research fosters cultural exchange and mutual learning among academicians (Zurba et al., 2022). Interacting with colleagues from diverse backgrounds enriches the academic experience, exposing researchers to different research methodologies, teaching practices, and worldviews (Moreno-Cely et al., 2021). This cultural diversity strengthens the fabric of global academia, promoting a more inclusive and interconnected scholarly community committed to advancing human knowledge collectively (Thibault et al., 2023). Collaborative research among academicians in Malaysia is gaining prominence as the nation emphasizes the importance of knowledge exchange and interdisciplinary collaboration to propel its academic institutions to greater heights (Mutahar et al., 2022). In Malaysia, academicians engage in collaborative research across universities, research centers, and industry partnerships, driven by a collective ambition to contribute significantly to national development (Abu Kassim et al., 2024). Government initiatives, such as the Malaysia Education Blueprint and the Higher Education Strategic Plan, actively encourage and fund collaborative research endeavors. This support has facilitated the creation of collaborative networks, allowing academicians to pool their expertise in areas critical to Malaysia's socio-economic progress, including technology, sustainable development, and healthcare (Ayob et al., 2022). The cultural diversity within Malaysia enriches collaborative research efforts, fostering an environment where academicians from different ethnic and disciplinary backgrounds collaborate on projects that address the nation's unique challenges (Ismail et al., 2022). This cross-pollination of ideas enhances the quality and relevance of research

outcomes and contributes to the global academic discourse. As Malaysian academicians collaborate, they strengthen the foundation of the nation's academic community, encouraging the exchange of knowledge, methodologies, and best practices. In doing so, they are crucial in positioning Malaysia as a hub for innovative research and academic excellence within the Southeast Asian region (Ravana et al., 2023). In Malaysia, challenges impede the realization of collaborative research potential among academicians. Limited cross-disciplinary collaboration confines researchers to specific domains, hindering holistic solutions. Uneven distribution of resources and funding creates disparities, especially for smaller institutions. Communication and coordination issues arise due to cultural diversity. Bridging these gaps is crucial for seamless collaboration. Addressing challenges requires strategic interventions, including targeted funding, interdisciplinary training, and initiatives fostering a collaborative culture, contributing significantly to Malaysia's academic and research landscape (Li et al., 2020). Collaborative research in Malaysia significantly impacts policymakers, higher education institutions, academicians, and students, shaping the nation's academic and socio-economic landscape. It informs evidence-based policymaking, enhances global standing for institutions, provides opportunities for impactful research, and enriches students' learning with valuable skills and interdisciplinary perspectives, aligning education with global demands (Osman et al., 2018). Collaborative research catalyzes holistic development, fostering Malaysia's dynamic and competitive academic landscape. This study assesses the direct and indirect relationship between organizational culture, perceived benefit, organizational support, and self-efficacy with collaborative research with attitude as a mediator. Among academicians in open flexible distance-learning higher education institutions.

Literature Review

Underpinning Theory

Social Cognitive Theory (SCT), developed by Bandura (1989), serves as a robust underpinning theory for studying the influence of organizational culture, perceived benefit, organizational support, and self-efficacy on collaborative research with attitude as a mediator among academicians in open flexible distance learning higher education institutions. SCT is particularly relevant because it emphasizes the dynamic interplay between cognitive, environmental, and behavioral factors. In open flexible distance learning higher education, where collaboration is often mediated by technology and individuals operate in diverse and geographically dispersed settings, SCT provides a lens to understand how academicians acquire, maintain, and apply knowledge and skills in collaborative research endeavors (Bandura, 1999). Self-efficacy, a central tenet of SCT, plays a pivotal role in this study. Academicians' beliefs in their capabilities to contribute to collaborative research efforts, despite physical distances and technological barriers, significantly impact their engagement and success. The observational learning component of SCT is crucial, as organizational culture and support become influential models. Positive organizational cultures that value collaboration and provide support can act as catalysts, shaping individuals' attitudes and behaviors toward collaborative research. As a mediator, attitude captures academicians' cognitive and affective responses to collaborative research. SCT's focus on reciprocal determinism acknowledges the continuous interaction between personal factors (such as self-efficacy), environmental influences (including organizational culture and support), and behaviors, shedding light on the complex dynamics shaping attitudes and collaborative engagement in the unique context of open flexible distance learning higher education institutions (Bandura, 1998). Overall, SCT provides a comprehensive framework for exploring

and understanding the multifaceted influences on collaborative research among academicians in this evolving educational landscape.

Relationship between Organizational Culture, Attitude and Collaborative Research

The relationship between organizational culture and collaborative research, with attitude as a mediator, holds profound implications for higher education institutions (Cherian et al., 2021). Organizational culture, comprising shared values, beliefs, and practices, shapes the environment in which collaborative research unfolds. In the context of higher education, a supportive and collaborative culture can foster an atmosphere conducive to interdisciplinary partnerships and knowledge exchange (Herinanto et al., 2022). Attitude is a crucial mediator in this relationship, influencing how individuals perceive and approach collaborative research initiatives within the organizational culture. Positive attitudes towards collaboration, driven by a shared sense of purpose and a commitment to collective goals, can catalyze the formation of collaborative networks (Lam et al., 2021). In higher education institutions, where academic pursuits thrive on the synergy of diverse expertise, a positive organizational culture can cultivate an environment that encourages open communication, mutual respect, and the integration of varied perspectives. Researchers with favorable attitudes toward collaboration are likelier to engage in joint projects, share resources, and actively contribute to the collaborative research ecosystem (Morales-Huamán et al., 2023). Conversely, a negative organizational culture may breed skepticism or resistance, hindering the formation of collaborative networks. Attitudinal barriers, such as a lack of trust or perceived competition, can impede the potential benefits of collaborative research. Understanding and addressing the mediating role of attitude in the relationship between organizational culture and collaborative research is vital for higher education institutions seeking to foster a collaborative ethos. Nurturing a positive culture that values collaboration and shaping attitudes that embrace shared endeavors can lead to a more vibrant and impactful research environment within these institutions (Mutonyi et al., 2022). Hence. The following hypotheses were proposed for this study:

H1: There is a relationship between organizational culture and attitude in collaborative research among academicians in open flexible distance-learning higher education institutions.

H2: There is a relationship between organisational culture and collaborative research among academicians in open flexible distance-learning higher education institutions.

H3: There is a mediating effect of attitude on the relationship between organisational culture and collaborative research among academicians in open flexible distance-learning higher education institutions.

Relationship between Perceived Benefit, Attitude and Collaborative Research

The relationship between perceived benefits and collaborative research, with attitude as a mediator, plays a pivotal role in shaping the collaborative landscape among academicians in higher education institutions (Ahn & Kwon, 2022). Perceived benefits encompass various advantages individuals anticipate from engaging in collaborative research, such as enhanced knowledge exchange, increased research productivity, and broader impact. Attitude serves as a crucial mediator in this dynamic. How academicians perceive collaborative research's benefits influences their attitudes toward engaging in such endeavors (Ali et al., 2021). Positive attitudes, driven by recognizing potential gains, can propel academicians to seek and

participate actively in collaborative projects (Osman & Sentosa, 2013). The perceived benefits include shared resources, expanded networks, and interdisciplinary collaboration opportunities (Ashaduzzaman et al., 2022). Academicians who believe in the positive outcomes of collaborative research are more likely to overcome potential barriers, such as time constraints or concerns about credit attribution, fostering a conducive environment for joint initiatives (Wei et al., 2021). Conversely, a lack of perceived benefits or negative attitudes may deter academicians from engaging in collaborative research. Addressing these perceptions and attitudes is crucial for creating a culture that values and promotes collaboration within higher education institutions (Bhalla, 2023). Understanding the nuanced interplay between perceived benefits, attitudes, and collaborative research is essential for institutions aiming to enhance their research ecosystems (Bilal et al., 2023). By highlighting and promoting the positive outcomes of collaborative endeavors, institutions can cultivate a culture that encourages and celebrates collaborative research among academicians, ultimately contributing to a more dynamic and impactful academic community (Tran, 2023). Therefore, the following hypotheses were proposed for this study:

H4: There is a relationship between perceived benefit and attitude in collaborative research among academicians in open flexible distance-learning higher education institutions.

H5: There is a relationship between perceived benefits and collaborative research among academicians in open flexible distance-learning higher education institutions.

H6: There is a mediating effect of attitude on the relationship between perceived benefits and collaborative research among academicians in open flexible distance-learning higher education institutions.

Relationship between Organizational Support, Attitude and Collaborative Research

The relationship between organisational support and collaborative research, with attitude as a mediator, is a critical determinant of the collaborative landscape among academicians in higher education institutions (Aryany et al., 2023). Organizational support encompasses the resources, encouragement, and infrastructure the institution provides to facilitate collaborative endeavors. Attitude serves as a crucial mediator in this relationship. The level of organisational support influences academicians' attitudes toward collaborative research initiatives (Bang et al., 2023). When higher education institutions actively foster a supportive culture, academicians are more likely to develop positive attitudes toward collaborative research, recognizing the institution's commitment to facilitating joint efforts (Ye et al., 2023). Organizational support manifests in various forms, including funding for collaborative projects, dedicated collaborative spaces, and policies that incentivize and recognize collaborative contributions (Carrell et al., 2022). Positive attitudes, in turn, drive academicians to seek collaborative opportunities actively, contribute to shared projects, and overcome potential barriers associated with joint research endeavors. Conversely, a lack of organisational support or negative attitudes may impede the collaborative spirit among academicians. Insufficient resources, unclear policies, or a lack of recognition can undermine the perceived value of collaborative research efforts (El-Kassar et al., 2022). Understanding and enhancing the relationship between organisational support, attitudes, and collaborative research is paramount for higher education institutions seeking to foster a culture of collaboration (Paynter et al., 2022). By providing robust support and cultivating positive attitudes, institutions can create an environment that encourages and celebrates

collaborative research, ultimately contributing to a more vibrant and impactful academic community (Zhao et al., 2023). Thus, the following hypotheses were proposed for this study:

H7: There is a relationship between organisational support and attitude in collaborative research among academicians in open flexible distance-learning higher education institutions.

H8: There is a relationship between organisational support and collaborative research among academicians in open flexible distance-learning higher education institutions.

H9: There is a mediating effect of attitude on the relationship between organisational support and collaborative research among academicians in open flexible distance-learning higher education institutions.

Relationship between Self-Efficacy, Attitude, and Collaborative Research

The interplay between self-efficacy, collaborative research, and the mediating role of attitude is crucial to understanding the dynamics among academicians in higher education institutions (Dehbozorgi et al., 2021). Self-efficacy refers to an individual's belief in their ability to perform specific tasks or attain particular goals successfully. In collaborative research, self-efficacy significantly influences academicians' willingness to engage in joint projects (de Oliveira et al., 2023). Attitude is a mediator, influencing the relationship between self-efficacy and collaborative research. Academicians with high self-efficacy in their research abilities are more likely to develop positive attitudes toward collaboration (Ince, 2023). They perceive themselves as capable contributors to collaborative endeavors, fostering a proactive approach to joint research initiatives. Positive attitudes, driven by self-efficacy, further influence engagement in collaborative projects. Academicians with confidence in their research skills are more inclined to seek collaborative opportunities, contribute actively to group projects, and navigate potential challenges with a problem-solving mindset (Keshmiri & Ghelmani, 2023). Conversely, low self-efficacy may lead to negative attitudes and reluctance to participate in collaborative research. Addressing and boosting self-efficacy through training, mentorship, and recognition can contribute to a more positive attitude and, consequently, increased involvement in collaborative endeavors (Mudhar et al., 2023). Understanding the intricate relationship between self-efficacy, attitude, and collaborative research is essential for higher education institutions aiming to promote a culture of research collaboration. By fostering self-efficacy and positive attitudes, institutions can empower academicians to contribute effectively to collaborative research initiatives, ultimately enhancing the vibrancy and impact of the academic community (Pfundt et al., 2024). Hence, the following hypotheses were proposed for this study:

H10: There is a relationship between self-efficacy and attitude in collaborative research among academicians in open flexible distance-learning higher education institutions.

H11: There is a relationship between self-efficacy and collaborative research among academicians in open flexible distance-learning higher education institutions.

H12: There is a relationship between attitude and collaborative research among academicians in open flexible distance-learning higher education institutions.

H13: There is a mediating effect of attitude on the relationship between self-efficacy and collaborative research among academicians in open flexible distance-learning higher education institutions.

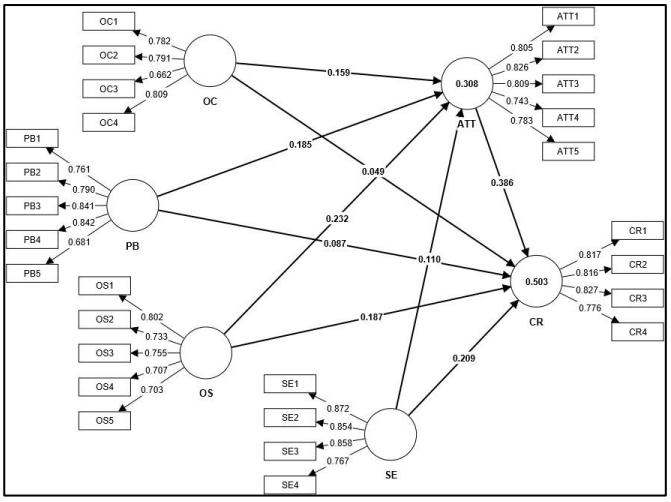

Figure 1: Research Framework

Note: OC=Organizational Culture PB=Perceived Benefit OS=Organizational Support SE=Self-Efficacy ATT=Attitude CR=Collaborative Research

Methodology

This study evaluated academicians' perceptions of the direct and indirect associations between organisational culture, organizational support and perceived benefits and self-efficacy impact on collaborative research with attitude as a mediator within open, online, and flexible distance-learning higher education institutions. Primary data was collected via surveys to conduct this research, and reliable measurements were selected after a thorough review of existing literature. Participants were chosen through purposive sampling, and surveys were distributed via email due to the absence of a comprehensive population list. The analysis covered a total of 27 observed variables. The independent variables included organisational culture, assessed with a 4-item scale from Van den Berg et al. (2004); perceived benefits, measured with five items by Garg et al. (2021); organisational support, evaluated using five items by Eisenberger et al. (1986); and self-efficacy, assessed with four items from Kang et al. (2019). The mediator, attitude, was measured using five items from Chu & Chen (2016), while the dependent variable, collaborative research, was measured with four items based on Al-Rahmi & Othman (2013). All constructs were evaluated using a 5-point Likert scale, ranging from strongly disagree to strongly agree. Out of 507 surveys distributed, 397 were returned, yielding a satisfactory % response rate of 78.4% for conducting structural equation modelling (SEM) analysis. Of the returned surveys, 383 were suitable for further analysis. The researchers utilised Smartpls4 software for data analysis and hypothesis testing, valued for its robustness and capacity for handling multivariate data analysis, as Ringle et al. (2022) recommended. This software played a crucial role in testing the proposed hypotheses and conducting detailed multivariate analyses, providing insights into the measurement and structural models.

Data Analysis

Respondents' Profiles

The study sample was composed of 383 academicians. Concerning gender, the majority were male at 59.3%, while females made up 40.7% of the respondents. The age distribution indicated that the largest group of respondents, 41.3%, fell into the 41-50 age bracket, followed by those aged 31-40 (22.7%) and 51-60 (20.4%). Smaller percentages were

represented by those under 30 years (7.3%) and above 60 years (8.4%). In terms of years of service, the most common category was 11-15 years, comprising 30.5% of the sample, followed closely by those with 16-20 years of experience at 29%. Additionally, 13.6% had 6-10 years, while 12.5% had 21-25 years of experience. The respondents were primarily senior lecturers, making up 77.5% of the sample, with associate professors at 19.1% and smaller distributions among lecturers (1%) and professors (2.3%). Notably, 99.2% of the participants expressed their willingness to engage in the study, reflecting a high level of cooperation.

Common Method Bias

The full collinearity test assesses common method bias by examining each construct's variance inflation factor (VIF). According to Kock (2015) and Kock & Lynn (2012), a VIF value greater than 3.3 may indicate common method bias. In this table, all constructs have VIF values well below the threshold of 3.3, ranging from 1.299 to 2.252 (Table 1). These findings suggest minimal multicollinearity, indicating that common method bias is unlikely to pose a problem in this study. Thus, the observed relationships between the constructs appear free from significant common method variance.

Table 1
Full Collinearity Test

	CR	OC	PB	OS	SE	ATT
CR		1.968	1.966	1.909	1.851	1.63
OC	1.717		1.494	1.711	1.693	1.702
PB	2.250	1.960		1.84	2.252	2.237
OS	1.976	2.029	1.664		2.022	2.026
SE	1.299	1.362	1.381	1.371		1.386
ATT	1.427	1.709	1.711	1.714	1.729	

Measurement Model

The study utilized the measurement evaluation technique proposed by Hair et al. (2017) to conduct both first-order and second-order assessments, focusing on identifying items with loadings below 0.7. Analyzing construct reliability and validity revealed that all constructs had Average Variance Extracted (AVE) values exceeding 0.5, ranging from 0.549 to 0.704 (Table 2), thereby confirming convergent validity (Hair et al., 2017). Additionally, composite reliability for all constructs was above 0.7, between 0.761 and 0.865, and Cronbach's alpha values were above 0.7, spanning from 0.758 to 0.859 (Table 2). Initially, cross-loadings were reviewed to verify discriminant validity and ensure accurate representation and measurement of constructs (Table 3). Subsequently, the Heterotrait-Monotrait (HTMT) ratio was applied as recommended by Henseler, Ringle, and Sarstedt (2015) to assess discriminant validity in Variance-Based Structural Equation Modeling (VB-SEM). The HTMT ratios for the constructs and the original sample are listed in Table 4, all falling below the 0.85 threshold.

Table 2
Construct Reliability & Validity

	CA	CR	AVE
ATT	0.853	0.856	0.630
CR	0.824	0.829	0.655
OC	0.758	0.761	0.583
OS	0.794	0.795	0.549
PB	0.844	0.865	0.617
SE	0.859	0.861	0.704

Notes: CA=Cronbach Alpha CR=Composite Reliability AVE=Average variance Extracted

Table 3
Cross Loadings

	ATT	CR	OC	OS	PB	SE
ATT1	**0.805**	0.543	0.388	0.437	0.427	0.304
ATT2	**0.826**	0.492	0.359	0.402	0.397	0.246
ATT3	**0.809**	0.459	0.344	0.347	0.339	0.270
ATT4	**0.743**	0.467	0.300	0.321	0.356	0.257
ATT5	**0.783**	0.455	0.321	0.392	0.393	0.277
CR1	0.540	**0.817**	0.433	0.523	0.499	0.406
CR2	0.457	**0.816**	0.369	0.400	0.423	0.386
CR3	0.486	**0.827**	0.357	0.437	0.431	0.381
CR4	0.488	**0.776**	0.270	0.377	0.292	0.350
OC1	0.327	0.365	**0.782**	0.311	0.445	0.342
OC2	0.260	0.344	**0.791**	0.331	0.404	0.282
OC3	0.370	0.285	**0.662**	0.488	0.470	0.242
OC4	0.357	0.362	**0.809**	0.409	0.557	0.318
OS1	0.363	0.388	0.366	**0.802**	0.547	0.294
OS2	0.361	0.399	0.360	**0.733**	0.445	0.267
OS3	0.318	0.335	0.330	**0.755**	0.453	0.306
OS4	0.401	0.470	0.383	**0.707**	0.518	0.318
OS5	0.322	0.389	0.423	**0.703**	0.510	0.329
PB1	0.315	0.324	0.466	0.454	**0.761**	0.289
PB2	0.366	0.387	0.439	0.551	**0.790**	0.328
PB3	0.472	0.511	0.596	0.606	**0.841**	0.383
PB4	0.393	0.435	0.469	0.568	**0.842**	0.333
PB5	0.319	0.318	0.440	0.425	**0.681**	0.233
SE1	0.277	0.452	0.359	0.402	0.391	**0.872**
SE2	0.263	0.399	0.297	0.345	0.375	**0.854**
SE3	0.274	0.352	0.288	0.295	0.272	**0.858**
SE4	0.330	0.371	0.357	0.324	0.312	**0.767**

Table 4
Hetrotrait-Monotrait (HTMT) Ratios

	ATT	CR	OC	OS	PB
CR	0.723				
OC	0.534	0.557			
OS	0.575	0.655	0.648		
PB	0.558	0.596	0.763	0.806	
SE	0.398	0.556	0.479	0.492	0.465

Structural Model

In this research, structural model evaluation adhered to the approach outlined by Hair et al. (2017), involving a comprehensive analysis of the pathway coefficients (β) and coefficients of determination (R^2). The Partial Least Squares (PLS) method was utilized, deploying 5000 sub-samples to evaluate the significance of path coefficients. Results from hypothesis testing, including confidence intervals for path coefficients (beta), t-statistics, and p-values, are exhaustively presented in Table 4. This meticulous method offers critical insights into the strength and significance of relationships among variables within the structural model. Table 4 provides a detailed examination of each hypothesis, listing beta coefficients, T-statistics, P-values, and the outcomes concerning hypothesis support. Consequently, this approach enhances the study's conclusions by offering a more precise and comprehensive understanding of the interactions among the variables under investigation.

The analysis of each hypothesis reveals the intricate relationships among the constructs examined in this study. Starting with *H1*, the positive beta value of 0.159, combined with a t-statistic of 2.719 and a p-value of 0.007, supports the acceptance of the hypothesis that organizational culture significantly impacts attitude. Conversely, *H2*, with a beta of 0.049, a t-statistic of 0.908, and a p-value of 0.364, indicates a lack of significant direct impact of organisational culture on collaborative research, leading to its rejection. However, *H3*, which examines the mediating role of attitude between organisational culture and collaborative research, is accepted with a beta of 0.061, a t-statistic of 2.409, and a p-value of 0.016, suggesting a significant mediating effect. For *H4*, the hypothesis is accepted as perceived benefit shows a meaningful influence on attitude, evidenced by a beta of 0.185, a t-statistic of 2.656, and a p-value of 0.008.

In contrast, *H5* is rejected as the perceived benefit does not significantly influence collaborative research directly, supported by a beta of 0.087, a t-statistic of 1.396, and a non-significant p-value of 0.163. *H6* is accepted, indicating that attitude mediates the relationship between perceived benefit and collaborative research, with a beta of 0.071, a t-statistic of 2.499, and a p-value of 0.012. Moving to *H7*, organizational support's significant impact on attitude is confirmed with a beta of 0.232, a t-statistic of 3.855, and a p-value of 0.000. Similarly, *H8* is accepted, demonstrating a positive effect of organizational support on collaborative research, as indicated by a beta of 0.187, a t-statistic of 3.081, and a p-value of 0.002.

H9 further strengthens this finding by confirming the mediating role of attitude in the relationship between organisational support and collaborative research, with a beta of 0.090, a t-statistic of 3.494, and a p-value of 0.000. *H10* shows self-efficacy's influence on attitude is

significant, with a beta of 0.110, t-statistic of 2.250, and p-value of 0.025, leading to its acceptance. Furthermore, *H11* validates a significant positive effect of self-efficacy on collaborative research, evidenced by a beta of 0.209, t-statistic of 4.070, and p-value of 0.000. *H12* underscores attitude as a robust predictor of collaborative research, with a substantial beta of 0.386, a t-statistic of 7.661, and a p-value of 0.000. Lastly, *H13* indicates that self-efficacy indirectly influences collaborative research through attitude, as reflected by a beta of 0.042, t-statistic of 2.161, and p-value of 0.031, leading to the acceptance of the hypothesis. Table 5 demonstrates the hypotheses testing results.

Table 5
Hypotheses Testing Results

Hypotheses	Beta	T statistics	P values	2.50%	97.50%	Decision
H1: OC -> ATT	0.159	2.719	0.007	0.041	0.269	*Accepted*
H2: OC -> CR	0.049	0.908	0.364	-0.054	0.157	*Rejected*
H3: OC -> ATT -> CR	0.061	2.409	0.016	0.015	0.114	*Accepted*
H4: PB -> ATT	0.185	2.656	0.008	0.043	0.316	*Accepted*
H5: PB -> CR	0.087	1.396	0.163	-0.035	0.206	*Rejected*
H6: PB -> ATT -> CR	0.071	2.499	0.012	0.018	0.131	*Accepted*
H7: OS -> ATT	0.232	3.855	0.000	0.11	0.345	*Accepted*
H8: OS -> CR	0.187	3.081	0.002	0.07	0.307	*Accepted*
H9: OS -> ATT -> CR	0.090	3.494	0.000	0.044	0.147	*Accepted*
H10: SE -> ATT	0.110	2.250	0.025	0.015	0.203	*Accepted*
H11: SE -> CR	0.209	4.070	0.000	0.105	0.305	*Accepted*
H12: ATT -> CR	0.386	7.661	0.000	0.285	0.481	*Accepted*
H13: SE -> ATT -> CR	0.042	2.161	0.031	0.007	0.084	*Accepted*

Effect Sizes (f^2) & Variance Inflation Factor (VIF)

Table 6 presents a comprehensive summary of effect sizes (f^2), evaluated following Cohen's (1992) guidelines, which categorize them into small (0.020 to 0.150), medium (0.150 to 0.350), or large (0.350 and above). The effect sizes identified in this study vary from small (0.003) to large (0.208), reflecting the diverse impacts of the variables analyzed. Moreover, the Intrinsic Value Inflation Factor (VIF) values listed in Table 6 are consistently below the more lenient threshold of 5, with the highest recorded value being 2.330, indicating minimal collinearity. This ensures that the comparison of effect sizes and interpretation of coefficients within the structural model is reliable. The endogenous construct exhibits a significant degree of explained variance, with an R^2 value of 0.503 (Figure 1). For the mediator, the model accounts for approximately 30.8% of the variance, as reflected by an R^2 value of 0.308. This highlights the model's effectiveness in capturing the mediation dynamics and accurately depicting the underlying processes.

Table 6
Effect Sizes (f^2) & variance Inflation Factor (VIF)

	f^2		VIF		
	ATT	CR		ATT	CR
ATT		0.208	ATT		1.444
OC	0.021	0.003	OC	1.710	1.747
OS	0.040	0.035	OS	1.929	2.006
PB	0.022	0.006	PB	2.281	2.330
SE	0.014	0.067	SE	1.284	1.302

PLSpredicts & Cross-Validated Predictive Ability Test (CVPAT)
The model's inference and managerial implications were rigorously assessed through out-of-sample predictive analysis using the PLSpredict method, as Shmueli et al. (2016, 2019) recommended. Table 7 illustrates that the application of PLS-SEM resulted in significantly superior Q^2 predictions (>0) compared to naive mean predictions, consistently showing lower Root Mean Square Error (RMSE) values than those from linear model (LM) benchmarks, thereby underscoring its predictive solid capabilities. Notably, in nine cases, RMSE values from PLS-SEM predictions outperformed those of the LM prediction benchmark, highlighting the proposed model's predictive strength as detailed in Table 7. The introduction of the Cross-Validated Predictive Ability Test (CVPAT) by Hair et al. (2022), along with its integration with PLSpredict analysis by Liengaard et al. (2021), marks significant advancements in predictive modeling. Additionally, Table 8 confirms the superior predictive capabilities of PLS-SEM, as evidenced by lower average loss values compared to indicator averages and LM benchmarks, providing strong evidence of its enhanced predictive performance.

Table 7
PLSpredicts

Items	Q^2predict	PLS-RMSE	LM-RMSE	PLS-LM
ATT1	0.231	0.614	0.622	-0.008
ATT2	0.191	0.621	0.640	-0.019
ATT3	0.153	0.670	0.677	-0.007
ATT4	0.137	0.686	0.706	-0.020
ATT5	0.183	0.619	0.636	-0.017
CR1	0.333	0.619	0.623	-0.004
CR2	0.232	0.619	0.627	-0.008
CR3	0.248	0.674	0.695	-0.021
CR4	0.162	0.723	0.725	-0.002

Table 8
Cross-Predictive Ability Test (CVPAT)

	Average loss difference	t-value	p-value
ATT	-0.089	4.815	0.000
CR	-0.140	6.418	0.000
Overall	-0.112	6.690	0.000

Importance-Performance Map Analysis (IPMA)

The Importance-Performance Map Analysis (IPMA), as detailed by Ringle and Sarstedt (2016) and Hair et al. (2018), is a strategic tool that aids in identifying areas for improvement by comparing the importance and performance of various constructs to enhance outcomes like collaborative research. According to Table 9, attitude ranks highest in importance with a score of 0.386, yet it shows a relatively lower performance at 60.829. This indicates a critical improvement, as boosting attitude performance could significantly enhance collaborative research. Although lower in importance at 0.277, organizational support performs the highest at 67.417, suggesting effective processes are in place. Conversely, organisational culture, with the lowest importance of 0.110, still performs relatively well at 66.786. To enhance collaborative research, strategies should focus on elevating attitude performance through targeted initiatives, such as training programs and motivational interventions, to align with its high importance and maximize its impact.

Table 9
Importance-Performance Map Analysis

	Importance	Performance
ATT	0.386	60.829
OC	0.110	66.786
OS	0.277	67.417
PB	0.158	66.591
SE	0.251	66.731

Discussion & Conclusion

Discussion

For open online flexible distance learning higher education institutions aiming to enhance collaborative research, several strategies can be adopted that focus on improving organizational culture, organizational support, perceived benefits, and self-efficacy, with attitude as a mediating factor. Organizational culture significantly influences attitude (H1) with a beta value 0.159. Therefore, institutions should foster an inclusive and collaborative environment, promoting values that encourage open communication and innovation. This could involve setting up virtual forums and workshops encouraging the sharing of ideas and best practices among academicians (Mudhar et al., 2023). Although organisational culture did not show a direct impact on collaborative research (H2), improving culture through supporting attitudes positively mediates this relationship (H3, beta = 0.061), enhancing its impact (Bang et al., 2023). The role of perceived benefits also significantly affects attitude (H4, beta = 0.185). However, it does not directly impact collaborative research (H5), suggesting that institutions must communicate and demonstrate collaborative efforts' benefits. By highlighting successful collaborations and their outcomes, institutions can increase perceived benefits indirectly affecting collaborative research through attitude (H6, beta = 0.071). Organizational support, with a strong direct impact on attitude (H7, beta = 0.232) and collaborative research (H8, beta = 0.187), should be strengthened by providing resources such as access to collaborative tools and platforms and administrative support. Additionally, recognizing and rewarding collaborative efforts can further bolster a supportive culture. This support significantly mediates through attitude (H9, beta = 0.090), amplifying its impact on collaborative research. Self-efficacy is another crucial factor that has a significant impact on both attitude (H10, beta = 0.110) and directly on collaborative research (H11, beta = 0.209)

(Dusdal & Powell, 2021). Enhancing self-efficacy could include offering professional development opportunities to develop research skills and confidence, mentoring programs, and workshops. By bolstering self-efficacy, institutions can significantly boost the propensity for collaborative research, mediated through attitude (H13, beta = 0.042). These combined strategies can create an ecosystem that nurtures collaboration by leveraging organizational dynamics and personal capabilities, ultimately leading to enhanced collaborative research outputs.

Theoretical Implications

The study's findings offer significant theoretical implications when viewed through the Social Cognitive Theory (SCT) lens articulated by Bandura (1989). SCT emphasizes the dynamic interplay between cognitive, environmental, and behavioral factors, suggesting that these elements collectively influence human functioning. This study highlights the critical role of organisational culture, support, perceived benefits, and self-efficacy in shaping academic attitudes and mediating collaborative research efforts. The significant influence of organizational support on attitude and collaborative research aligns with SCT's principle of environmental influences, indicating that the institutional environment is a robust determinant in shaping behaviors (Bandura, 1989). Furthermore, the substantial impact of self-efficacy corroborates SCT's assertion that belief in one's capabilities is essential to initiating and sustaining behavioral engagement. By confirming that self-efficacy directly enhances attitude and collaborative research, the study supports SCT's proposition that self-efficacy affects motivation and performance (Bandura, 1989). This theoretical integration enhances our understanding of collaborative dynamics in educational settings, showing that strengthening self-efficacy and organizational support can lead to improved collaborative outcomes mediated by positive attitudes. Thus, the study provides a nuanced understanding of SCT's application in the educational context, specifically within open online flexible distance learning environments.

Practical Implications

The study offers several practical implications for open online flexible distance learning higher education institutions aiming to boost collaborative research. First, enhancing organisational culture by promoting open communication and shared values can positively influence academicians' attitudes toward collaboration (Ali et al., 2021). Institutions should implement regular interactive workshops and virtual meetups to build a cohesive community that values collaborative research, thus aligning with the study's findings that link positive organisational cultures to improved attitudes. Second, organisational support is crucial. Institutions should invest in robust support systems that provide researchers with the necessary tools and resources, such as advanced collaborative platforms and administrative assistance (Bilal et al., 2023). Recognizing and rewarding collaborative efforts could further foster a conducive environment for partnership. Moreover, highlighting the perceived benefits of collaborative research by showcasing successful collaborations can enhance attitudes further, as supported by the study. Finally, enhancing self-efficacy among academicians is vital. Providing professional development opportunities and mentorship programs can help researchers build confidence in their collaborative capabilities (Cherian et al., 2021).

Suggestions for Future Study

Future research should explore the longitudinal effects of organisational culture, support, perceived benefits, and self-efficacy on collaborative research to understand how these factors evolve and impact academic collaboration. Additionally, expanding the scope to include different cultural and geographical contexts would provide a more comprehensive picture of how these dynamics operate globally, particularly in diverse educational environments. Including qualitative methods, such as interviews or focus groups, could yield more profound insights into personal experiences and perceptions of academicians, enriching the quantitative findings. It would also be beneficial to examine other potential mediators or moderators, such as technological proficiency or institutional policies, to understand their roles in enhancing collaborative research. Finally, investigating the impact of emerging technologies, like AI and virtual reality, on collaborative practices could reveal new dimensions of organizational support and self-efficacy. These expansions would validate and extend the current research and offer practical strategies tailored to the evolving landscape of higher education.

Conclusion

In conclusion, this study underscores the pivotal roles of organizational culture, support, perceived benefits, and self-efficacy in fostering a conducive environment for collaborative research within open, online, flexible distance learning institutions. By leveraging these factors, institutions can enhance academic attitudes, which mediate and promote effective collaboration among researchers. The integration of Social Cognitive Theory (Bandura, 1989) highlights how cognitive and environmental factors converge to influence research dynamics. The study suggests implementing supportive infrastructures and professional development initiatives to boost self-efficacy and collaborative success. These findings contextualize the need for institutions to adapt strategies that consider local organizational cultures and support systems, ensuring they align with broader educational goals and technological advancements. Expanding these insights across different global settings can enrich understanding and effectively tailor strategies. This comprehensive approach can ultimately drive innovation and productivity in the academic research landscape, fostering a more collaborative and inclusive environment.

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