



Bridging Organizational Learning and Sustainability: The Underlying Mechanism of Resilience in Public Sector Organizations

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Abstract

This study aims to address a void in human resource management and organizational studies by examining the direct impact of organizational learning (OL) on organizational sustainability (OSUS) through the underlying mechanism of 'organizational resilience' (ORES) in the relationship, particularly among public sector organizations in Nigeria. The research employed a cross-sectional surveys and data were collected from 348 respondents over a six-month period, which was analysed based on a non-parametric approach (PLS-SEM) using Smart-PLS to evaluate the hypothesized relationships. The results show that organizational learning positively predicts organizational sustainability, also, the direct link between OL and ORES as well as ORES and OSUS were all positive and significant. The result similarly demonstrates that 'organizational resilience' positively and significantly mediates the relationship between OL and OSUS showing that all the hypotheses were supported. The study highlights mediating role of ORES on the connection between OL and OSUS in public organizations in Nigeria. Leaders of PSOs should establish comprehensive plans, policies, and systems that promote resilient practices and continuous learning while adopting sustainability models to improve economic, social, and environmental concerns of the organizations. This study establishes the impact of OL on organizational sustainability along with the underlying mechanism of 'organizational resilience' in PSOs in Nigeria which have seldom remained understudied analytically.

Keywords

Organizational Sustainability, Organizational Learning, Organizational Resilience, Public Sector Organizations

1. Introduction

The growing emphasis on achieving Sustainability Development Goals (SDGs) worldwide has increased the pressure on various stakeholders to prioritize organizational sustainability (Haleem et al. 2022). Consequently, organizations are required to find a harmonious balance between their social, environmental, and economic objectives. Successfully meeting these objectives not only enhances trust between businesses and stakeholders but also reduces disruptions from social and environmental regulations, improves resource prudence, boosts worker's self-esteem, enhances effectiveness, and augments organization income (OECD 2020). In developed nations, companies have made notable progress in advancing sustainability initiatives over the last two decades. This progress has led to a gradual decline in stakeholder concerns regarding social and environmental deterioration within these countries (Sachs et al. 2022). Discovering effective resolutions to sustainability issues necessitates organizations and various entities to expand their perspectives, surpass organizational confines, and actively involve their clients (De Bakker, Rasche, and Ponte 2019). Nevertheless, widening organizations viewpoints and engaging with varied parties come with intrinsic political and procedural pressures. These tensions arise from defiance to change, conflicting purposes, insufficient conviction, and the use of discipline-specific jargon. Addressing sustainability challenges involves intricate and disorderly issues lacking clear solutions or confined to specific disciplines, necessitating innovative approaches to organization and collaboration (Feeney et al. 2023). Conventional approaches to sustainability have predominantly revolved around management regulations, private sector taxes, investments in sustainable innovations, voluntary reporting, and private control of

commercial behaviour (De Bakker et al. 2019). Regardless of these efforts by governmental bodies and businesses, advancement regarding sustainability remains sluggish, often constrained by actors functioning within their disciplinary confines (Laasch et al. 2020). To attain a sustainable future, multifaceted and cross-sectoral approaches for coping and adjustment are essential, according to the Intergovernmental Panel on Climate Change (IPCC) (2018) and the SDGs agenda (Scheyvens, Banks, and Hughes 2016). However, working with a variety of parties involved presents significant difficulties since, when it comes to sustainable cooperation, each party usually has their own, often competing, objectives.

Learning serves as a crucial organizational practice for overcoming challenges encountered in collaborative efforts toward organizational sustainability (Osagie et al. 2022). Enhancing an organization's learning capacity directly correlates with its ability to adjust and evolve, both essential factors for organizations addressing sustainability issues (Linnenluecke 2017). Over the last twenty years, the term "organizational learning" (OL) has become more popular in scholarly managerial research, and helps organizations build evolving, well-informed, and continuously up-to-date personnel (Mousa et al. 2020). This has a favourable impact on competitiveness (Santos-Vijande, López-Sánchez, and Trespacios 2012), staff well-being (Joo and Shim 2010), organizational effectiveness (García-Morales, Jiménez-Barrionuevo, and Gutiérrez-Gutiérrez 2012), financial capabilities (Ellinger et al. 2002), and the creation of novel products. (Dee and Leišytė 2016) assert that people or workers function as crucial actors in OL by converting data into knowledge that can be saved, distributed, and used. OL causes transformations across organization and personal expertise, which lead to a modification of an individual's mental state as well as in the daily operations of the organization.

Previous research indicates that Organizational Learning (OL) plays a crucial role in driving organizational sustainability (OSUS) (Lwanga, Korir, and Bonuke 2023). For example, (Battistella, Cicero, and Preghenella 2020) outlined OL attributes that facilitated OSUS practices in three Italian food and beverage companies. Similarly, (Vihari, Rao, and Doliya 2019) discovered a noteworthy positive correlation between OL and OSUS in their examination involving pharmaceutical companies in India. These investigations validate the notion that learning, as a subtle asset, empowers organizations to provide information (competencies in knowledge) that is pertinent for comprehending and addressing stakeholder interests and ethical considerations. Despite the valuable contributions of these existing studies, there remains a scarcity of empirical literature on OSUS within developing economic contexts (Alinda et al. 2022). Moreover, the primary focus on OL as the key predictor of OSUS has primarily been approached from the standpoint of capability or characteristics. However, there is a scarcity of knowledge regarding how OL relates to sustainability, a notion suggested in the works of (van Mierlo and Beers 2020). Additionally, several existing empirical studies assume a direct correlation between OL and OSUS while neglecting other core related factors that might influence this connection (Haleem et al., 2022). Hayes (2017) propose that upcoming scholars should move beyond merely testing direct causal relationships and consider incorporating other third variables that could account for a more substantial variance in OSUS, especially within the context of a developing economy. Nonetheless, there is a limited understanding concerning the intermediary role of 'organizational resilience' (ORES) in the correlation between OL and sustainability, particularly among public organizations in a developing nation such as Nigeria. Thus, this study aims to address a void in human resource management and organizational studies by examining the direct impact of OL on OSUS and investigating whether ORES plays a mediating role in this association. The aim of this inquiry is to clarify possible organizational linkages while also delving into an organizational setting that has not been thoroughly studied, particularly Nigerian public sector organizations (PSOs). This sector has received limited attention in HR management and organizational studies compared to other sectors. The later parts of this article encompass a literature review, methodology, findings, discussion, conclusion, limitations, and implications of the study.

2. Literature Review and Hypothesis Development

2.1 Organizational Learning (OL)

OL has emerged as a pivotal resource driving success within the contemporary, volatile, and knowledge-driven environment (Oh and Han 2020). Through the process of learning, organizations develop competencies in knowledge that enhance their internal activities and overall outcomes. Fundamentally, learning empowers organizations to engage with both internal operations and the external environment. This engagement results in the creation, acquisition, sharing, integration, and utilization of knowledge related to the evolving environment, market dynamics, and stakeholder expectations, ultimately amplifying the value of the organization (North and Kumta 2020).

OL is a social process in which individuals engage in collaborative situational behaviour's and discussions that concurrently generate organizational knowledge structures and establish connections across various levels of learning. It represents a method for learning in which people produce, store, and share information inside an organization (Tortorella et al. 2020). This process involves a wide range of interactions and analyses that take place at several levels, including personal, team, corporate, and inter-organizational layers (Mousa et al., 2020). OL plays a crucial role in helping organizations achieve their goals, and its results are strongly influenced by the organization's structures, procedures, and ethos as well as creating an atmosphere in businesses that supports innovation, freedom, teamwork, and trying new things. However, (Ko, Kirsch, and King 2005) argue that the goals behind OL can overcome problems and make learning easier by encouraging the free sharing of information, creating cohesion, and lowering the costs of educational activity. In a community of practice, individuals with comparable methods work together to achieve ongoing progress by jointly discussing and commenting on current techniques. OL establishes connections among diverse stakeholders, resulting in

fresh perspectives and develops in stages that include gathering information, comprehension, recollection, and knowledge retrieval. When information is obtained from many sources and shared within the company, OL can yield maximum advantages and lead to the production of novel ideas. This newly discovered value, objectives, procedures, guidelines, or other behaviours across the organization may, purposefully or unconsciously, improve the position of one or more stakeholders, either promptly or following an extended period.

2.2 Organizational Sustainability (OSUS)

Sustainability has gained considerable traction in political, business, and public domains owing to its potential to tackle global challenges. The United Nations Rio Summit of 2012 mandated nations to formulate Sustainable Development Goals (SDGs), which were formally ratified in 2015 and widely disseminated to address recognized global challenges by the year 2030. Despite its widespread usage, the term "sustainability" might be misconstrued in certain contexts, particularly where its environmental origins carry less significance (Marchese et al. 2018). In some cases, the notion of "sustainability" might be simplified to mean merely "maintaining the current state without disappearing". Another overly broad definition of sustainability could be articulated as "everything that guarantees the welfare of societies and the environment" (Lew et al. 2016), or as "an ethical concept dictating that future conditions should surpass present ones". Another perspective on sustainability is encapsulated by the concept of "longevity," signifying that the sustainability of a system is often judged by its ability to endure over an extended period. Recent definitions have expanded to encompass a broader process-oriented understanding, going beyond mere economic performance. Sustainability is now viewed as an interaction between social and ecological systems, representing a convergence of diverse principles (Brandt and Thomassen 2020). The Brundtland Commission's sustainability definition underscores the importance of balancing and respecting the needs of both present and future generations. Subsequently, the Triple Bottom Line (TBL) was introduced (Elkington 2018) emphasizing the interdependence of organizational goals with societal and environmental contexts in which they operate. This model, featuring the environment, economy, and society, has traditionally represented sustainability. While widely used in literature to balance conflicting objectives across these three domains, the theoretical underpinnings of this concept remain underdeveloped, posing challenges in understanding its origins (Abdullahi, Mohamed, and Senasi 2023).

Organizations encounter substantial hurdles in translating sustainability principles into tangible actions across fundamental operational domains like strategy, learning and change, production, human resources, and marketing (Brandt and Thomassen 2020). Ethical and social responsibilities compel organizations to address and resolve these challenges, with their responsiveness to sustainability imperatives being pivotal for enacting required transformations. While Organizational Sustainability (OSUS) has garnered recognition and significance due to its potential to confer competitive advantages and generate value for organizations, stakeholders, and society, the comprehensive integration of sustainability remains incomplete at both strategic and operational levels. Some scholars posit that the primary barrier hindering the implementation of sustainability within organizations lies in the inability to consistently create sustainable value across the entire value chain, particularly in areas beyond organizational control, such as the supply chain (Nawaz and Koç 2019). OSUS, as articulated by (Abdullahi, Mohamed, Senasi, et al. 2023) can be conceptualized as an organization's capacity to maintain competitiveness both in the present and the future. The United Nations Environment Programme defines OSUS as the methodologies adopted by organizations to attain sustainability objectives by transforming inputs into products or services. This involves ensuring economic advancement, environmental preservation, and social equity. According to Hart and Milstein, OSUS embodies an organization's contribution to advancing human development inclusively, equitably, and securely, by concurrently delivering economic, social, and environmental advantages. OSUS is an organization's capacity to effectively fulfil the needs and demands of many stakeholders, hence promoting and maintaining long-term growth.

Scholars have advocated for the utilization of Organizational Sustainability (OSUS) methodologies in scholarly investigations. For instance, (Batista and de Francisco 2018) conducted a review focusing on the sustainability best practices observed in the most environmentally viable companies in Brazil registered in the Corporate Sustainability Index. The authors delineated OSUS categories and exemplary practices within each of the tri-dimensions of sustainability. Likewise, (Kiesner and Baumgartner 2019) executed a survey targeting medium to big firms in Austria, aiming to uncover optimal practices concerning organizational change for sustainability. The authors proposed a model facilitating communication among change agents, aiming to enhance the personnel and cultural aspects of these enterprises. Numerous other studies also delve into examining the best sustainability practices within organizations (Sarango-Lalangui, Álvarez-García, and del Río-Rama 2018). However, most of these studies primarily concentrate on OSUS at the macro-level, neglecting micro-level sustainability initiatives and practices. While acknowledging that the effort of Batista & de Francisco (2018) comes closest to tackling these limitations, their confinement of outcomes to a single country and the categorization of sustainability practices into facets without accentuating illustrative examples may not fully mitigate these concerns. This current work strives to bridge these gaps and overcome these limitations.

2.3 Organizational Learning and Organizational Sustainability

There is a common misconception that learning is confined to formal educational settings such as universities and colleges. Contrarily, it also takes place in workstations, via social interfaces, and lived experiences (Jeong et al. 2018). It is an activity evolving over time, seen in activities like participating in training programs, and an outcome derived from

insights gleaned through past actions, like reflecting on previous tasks. This research centers on learning occurring beyond conventional learning systems since organizations are pivotal in advancing sustainability. For instance, they hold significant responsibility for universal CO₂ emissions, while governments, NGOs, and other social actors are accountable for overseeing firms' actions in this realm (Feeney et al. 2023). Comprehending how learning contributes to fostering sustainability within these entities holds the potential to significantly influence future endeavors in sustainable development.

OL originates from disciplines such as organizational behaviour, dynamics of systems, as well as managerial studies in the field of human capital development research. Its main objective is to comprehend the characteristics of methods of learning and their ensuing effects (Mousa et al. 2020). Ontologically, OL involves a dynamic exchange between people and their organizations. From an epistemological perspective, OL is specifically placed within and outside organizational settings. Researchers specializing in organizational studies have recognized the limitations associated with training individuals in isolation and have begun to appreciate the potency of staff shared knowledge. This entails problem-solving within unstructured scenarios and fostering innovation by acknowledging the creation of informal groups where members collaborate in shared social activities to generate new ideas. Recent research endeavors have begun linking OL with sustainability, acknowledging the connections between these concepts (van Mierlo and Beers 2020). Studies highlight that OL allows organizations to actively gather information vital for addressing the evolving economic, social, and environmental concerns of stakeholders. For instance, OL has been linked to enhancements in organizational innovativeness, disaster planning and management, competitiveness, and strategic renewal. Given this, the significance of OL in predicting Organizational Sustainability (OSUS) is undeniable. Therefore, there's a necessity to deepen researchers' comprehension of how OL, involving knowledge acquisition, sharing, interpretation, and storage, correlates with OSUS. From a sociological perspective, learning unfolds as individuals build information via observation or practice, subsequently disseminating, interpreting, and incorporating it at the collective level to influence the development of new organizational elements like policies, structures, systems, routines, and performance (North and Kumta 2020). As a result, Organizational Learning (OL) is proposed to empower organizations in acquiring insights into the evolving sustainability demands of stakeholders. With this knowledge, managers and employees collaboratively assess the existing performance framework and transition to a more comprehensive one, capable of addressing the diverse economic, social, and environmental interests of stakeholders. Subsequently, the following hypothesis was formulated:

H1. *OL positively predicts organizational sustainability (ECOSUS, ENVSUS, SOCSUS).*

2.4 Organizational Learning and 'Organizational Resilience'

The rapidly changing global landscape demands that organizations continually engage in learning to acquire pertinent knowledge addressing their requirements. This process encompasses creating, acquiring, disseminating, integrating, and storing knowledge in an organization which in turn inspires empowerment among employees. This empowerment fuels a continuous exploration and utilization of learning opportunities (Lwanga et al. 2022). Alternatively, (Gaillard 2007) outlines two distinct organizational responses when confronted with an adverse event. The first response involves vulnerability, characterized by an unconditional acceptance of crises and a willingness of organizational members to endure and transform any crisis, regardless of its impact. The second response, resilience, signifies the ability to endure sudden disruptions and proactively convert unforeseen threats into opportunities. This necessitates maintaining a resilient culture akin to the human body's defence against disorders (Mousa et al. 2020). A resilient culture ensures transparent discussions about present and future threats and equips the organization with adaptable scenarios for impending risks. According to (Linnenluecke 2017) five components make up the resilience of an organization (ORES): identifying extrinsic risks, personnel readiness, organizational dependability, on-going business model improvement, and supply chain disruption protection.

The relationship between ORES and OL may encompass the routines, values, models, and capabilities that enable organizational members to adeptly respond in uncertain situations, ensuring organizational existence. For (Kantur and Iseri-Say 2015) ORES comprises three primary dimensions. Firstly, robustness signifies the ability of elements or systems within an organization to endure stress without encountering destruction or failure of function. Secondly, agility represents a capability to swiftly identify and capitalize on opportunities while effectively addressing risks in an unpredictable situation. Thirdly, integrity is the required amount of commitment and teamwork among employees in an organization while dealing with unfortunate circumstances. Therefore, the ensuing proposition is formulated based on these dimensions:

H2. *OL positively predicts 'organizational resilience' (ROB, AGL, INT).*

2.5 'Organizational Resilience' and Organizational Sustainability

Although resilience and sustainability have emerged as a new topic of exploration across numerous domains, multiple findings highlight the absence of a theoretical model that integrates these two ideas (Phillips et al. 2017). While some view "sustainability and resilience" as closely related concepts, others perceive them as separate paradigms. Sustainability focuses on conservation objectives, whereas resilience emphasizes adaptive goals. (Lew et al. 2016) attributes this misunderstanding between the categories to two factors. There are two main reasons why it is difficult to clearly define and conceptualize these two words. Firstly, there is a dearth of concrete description and understanding of the terms.

Secondly, both ideas have some fundamental similarities in terms of their assumptions, methodologies, and aims. These include life-cycle evaluation, structural, and socio-economic analyses. Additionally, both notions prioritize the ability to survive or, as (Fiksel, Goodman, and Hecht 2014) argued, the capacity to adapt and recover from disruptions. Their shared association with worldwide political patterns, such as reducing climate change effects, tie them to establishing global structures and collaborative agendas. To assess the viability of establishing a comprehensive model encompassing both concepts, it is necessary to explore the interconnection between these two concepts. Literature has established many correlations between sustainable development and resilience. (Derissen, Quaas, and Baumgärtner 2011) categorize research on the correlation of sustainability and resilience into two primary groups. According to (Lizarralde et al. 2015) the first category views the two terms as synonymous and frequently uses them simultaneously. Similarly, (Holling and Walker 2003) contend that a resilient socioecological arrangement is equivalent to an area that achieves ecological, economic, and social sustainability. However, (Levin et al. 1998) view resilience as the optimal approach to conceptualize sustainability in both natural and social systems. The second body of literature regards resilience as an essential prerequisite for sustainability. Notable studies emphasize that economic activities can only be considered sustainable if they rely on robust life-support ecosystems. Similarly, (Perrings 2006) argues that a development plan cannot be deemed sustainable until it demonstrates resilience. Accordingly, (Lebel et al. 2006) stressed that it is crucial to enhance societies' ability to handle resilience in order to effectively pursue sustainability. Consequently, we postulated that:

H3. *'Organizational resilience' (ROB, AGL, INT) positively predicts organizational sustainability (ECOSUS, ENVSUS, SOCSUS).*

2.6 Mediating Role of Resilience

Numerous constructs served as mediators in the OL–OS nexus in addition to the previously established direct relationships. These constructs include innovation types (Lwanga et al. 2022), knowledge management (Kordab, Raudeliūnienė, and Meidutė-Kavaliauskienė 2020), organizational culture (Firooz, Hosseinzadeh, and ... 2021), organizational characteristics (Osagie et al. 2022), and organizational innovation (Inthavong et al. 2023). Several research inquiries were undertaken to elucidate the underlying mechanisms that link OL to OSUS. The present research proposes that ORES, which has not been previously examined as a mediating variable in the link between OL and OSUS, should be considered as a possible mediator. Numerous studies and contexts have employed resilience as a mediating variable (Xiao et al. 2023). While individual elements like OL have been associated with the sustainability of organizations, ORES is anticipated to contribute to the process. Organizations are more likely to continue reaching their sustainable goals and, consequently, to prosper if they are more resilient to adversity and disturbances. Thus, it is contended that OL causes ORES, which causes OSUS, and hence the following hypothesis:

H4. *'Organizational resilience' (ROB, AGL, INT) has a positive mediating effect in the OL and OSUS (ECOSUS, ENVSUS, SOCSUS) relationship.*

3. Methodology and Research Design

3.1 Sample and Procedures

The current quantitative study's conceptual framework was derived from previous research on Organizational Learning (OL), 'organizational resilience' (ORES), and Organizational Sustainability (OSUS). Notably, prior investigations did not explore the interplay among OL, ORES, and OSUS, particularly within the public sector (PSOs). This study was conducted among permanent staff across all cadres and levels from various PSOs in Kano, serving as a representation of all PSOs operating under similar standards. A sample of 9 PSOs, comprising 7,042 staff, was selected using a convenience sampling method. Participants were assured that their survey responses would remain anonymous, confidential, and solely used for academic purposes, implying their consent upon completion. Due to the lack of a sample frame, G-power was employed to determine the sample size, establishing a minimum requirement of 123 samples to achieve an 80% power level (Ringle et al. 2020). Using Google Form, 360 surveys were collected over a six-month period, with 12 incomplete responses omitted. Outlier assessments were performed, resulting in 348 valid responses for analysis. The sample size exceeded 160, meeting the minimal recommended size for PLS-SEM (Kock 2018).

3.2 Measures

OL was assessed using a set of four items introduced by (Lee, Vargo, and Seville 2013) which had been previously utilized in studies associated with 'organizational resilience' and OL (Şengül, Marşan, and Gün 2019). An example of the questions posed was, "My organization actively encourages people to challenge and develop themselves through their work." The items were ranked on a 5-point Likert scale (1 = strongly disagree; and 5 = strongly agree). Further, OSUS was evaluated through a scale established by (Irfan, Hassan, and Hassan 2018) comprising 17 items, categorized into three dimensions: Economic sustainability (4 items), Social sustainability (6 items), and Environmental sustainability (7 items). Equally, ORES was assessed utilizing the scale created by (Kantur and Iseri-Say 2015). It comprises of 4 items for robustness, 3 for agility and 2 items to integrity evaluated on a five-point Likert-type scale, 1 (strongly disagree) to 5 (strongly agree). See Appendix A.

4. Results

We employed Smart-PLS 4 for model estimation. Smart-PLS 4 is known for being less stringent concerning sample size, model intricacy, and abnormal data, making it well-suited for higher-order constructs models. Specifically, the higher-order model estimation in this study utilized the disjoint 2-stage method to assess the outer model of OSUS and ORES as the second-order components, following the method proposed by (Becker et al. 2023).

4.1 Evaluation of the Measurement Model

As depicted in Table I, all the tested VIF scores are much lower than the criterion of 5 (Joseph F. Hair et al. 2023). It means that Multicollinearity is not an issue in this study.

Table 1 Full collinearity

Variables	AGL	ECOSUS	ENVSUS	INT	OL	ROB	SOCSUS
VIF	2.789	2.447	1.918	2.404	2.737	3.461	2.379

Subsequently, we implemented the disjoint 2-stage method (Sarstedt et al. 2019). Initially, in the first stage, we evaluated the reflective outer model of the first-order elements encompassing ORES (ROB, AGL, INT) and OSUS (ECOSUS, ENVSUS, SOCSUS). All loading values were expected to fall within the range of 0.5 to 0.708, accompanied by an AVE value of no less than 0.5 and a CR value of no less than 0.7. As illustrated in Table II, all AVEs and CRs exceed 0.5 and 0.7, respectively. Despite having five or six loadings below 0.708, which are still considered acceptable, the overall loadings were deemed satisfactory (Hair Jr et al. 2022).

Table 2 Convergent validity

Variable	Items	Loadings	CR	AVE
Agility	AGL1	0.830	0.889	0.728
	AGL2	0.874		
	AGL3	0.855		
Economic Sustainability	ECOSUS1	0.710	0.888	0.666
	ECOSUS2	0.799		
	ECOSUS3	0.883		
	ECOSUS4	0.861		
Environmental Sustainability	ENVSUS1	0.647	0.900	0.564
	ENVSUS2	0.644		
	ENVSUS3	0.788		
	ENVSUS4	0.840		
	ENVSUS5	0.734		
	ENVSUS6	0.827		
	ENVSUS7	0.751		
Integrity	INT1	0.870	0.835	0.717
	INT2	0.823		
Organizational Learning	OL1	0.759	0.791	0.566
	OL2	0.669		
	OL3	0.809		
	OL4	0.538		
Robustness	ROB1	0.773	0.854	0.599
	ROB2	0.870		
	ROB3	0.825		
	ROB4	0.599		
Social Sustainability	SOCSUS1	0.825	0.891	0.579
	SOCSUS2	0.711		
	SOCSUS3	0.600		
	SOCSUS4	0.831		
	SOCSUS5	0.747		
	SOCSUS6	0.824		

The present research employed various reliable methods to assess discriminant validity of the variables, including the square root of the average variance extracted (AVE) as proposed by (Fornell and Larcker 1981), loadings and cross-loadings as outlined by (Chin 1998), and the heterotrait-monotrait ratio (HTMT) as suggested by (Franke and Sarstedt 2019) and (Henseler, Ringle, and Sarstedt 2015). Table 3 shows that the square root of the AVE values exceeded the correlations among the constructs, indicating satisfactory discriminant validity. Additionally, discriminant validity was confirmed by comparing the loadings of the items with those of other items in the cross-loadings analysis as shown in Table 4. Moreover, HTMT analysis was utilized to confirm the distinctiveness of the constructs, following recommendations by (Henseler et al. 2015) and (Franke and Sarstedt 2019). It was required that HTMT scores remain

below 0.85 and 0.90. Although Table 5 indicated, further confirmation of discriminant validity was conducted through bootstrapping. This analysis aimed to assess if the HTMT score significantly differed from 1.00, as advised by (Franke and Sarstedt 2019), (Henseler et al. 2015), and (Ringle et al. 2023). The results revealed upper limit confidence intervals below 1 (see, values in bold italics), reinforcing the evidence for discriminant validity. In conclusion, the study met all essential criteria and conditions necessary for establishing validity and reliability.

Stage two involves evaluating the measurement model of the second-order components, namely ‘organizational resilience’ and organizational sustainability. Table 6 reveals that the psychometric properties of robustness, agility, and integrity (the first-order components) are satisfactory for the second-order component of ‘organizational resilience’. Similarly, the environmental, economic, and social sustainability components exhibit satisfactory psychometric properties for organizational sustainability. We further assessed the significance of the weights of the formative constructs using a bootstrapping resampling method with 10000 iterations. The analysis revealed that all the items, were significant in terms of both the outer weights and the outer loadings. The subsequent step is to assess the structural model. The findings for the formative second-order constructs are illustrated in Figure 1 and detailed in Table 6.

Table 3 Discriminant validity (Fornell & Larcker)

Constructs	1	2	3	4	5	6	7
ECOSUS	0.818						
ENVSUS	0.530	0.751					
INT	0.499	0.536	0.847				
AGL	0.538	0.546	0.677	0.853			
OL	0.596	0.656	0.789	0.684	0.700		
ROB	0.669	0.608	0.690	0.735	0.683	0.778	
SOCSUS	0.664	0.557	0.496	0.457	0.628	0.520	0.761

Table 4 Discriminant validity (Loadings and Cross-loadings)

Items	1	2	3	4	5	6	7
AGL1	0.830	0.381	0.570	0.836	0.601	0.647	0.414
AGL2	0.874	0.523	0.569	0.873	0.589	0.643	0.367
AGL3	0.855	0.494	0.595	0.851	0.561	0.589	0.391
ECOSUS1	0.647	0.710	0.266	0.317	0.333	0.349	0.458
ECOSUS2	0.716	0.799	0.373	0.403	0.474	0.519	0.521
ECOSUS3	0.526	0.883	0.482	0.530	0.530	0.696	0.582
ECOSUS4	0.547	0.861	0.487	0.490	0.588	0.592	0.602
ENVSUS1	0.399	0.549	0.647	0.335	0.452	0.454	0.507
ENVSUS2	0.317	0.431	0.644	0.399	0.443	0.444	0.359
ENVSUS3	0.333	0.582	0.788	0.392	0.560	0.383	0.381
ENVSUS4	0.350	0.741	0.840	0.414	0.579	0.488	0.500
ENVSUS5	0.478	0.513	0.734	0.546	0.451	0.487	0.380
ENVSUS6	0.471	0.735	0.827	0.415	0.519	0.478	0.434
ENVSUS7	0.427	0.659	0.751	0.369	0.434	0.459	0.351
INT1	0.454	0.405	0.713	0.870	0.796	0.541	0.400
INT2	0.394	0.499	0.634	0.823	0.554	0.623	0.438
OL1	0.448	0.411	0.523	0.467	0.759	0.527	0.576
OL2	0.427	0.225	0.459	0.511	0.669	0.444	0.390
OL3	0.454	0.405	0.830	0.540	0.809	0.541	0.400
OL4	0.333	0.782	0.354	0.392	0.538	0.383	0.381
ROB1	0.856	0.463	0.482	0.530	0.530	0.773	0.582
ROB2	0.527	0.522	0.669	0.641	0.646	0.870	0.439
ROB3	0.468	0.484	0.550	0.598	0.548	0.825	0.409
ROB4	0.238	0.419	0.417	0.509	0.375	0.599	0.179
SOCSUS1	0.662	0.517	0.441	0.444	0.576	0.497	0.825
SOCSUS2	0.421	0.342	0.311	0.243	-0.428	0.333	0.711
SOCSUS3	0.448	0.263	0.252	0.284	0.300	0.292	0.600
SOCSUS4	0.554	0.477	0.464	0.446	0.548	0.439	0.831
SOCSUS5	0.429	0.446	0.369	0.315	0.467	0.385	0.747
SOCSUS6	0.486	0.449	0.387	0.319	0.500	0.397	0.824

4.2 Evaluation of the Structural Model

Our findings illustrate that OL demonstrated a positive association with OSUS ($\beta = 0.449$; $t = 3.136$; $p < 0.001$), supporting H1. Likewise, OL exhibited a positive relationship with ORES ($\beta = 0.814$; $t = 31.141$; $p < 0.001$), confirming H2. Additionally, ORES showed a positive connection with OSUS ($\beta = 0.357$; $t = 2.472$; $p = 0.007$), supporting H3. The model explained 66.3% of the variance in ORES and 59% in OSUS based on the R² values (see Table 7 and Figure 1).

The Stone–Geisser’s Q2 values, evaluating predictive relevance, were notably high at 0.494 for OSUS and 0.642 for ORES. Furthermore, effect sizes (f2) indicated large, two medium, and one small effects within the model.

Table 5 Discriminant validity (HTMT)

Constructs	1	2	3	4	5	6	7
1. AGL							
2. ECOSUS	0.647 [0.508,0.778]						
3. ENVSUS	0.653 [0.531,0.779]	0.619 [0.515,0.722]					
4. INT	0.853 [0.725,0.901]	0.694 [0.367,0.656]	0.735 [0.639,0.858]				
5. OL	0.861 [0.758,0.910]	0.655 [0.456,0.706]	0.551 [0.414,0.685]	0.853 [0.541,0.844]			
6. ROB	0.805 [0.853,0.918]	0.826 [0.732,0.922]	0.746 [0.619,0.869]	0.896 [0.699,0.905]	0.858 [0.802,0.911]		
7. SOCSUS	0.542 [0.408,0.699]	0.779 [0.674,0.859]	0.637 [0.535,0.737]	0.679 [0.392,0.697]	0.728 [0.451,0.736]	0.635 [0.522,0.743]	

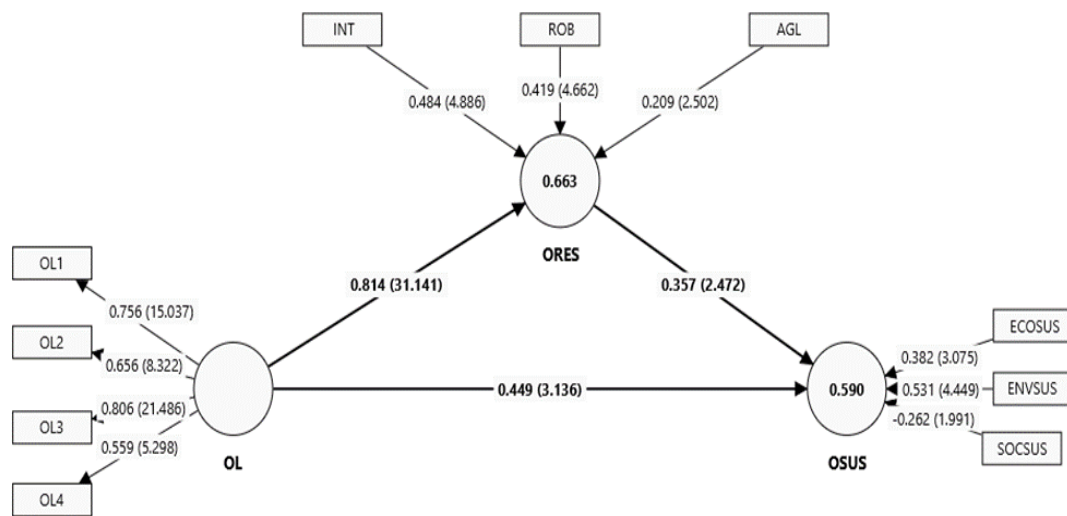


Fig. 1 Measurement Model of the formative second order Components (Two-staged)

Table 6 Assessment of the Measurement Model of the second order Components

Items	Loadings	Outer weights	CR	AVE
ORES			0.898	0.543
AGL	0.845	2.502		
INT	0.915	4.886		
ROB	0.907	4.662		
OSUS			0.919	0.511
ECOSUS	0.838	3.075		
ENVSUS	0.880	4.449		
SOCSUS	0.812	1.991		

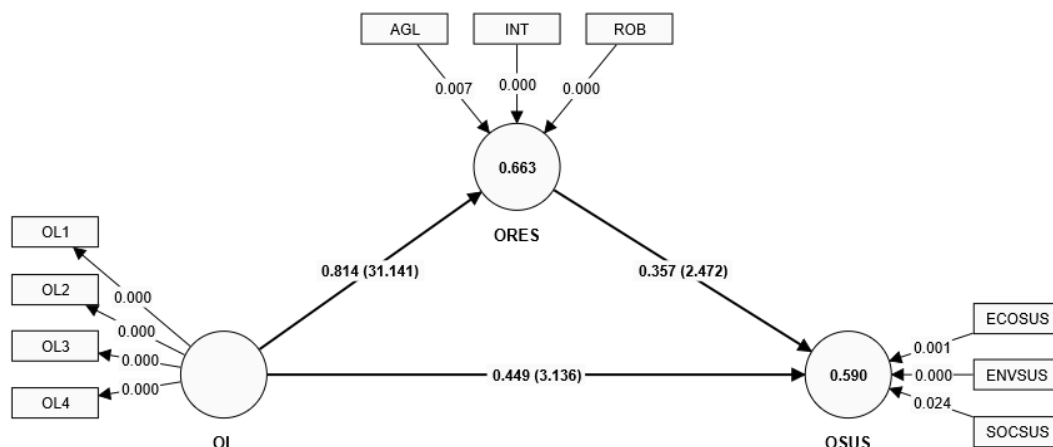


Fig. 2 Structural model

4.3 Evaluation of the Mediation

Concerning Hypothesis 4, which assumes a mediating effect, we adhered to the criteria established by (Baron and Kenny 1986; Moreira et al. 2022). This study performed a mediation analysis using the bootstrapping procedure, a nonparametric method within PLS-SEM, to evaluate the mediator function of ORES. The Sobel test, which necessitates a normal distribution, could not be applied in PLS-SEM (Hair et al., 2017). The effect of OL on OSUS was both positive and significant (Table 7), as was its direct effect on OSUS, as previously mentioned in the "assessment of the structural model" section. Consequently, the mediation effect of ORES on OL and OSUS connection was also positively significant (Table 7). Essentially, higher OL levels not only directly increased OSUS but also heightened ORES, which subsequently led to improved OSUS. Essentially, the influence of OL on OSUS was justified by ORES.

Table 7 Hypotheses testing and results

Hypos	Relationship	Std-Beta	Std-Error	t-value	p-value	BCILL	BCIUL	f2	Decision
H1	OL -> OSUS	0.449	0.143	3.136	0.001	0.203	0.673	0.202	Supported
H2	OL -> ORES	0.814	0.026	31.141	p< .001	0.760	0.850	0.663	Supported
H3	ORES -> OSUS	0.357	0.144	2.472	0.007	0.073	0.560	0.127	Supported
H4	OL -> ORES -> OSUS	0.290	0.120	2.420	0.008	0.052	0.441	0.084	Supported

The study further assessed the model's predictive accuracy using "a novel approach for assessing a model's out-of-sample prediction" known as PLS predict (Shmueli et al. 2019). Accordingly, when the disparities in items (PLS-LM) are consistently minimal, it suggests a high level of predictive ability. On the other hand, if they are greater, it means that predictive significance cannot be proven. When the majority have lower values, it indicates a moderate level of predictive capacity. Conversely, if the minority has lower values, it suggests a low level of predictive power. Table 8 shows that the PLS-predict assessment results revealed that most of the Q² values produced by the PLS model are higher than those produced by the linear regression model (LM). Following the procedures outlined by (Shmueli et al. 2019), the predictive results demonstrated that the ECOSUS, SOCSUS, AGL and ROB items in the PLS model had low predictive error. In contrast to the LM model, this confirms that the PLS model possesses a moderate predictive power.

Table 8 PLS Predict

Item	Q ² predict	PLS-SEM_RMSE	LM_RMSE	PLS-LM
ECOSUS	0.326	0.824	0.862	-0.038
ENVSUS	0.415	0.768	0.600	0.168
SOCSUS	0.372	0.794	0.812	-0.018
AGL	0.449	0.747	0.759	-0.012
INT	0.624	0.619	0.548	0.071
ROB	0.441	0.751	0.770	-0.019

5. Discussion

This investigation focuses on learning that occurs in organizations particularly PSOs which plays a significant function in achieving sustainability. Appreciating the significance of learning in fostering sustainability actions is a fundamental requirement, given that these organizations possess the capacity to influence forthcoming initiatives in sustainability. The findings revealed that OL substantially influences OSUS. This implies that PSOs that interact with inside as well as the outside settings to actively participate in constant learning develop data pertinent to comprehending the evolving needs of stakeholders. Following the findings of (van Mierlo and Beers 2020), the degree to which organizations participate in an ongoing learning process determines their ability to endure and develop in the knowledge-based economy of today. Internally, members of the organization are equipped with knowledge of the changes happening in the business landscape through the process of learning. By adopting such revised cognitive frameworks, pertinent strategic choices are intentionally proposed to guarantee that organization activities protect the financial, social, and ecological concerns of current and future parties involved

Secondly, the results revealed the significant direct effect of OL on ORES. ORES is considered vital organizational attitude in facing and adapting to critical environmental challenges such as the COVID-19 pandemic which had left many organizations around the world in an indeterminate state. It follows that resilient organizations have stronger coping abilities in the face of hardships. Findings of this study are in congruent with prior studies (Mousa et al. 2020). Thirdly, the study hypothesized the relationship between ORES and OSUS and found that ORES is positively related to OSUS. According to these findings, organizations need resilience to help them go through difficult circumstances and even come out from setbacks and difficult conditions stronger than ever to be sustainable. The results are in line with previous research that demonstrated a substantial association between ORES and OSUS (Rai, Rai, and Singh 2021), and they also correlate with (Liang and Li 2023) assertion that ORES is essential to meeting the changing institutional demands brought about by sustainability. The last hypothesis focused on the mediator role of ORES in the connection between OL and OSUS. The study shows a statistically significant relations thus, the mediation hypothesis was supported. This finding proposes a more coherent perspective by indicating that the direct correlation between OL

and OSUS is modified by ORES. The study's results indicate that resilient organizations thrive in the present competitive environment, despite continuous change and uncertainty.

5.1 Implications

The paper elicits pertinent developments for both theory and practice. The findings highlight the need to expand the understanding of organizational learning as a dynamic capability. In theory, the findings of this study confirmed the significance of how acquiring knowledge and adaptability might enhance the long-term viability of an organization. Moreover, the findings contribute to the current empirical literature that confirms the substantial interconnectedness between organizational learning (OL), 'organizational resilience' (ORES), and organizational sustainability (OSUS). The study specifically highlights the mediating function of ORES in the link between OL and OSUS.

The research recommends that managers focus more on the dynamics of OL, including mentoring, counselling, workshops, and training opportunities. Prioritizing the most pressing issues and impending challenges in the current situation is necessary before turning to OL dynamics to solve them. PSOs should also cooperate with a variety of partner networks and stakeholder groups to reduce the negative effects of any anticipated disruption, especially those having a global influence like climate change. The study emphasizes the importance of balancing both tangible and intangible factors in achieving organizational sustainability. It suggests that assessing sustainability solely on organization structural attributes is insufficient. Instead, it recommends leveraging human resource management and development practices to implement structural and technological interventions to enhance the organization's steadfastness and sustainability. These factors encourage us to make further practical suggestions for strengthening OSUS in the face of increased environmental volatility. To deal with unanticipated issues brought on by environmental instability, an eco-socially responsive strategy should be adopted. These practices are based on learning redundancy, adaptability, and responsiveness, which allow the organization to endure unexpected events and absorb shocks.

6. Conclusion

Both organizational learning and sustainability are essential for an organization's long-term success. While gaining knowledge can strengthen an organization's capacity to withstand external pressures and anticipate environmental shocks, it also has the potential to cause it to engage in practices that are detrimental to its long-term viability. It is suggested that learning and sustainability be optimized simultaneously to remain on top of this circumstance. An organization will have a better chance of surviving in the environment if it does this and avoids wasting resources. Rethinking organization from an eco-social viewpoint is necessary to seek sustainability and resilience at the same time. Resilience is seen as a property of ecological systems that goes beyond the boundaries of the organization. The study aims to make a substantial contribution by examining the relationship between OL and OSUS, being an initial effort of its kind in the context of PSOs in Nigeria based on the author's knowledge. In addition, the authors introduced ORES, emphasizing its significance as an underlying mechanism.

7. Limitations and Suggestions for Future Study

This study faces several limitations just like any scientific inquiry. Firstly, the sample size ($n = 348$) aligns with the study's criteria, yet for future investigations, a recommendation stands to utilize larger sample sizes for enhanced result reliability. Secondly, due to the complexities in data collection in Nigeria, this study relied on a convenience sample. Conversely, using a random sample where feasible is advised to mitigate biases in representation and bolster data trustworthiness. Thirdly, following a cross-sectional design, this research, like many others, utilized various methods to assess Common Method Variance (CMV). To offer more conclusive insights into the relationships among variables, it is suggested that future studies explore alternative data collection methods and diverse measures. Essentially, future studies could employ qualitative or mixed methods to allow for triangulation. Equally, other variables could be applied as mediators or moderators to validate this finding and or explore its inconsistencies. Finally, the current study collected data within PSOs in Nigeria, an emerging economy, and acknowledges the limitations in generalizing conclusions due to contextual variations. Future research endeavors hold promise in replicating this study across diverse countries and contexts, facilitating a direct comparative analysis of PSOs among different nations as well as other sectors distinct from PSOs.

Conflict of Interest

The authors of this article assert that they have no conflicts of interest that could potentially impact or be perceived to impact the research and its results.

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Appendix A

Organizational Learning

S/No.	Variable	Items	Source
1	Organizational Learning	Our organization is prepared to invest to ensure that decisions are made on the basis of the most up to date information.	Şengül et al., (2019)
2	Organizational Learning	People are encouraged to move between different departments or try different roles within our organization to gain experience.	
3	Organizational Learning	In our organization, it is a priority that people have the information and knowledge they need to respond to unexpected problems that arise.	
4	Organizational Learning	Our organization actively encourages people to challenge and develop themselves through their work	

Organizational Sustainability

S/No.	Variable	Items	Source
1	EcoSus1	Obtains the greatest possible benefits.	Irfan et al., (2018)
2	EcoSus2	Tries to achieve long term success.	
3	EcoSus3	Improves its economic performance.	
4	EcoSus4	Ensures its survival and success in the long run.	
5	SocSus1	Are committed to improve the welfare of the communities.	
6	SocSus2	Actively participates in social and cultural events.	
7	SocSus3	Plays a positive role in the society	
8	SocSus4	Provides fair treatment to its employees.	
9	SocSus5	Provides training and promotion opportunities for employees.	
10	SocSus6	Helps to solve social problems	
11	EnvSus1	Environment Protects the environment.	
12	EnvSus2	Environment Reduces its consumption of natural resources	
13	EnvSus3	Environment recycles.	
14	EnvSus4	Environment communicates public about its environmental practices.	
15	EnvSus5	Environment Exploits renewable energy in a productive process compatible	
16	EnvSus6	Environment conducts annual environmental audits.	
17	EnvSus7	Environment participates in environmental certifications.	

Organizational Resilience

S/No.	Variable	Items	Source
1	Agility	Rapidly takes action as changes occur in the environment.	Kantur Deniz & Arzu Iseri-Say, (2015)
2	Agility	Sets other alternatives in order to take advantage of unfavorable conditions.	
3	Agility	Are agile in taking required action when needed	
1	Robustness	Stands straight and preserves its position.	
2	Robustness	Is successful in generating diverse solutions	
3	Robustness	Shows resistance to the end in order not to lose	
4	Robustness	Does not give up and continues its path	
1	Integrity	Is a place where all the employees engaged to do what is required from them	
2	Integrity	Is successful in acting as a whole with all of its employees.	