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Building Institutional Resilience Through Sustainable Facility Management in South African Vocational Education

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Abstract:

This research aims to examine how sustainable facility management (SFM) practices can contribute to institutional resilience in South African vocational education institutions (SAVEIs). Similarly, identify the critical environmental, social, and economic indicators of sustainability for improving operational continuity, flexibility, and long-term institutional performance in the vocational education sector.

The Systematic Literature Review (SLR) methodology was adopted to synthesize current studies on sustainable facility management and institutional resilience. Thus, peer-reviewed articles published between 2010 and 2025 were selected from scientific databases, which include Scopus, Web of Science, and ScienceDirect. Keyword mapping and thematic analysis were employed to identify existing patterns, structures, and conceptual connections relevant to the South African context.

The study was built on secondary data from peer-reviewed literature reviews that ignore local concerns or leading-edge post-pandemic practice in (SAVEI). Future empirical studies on a framework for the implementation of sustainable facility management for vocational education are crucial. This study investigates the nexus between institutionally resilient and sustainable facility management in SAVEI and hence contributes to technical and academic knowledge by developing an integrative conceptual framework that can be applied to inform facility managers, education administrators, and policymakers to enable sustainable, resilient learning environments.

JEL:
I21; I28;
Q01; M10

Keywords:

Building institutional, facility management, resilience, sustainable, vocational education

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1. Introduction

There is a greater demand for resilient and sustainable school buildings these days amid global environmental pressure, economic instability, and organizational transformation. School FM has broadened its own remit from the reactive role of undertaking repair work to sustainability-driven interventions as an effort to enable institutions to be reactive and add value to long-term operational efficiency. Sustainable Facility Management (SFM) aligns environmental sustainability, social justice, and economic efficiency in facility management with institutional goals and international agendas of sustainability, such as the United Nations Sustainable Development Goals (SDGs) (UNESCO, 2022). In addition, despite this developing interest, vocational education colleges are a less-researched area of scholarship from a sustainability perspective, and particularly within developing economies like South Africa. Although there has been a lot of effort put into sustainable practice within state schools and universities (Zvavahera, 2024; Williams, 2021; Simmonds & Le Grange, 2019). These are empirical and theoretical evidence for the role of SFM in institutional resilience found mainly within vocational training institutions. The supply and quality of resources and infrastructure can be exceedingly diverse. These studies aim at environmental sustainability efforts such as energy efficiency or waste management, without a proper focus on constructing the strategic and organizational aspects of resilience, such as flexibility, continuity planning, and risk management on facilities.

The literature is mainly resilience and sustainability as independent concepts that are not connected to each other, and not as interdependent systems affecting the performance of institutions. Fewer studies have attempted to synthesize these ideas into a similar model to be used for application within school buildings, much less several such situated processes in the contexts of South African technical high schools, where difference in investment for infrastructure, culture, and policy interpretation is the norm (John et al., 2018; Gwabavu et al., 2023). Synthesis of evidence to verify the relationship between vocational education resilience outcomes and SFM practice takes top priority in research. Furthermore, with more interest in sustainability and resilience currently within the higher education system, there is little empirical research on the application of sustainable facility management practice to build institutional resilience within South African TVET colleges. Most of the available literature refers to universities or public buildings in general and does not consider the specific operating, financial, and environmental conditions under which TVET colleges operate. This knowledge gap is noteworthy in that vocational colleges are at the forefront of skill formation and economic transformation in South Africa. Therefore, this research shows that sustainable facility management as a driver of institutional resilience not only constructs theory but also informs policymaking on sustainable management of educational facilities. Lastly, a systematic review of local and international literature is critical to identify intervening factors for the institutional resilience that is enhanced by facility management, particularly in the context of constrained resources.)

2. Conceptual Framework Narrative

Conceptually, the study is supported by South African institutional resilience and Isolated Sustainable Facility Management practice for vocational training. The conceptual framework takes the theoretical assumptions of sustainability theory and

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resilience thinking to include systems, adaptive capacity, and long-term institutional survival (Folke et al., 2016; Nelson et al., 2020). The integration of economic, social, and environmental sustainability in facility management practice provides TVET institutions with operational resilience, together with sustainable performance. The conceptual structure thus brings SFM onboard as a way of operating and strategic institution resilience in an era of environmental uncertainty, fiscal constraint, and evolving society expectations.

2.1 Pathway of Environmental Sustainability

Sustainability facility management practices refer to those that reduce environmental impact and improve environmental performance throughout the life cycle of the assets. They involve energy efficiency, renewable energy use, minimization of waste, and incorporation of green design (Nielsen et al., 2016; Zuo & Zhao, 2014). In TVET institutions, SFM interventions ensure the conservation of resources for water-saving, energy-saving, recycling, and improving indoor environmental quality (Eromobor, 2018; Mukwevho, 2023). Green building practice adoption gives an organization the advantage of reduced dependence on contracted services, reduced business downtime caused by slowdown that comes with limited resources, and delivery of environmental compliance as policy through the mode of the Green Star South African rating system (Hasim et al., 2021; Opoku & Lee, 2022). Climate-resilient infrastructure also encompasses shock absorption to climate exposure risk and adaptive infrastructure support to remain strong enough to withstand sequential delivery of education in case of environmental shock (Argyroudis et al., 2022; Mujahid, 2023). Environmental stewardship under SFM also facilitates other ecological balances and longer operating stability for vocational schools.

2.2 Economic Sustainability Pathway

Economic sustainability is sound financial management to attain institutional effectiveness and sustainability. In SFM, it is life-cycle costing, avoidance of maintenance, and sound investment in assets for the lowest life cycle cost of ownership for the long term (Kostetska et al., 2020). Economic sustainability with SFM for economically poor TVET institutions will avoid maintenance backlogs, optimize functional life of assets, and optimize return on investment (Lăzăroiu et al., 2020; Benlaria & Almawishir, 2025). Institutionalization of financial resilience is met with cost-saving design, low-cost acquisition, and asset performance management (Chukwuma-Eke et al., 2022). The practices make institutions resilient to financial adversity, avoid excessive dependency on unsustainable finance, and achieve optimal long-term financial sustainability (Marwa, 2023). Economically sustainable SFM also provides the platform for optimum use of limited funds being spent on strategic projects in a manner that ensures quality delivery of vocational training even during an economic crisis.

2.3 Social Sustainability Pathway

The social sustainability pathway is the human and social aspect of facility management and encompasses inclusivity, accessibility, health and safety, and stakeholder engagement (Staub, 2025). Social sustainability of vocational schools means providing safe, accessible, and inclusive environments that encourage collaboration, well-being, and learning productivity (Grum & Kobal Grum, 2020).

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SFM practice that is socially and value sustainable establishes institutional resilience through the establishment of user satisfaction by connecting with society and culture towards joint responsibility for facility maintenance (Raiden & King 2021). Health, safety, and accessibility faculties establish institutional responsiveness through their capacity to achieve learning resilience in case of disruption, like pandemics or building collapse (Koh et al., 2020). Socially sustainable TVET learning environments create social cohesion, social engagement, and social trust. These are good pillars of quality education systems that lead to sustainability.

2.4 Integrative Mechanism

Facilities management relies on the integration of institutions' economic, social, and environmental dimensions of sustainability. SFM offers an integrative mechanism in driving operational practice to strategic sustainability results (Okoro 2023). Through convergence of policies, leadership by managers, and processes of operational improvement, institutions can be able to strengthen adaptive capacity and learning mechanisms (Bröchner et al., 2019). Institutional learning mechanisms that are part of climate-resilient FM systems allow institutions to transform and develop physical capital into climate-resilient capital that can survive environmental, economic, and social traumas (Long, 2021; Saxer, 2023). The synergy strategy develops SFM into an institutional resilience driver that becomes a resilient sustainability practice that can survive educational continuity more, reducing risks, and keep evolving without being constrained by sustainability (Choudhury, 2021). Briefly stated, this conceptual framework harmonizes with how synergistic utilization of environmental, economic, and social strands of sustainability necessitates SFM to remain perpetual and dynamic. In SDGs, SDG 4 (quality education), SDG 9 (industry, innovation, and infrastructure), and SDG 11 (sustainable cities and communities), vocational education campuses are located at the drivers of sustainable development nexus of South Africa (Velazquez, 2025).

3. Linkage to the Systematic Literature Review (SLR)

This way-finding conceptual model is likewise a way-finding model for the Systematic Literature Review (SLR) method. Three roads to sustainability and economic, environmental, and social thematic filters are the three roads where the chosen literature will be read. During the conduct of SLR, research will be coded and named based on how they feed into the three roads. The conjoining will yield convergences, interrelations, and gaps among the disciplines, in the attempt to bring a profound understanding of how sustainable facility management as an organization incorporates vocational education institutional resilience in general. The model, therefore, guarantees homogeneity of analysis, aids comparative evaluation, and is the benchmark for a context-specific model of resilience to be used in South African vocational institutions.

3.1 Theoretical Foundation of SFM

This is a framework based on three interlinked theoretical models: Resilience Theory, the Triple Bottom Line (TBL) Framework, and Systems Thinking. Resilience Theory is the theoretical framework on which the explanation of how institutions stay stable in shock, learn to adapt to evolving conditions, and stay operational as long as the disturbance persists. Adaptation, rebounding, and

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elasticity are emergent characteristics of resilient institutions in Resilience Theory. Resilience here means vocational institutions' ability to keep operating, continue offering services, and bounce back from a crisis after effective management of facilities.

Table 1: Summary of "Building Institutional Resilience Through Sustainable Facility Management in South African Vocational Education"

Reference	Application/Relevance to the Study
Argyroudis et al. (2022)	Supports digital transformation for resilient FM systems
Benlaria & Almawishir (2025)	support mediation discussion on economic–green practice links
Bröchner, Haugen & Lindkvist (2019)	Useful in a literature review to discuss future-oriented FM
Choudhury (2021)	Use for discussion on institutional learning for resilience
Eromobor (2018)	Supports empirical SA evidence base
Folke et al. (2016)	Core foundation for the conceptual framework
Grum & Kobal Grum (2020)	Used to justify social sustainability indicators
Gwabavu, Michell & Shakantu (2023)	Essential for contextual grounding in SA
Hasim et al. (2021)	Use for the comparative sustainability indicator framework
Kostetska et al. (2020)	Use to support governance/inclusive FM argument
Lăzăroiu et al. (2020)	Supports SFM performance discussion
Long (2021)	Use for resilience funding policy context
Marwa (2023)	Could support the financial management dimension if needed
Mujahid (2023)	Use for comparative resilience practices
Mukwevho (2023)	Supports the energy/water sustainability section
Nelson et al. (2020)	Aligns with model structure
Nielsen, Sarasoja & Galamba (2016)	Foundational literature in FM
Opoku & Lee (2022)	Use in intro/conceptual framework.
Raiden & King (2021)	Supports social value/resilience links
Saxer (2023)	Use for local-level resilience discussion
Staub (2025)	Useful for linking FM, design & social value
Velazquez (2025)	Use for institutional linkage with SDGs
Zuo & Zhao (2014)	Foundational background for environmental FM
Zvavahera (2024)	Supports the institutional sustainability context

Triple Bottom Line (TBL) Approach informs the sustainability component of the research through its attention to interrelations between economic, environmental, and social performance. TBL, as an analysis system, views SFM practices as either the reduction or elimination of returns on sustainability programs to ecological performance and economic welfare, and sustainability. Systems Thinking offers a comprehensive approach to educational institutions as comprehensive, interdependent systems. It offers an end-to-end understanding of interdependence between facility management and institutional process, policy, and stakeholder dynamics in establishing resilience outcomes. It makes it possible to construct a framework with interdependences, cross-dimensional interactions, and feedback loops among sustainability trajectories. These theoretical bases alone and in combination contribute to the research conceptuality by connecting the facility management concept with a thrust toward sustainability to building processes of resilience for South African vocational education complexes.

3.2 Conceptualisation of the SFM

Sustainable Facility Management (SFM) is a coordinated operation, maintenance, and planning of physical resources, assets, and infrastructure that aims to enhance long-term environmental stewardship, social well-being, and economic performance. It incorporates principles of sustainability into planning, operation,

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and maintenance processes in institutional buildings as a way of reducing resource consumption, minimizing environmental impacts, and enhancing user satisfaction. For education, SFM goes beyond maintenance to include energy efficiency, reducing waste, water conservation, and secure learning environments. Therefore, aligns with the international agenda on sustainability. In SDGs for quality education (SDG 4), sustainable cities and communities (SDG 11), and climate action (SDG 13) are significantly contributing to implementation.

In South African vocational training, SFM is the foremost institution of resilience through the method of making the facilities operate, become resilient, and still function efficiently despite fiscal, environmental, or functional stress. TVET colleges also have the additional challenge of taking over skills development amid budget constraints and aging infrastructure. Institutionalization of sustainable facility management practice enables these institutions to achieve optimum benefit from resources, enhance the learning environment, as well as minimize risk towards disruption like power outage, maintenance backlog, or climatic disruption. Situating SFM here puts it not just as a maintenance function, but more strategically as an institutional driver towards sustainability, continuity, and resilience.

3.3 Relationship between Sustainable Management and Facility Management

Facility management and sustainable management complement one another as both share a goal of optimising organisational assets' performance and lifespan for environmental, social, and economic harmony. Facility management provides the operating systems through which the resources, the buildings, and the infrastructures are run, and sustainable management provides the principles through which these operations can be made environmentally sustainable, socially responsible, and economically viable. Sustainable management, in turn, informs facility management action and planning — from the productivity of short-term maintenance to long-term value capture and resilience. Mainstreaming sustainable management of facility management across South African vocational training supports long-term decision-making for reduced wastage of resources, optimising energy efficiency, healthy learning environments, and institutional resilience. Thus, sustainable management is not an aside to facility management but the strategic route whereby facility management achieves long-term institutional and societal sustainability benefits.

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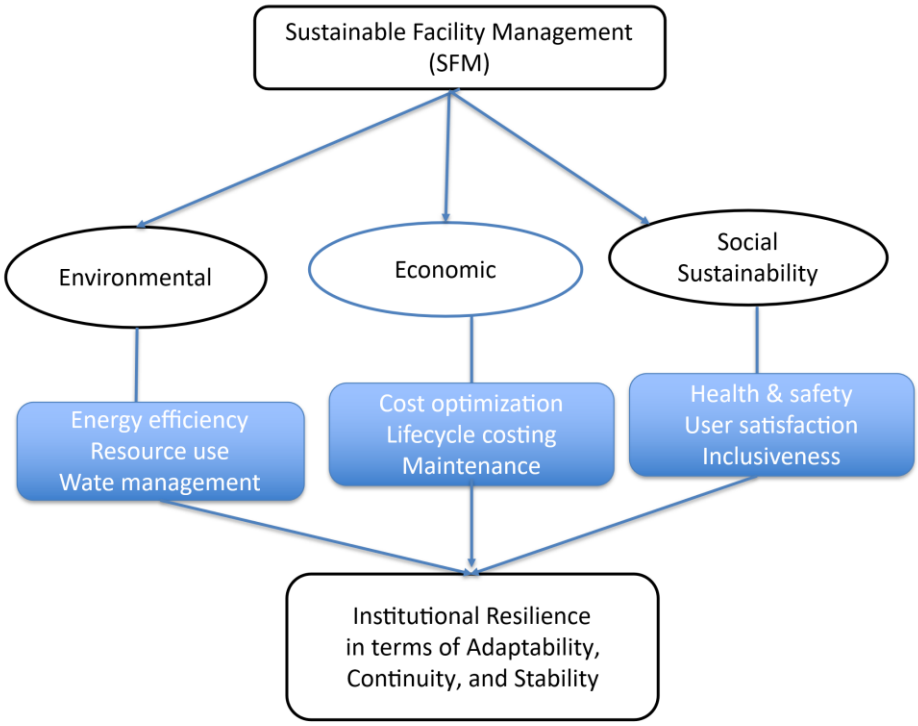
Figure 1: Shows the conceptual framework of the sustainable facility management serves as a multidimensional driver of institutional resilience



4. Methodology

Research adheres to the Systematic Literature Review (SLR) process in exploring how Sustainable Facility Management (SFM) contributes to developing vocational education institutional resilience in South Africa. SLR process facilitates systematic synthesis of extant studies as a systematic sequence of discovery, evaluation, and summarizing findings of published research. Review adheres to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guideline to enhance transparency, reproducibility, and quality.

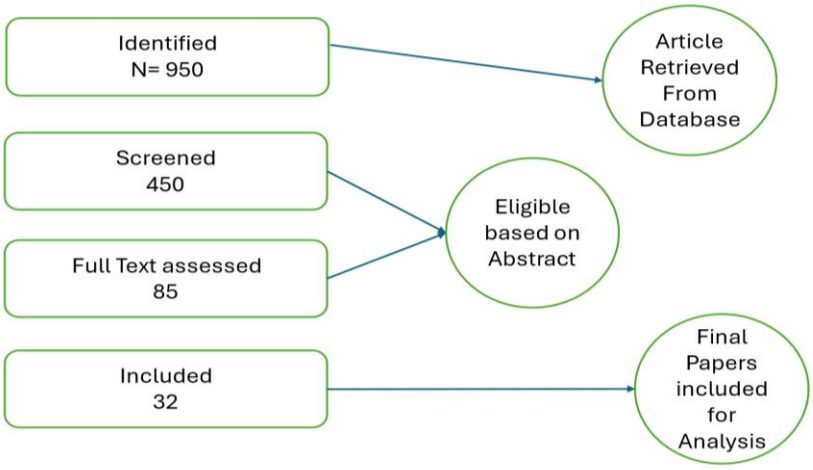
4.1 Data Sources and Search Strategy

Peer-reviewed journal articles between 2010 and 2025 were retrieved from top-ranked databases like Scopus, Web of Science, ScienceDirect, and Google Scholar. Keywords and search terms applied were permutations of {"sustainable facility management," "institutional resilience," "vocational education," "educational facilities," "South Africa,"} and {"sustainability practices in education."}. Boolean operators (AND, OR) and truncation techniques were used to get the best coverage and relevance. To ensure quality and relevance, the study was screened based on the inclusion of Journal articles, conference papers, and book chapters dealing with sustainable facility management, resilience, or both for educational buildings; studies of higher or vocational education institutions; publications in English. Also, editorial pieces, non-scholarly literature, studies not conducted in educational buildings, and publications with no full-text access.

4.2 Data Extraction and Synthesis

The above studies were coded and assigned to the environmental, economic, and social pathways of sustainability of the conceptual framework. Facility management strategy, sustainability practice, resilience outcome, and context of South African vocational institution-specific were the main variables that were established. The research was also thematically analyzed for patterns, gaps, and inter-relationships of the research upon which an enhanced understanding of how SFM builds institutional resilience could be established. Methodological quality, relevance, and credibility of studies included were evaluated using standard appraisal quality instruments such as clarity of aim of the study, suitability of the study design, and literature strength. Top-quality studies with outcomes that were more than the appraisal threshold were synthesized for final analysis. Thematic and narrative integration was utilized while combining the evidence. They integrated findings along economic, social, and environmental pathways. Cross-study comparison was done to emphasize the provision of cumulative evidence as well as research gaps. The method enables the formulation of a context-specific model of South African vocational education institutions' resilience from empirical and theoretical evidence found in the literature. This strategy ensures the stringent, systematic, and transparent examination of how institutional resilience interacts with sustainable facility management and provides a sound basis for scholarship and practice development.

Figure 2: Systematic Literature Review (SLR) of Sustainable Facility Management (SFM) towards vocational education institutional resilience in South Africa



5. Findings / Results

Systematic literature review revealed some of the most significant findings on how Sustainable Facility Management (SFM) contributes to institutional resilience in South African vocational training, classified under the three channels of sustainability in the conceptual framework.

5.1 Environmental Sustainability Pathway

The research puts considerable focus on the pivotal role of green practices in supporting the evolution of institutional resilience and promoting long-term

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operational sustainability. Empirical observation across various educational and organisational contexts attests that the institution of energy efficiency measures, renewable energy systems, water-conserving practices, and waste management practices in their entirety can not only curtail environmental degradation but also promote the adaptive capacity of the institutions (Nielsen et al., 2016; Zuo & Zhao, 2014). These efforts reduce risks, primarily by reducing exposure to the volatility of energy prices, material disruption, and carbon emissions legislation risk. Companies employing the green building concept and eco-efficient infrastructure realize significant gains in the form of operational continuity, cost-effectiveness, and stakeholders' trust, which are specific kinds of environmental impacts (Eromobor, 2018; Mukwevho, 2023). In contrast to all such developments at the global front, few empirical investigations within the published literature have focused on context-dependent application and implications of environmental sustainability and facilities management (SFM) practices for the South African Technical and Vocational Education and Training (TVET) context. Most of the work done so far is either theoretical or done in the setting of a developed economy, and policy and institutional settings are far from South Africa (Hasim et al., 2021; Opoku & Lee, 2022). Yet to be done locally to ascertain how ecological SFM indicators reflect resilience, efficiency, and long-term sustainability gain in the setting of a South African vocational training school. There is a need to fill this research gap immediately to be able to develop context-specific models aligned with the nation's unique socio-economic realities, infrastructure constraints, and national sustainability goals.

5.2 Economic Sustainability Pathway

Economic viability was always the top concern in offering future-ready and sustainable school facilities management. Literature implications within domestic and international literature recognize that economic resilience in facilities management is never cost management but value optimization across the infrastructure lifecycle. Lifecycle costing, preventive maintenance, and long-lived infrastructure investment drive institutional fiscal well-being and risk aversion against premature asset obsolescence and business disruption. Empirical evidence indicates that evidence-based asset management systems in institutions provide measurable benefits of lower maintenance backlogs, improved predictability of operating costs, and improved return on investment on infrastructure (Lăzăroiu et al., 2020; Benlaria & Almawishir, 2025). This aligns with national goals of sustainability, including effective use of resources, prudent finance, and long-lasting infrastructure as the main drivers of socioeconomic advancement. But infrastructural constraints, which involve everything from outdated equipment and small-scale technical capacities to undercapitalized facilities, are still holding back the realization of such visions, particularly by the new economies. Undercapitalized vocational schools of instruction are likely to be overwhelmed by an inability to create a sense of making it harder to defer today's operating needs to long-term sustainability objectives. Therefore, there is a gap in research for studies that are seeking to examine the cost-benefit analysis and performance of institutions bringing Sustainable Facility Management (SFM) practices into the buildings (Chukwuma-Eke et al., 2022; Marwa, 2023). Future research will critically examine on what fronts economic sustainability alternatives are applicable in the situation of bounded budgetary funds and national sustainability policy, and international sustainable development paradigms. That will be significant in the building of

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adaptive, context-specific models of economics that include alternatives to sustainability in infrastructure development and education policymaking.

5.3 Social Sustainability Pathway

Sustainability of social practice was the major determinant of sustainability for the vocational learning institutions. Social practices such as strict health and safety, inclusion for all, inclusive stakeholder engagement, and ongoing monitoring of user satisfaction were excluded from the paper as extra dimensions to be included to ensure the production of safe, accessible, and responsive learning spaces (Grum & Kobal Grum, 2020; Staub, 2025). Organizations had practiced participative leadership wherein academic, student, and non-academic staff took part in decision-making when the matter concerned facilities and operations management. Organizations were more adaptable in adaptive capacity and organizational flexibility towards disturbance, pandemics, or resource scarcity. In addition, the practices create trustworthiness, channels of communication, and a sense of responsibility to one another between institutional actors, thereby fostering social cohesion and collective problem-solving based on institutional resilience. Nonetheless, enhanced sensitivity to such relations is the norm; endemic signs of a knowledge gap were identified by the systematic review in empirical studies offering relations between direct measures of SFM interventions and social sustainability and measurable outcomes of resilience for vocational education institutions as an exception (Koh et al., 2020; Raiden & King, 2021). This calls for context-driven research to extrapolate the translation of indicators of social sustainability, such as participation, well-being, and inclusiveness. This will enhance the institutional resilience performance indicators. There is a need for future studies to utilize mixed methods in their investigation and derivation of hybrid models that merge social sustainability and resilience frameworks to school building control.

5.4 Integrative Insights

Integration illustrates that economic, environmental, and social paths towards sustainability are mutually dependent and lead to cross-reinforcing institutional determinants of collective resilience. Institutions governing all three paths in an integrated manner to encompass them fully become more adaptive, operationally resilient, and resilient over the long term, particularly in the face of external pressure and systemic stress. Three-dimensional integration leads to a culture of learning, continuous efficiency of resources, and stakeholder involvement rights inherent in the assurance of institutional performance in states in transition (Bröchner et al., 2019; Okoro, 2023; Long, 2021; Saxer, 2023). More policy emphasis on Sustainable Frameworks for Management (SFM) in South African education and training is important. Most studies discuss sustainability, either environmental stewardship, economic sustainability, or social responsiveness, but never connect both indicators. In this context emerges an infinitely potent imperative emerges to carry out research to develop a contextualized, develop model that will be able to encompass the SFM assumptions and resulting South African vocational education institution realities (Choudhury, 2021; Velazquez, 2025). The imperative can be evidence-informed policy options to stimulate institutional resilience, hatch sustainable capabilities development, thereby advancing the nation's agenda of inclusive and sustainable development.

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Summary of Research Gaps

1. Empirical literature on South African vocational schools is lacking.

2. Separate independent research on environmental, economic, and social sustainability.

3. Little literature exists on the gap between social sustainability practice and quantifiable indices of resilience outcomes.

4. No context-specific SFM models for vocational training in the developing world.

6. Conclusion

The study confirms that sustainability facility management (SFM) is not only a managerial imperative but also a strategy for driving TVET institutional resilience in South Africa. The study confirms that long-term sustainability and flexibility of TVET institutions correlate with the degree to which institutions undertake values of sustainability in planning, operating, and managing physical facilities. By modern facility management practice, proactiveness, energy saving, handling of resources, preventive maintenance, and stakeholders' participation, organisations can adopt strategic risk, support learning facility continuity, and install responsiveness to socio-economic turmoil.

Specifically, the research contributes to educational knowledge in building resilience by filling the theory-practice gap of sustainability in facilities management. The research shows that resilience is not an infrastructure function but a decision-making culture of an institution anchored on sustainability-informed decision-making, human capacity building, and inclusive governance. The institutional resilience driver variable is an interaction between human capital, physical infrastructure, and natural resource management.

At the policy level, the study urges the Department of Higher Education and Training (DHET) and management councils for TVET to instil sustainability norms, incorporate SFM factors in the design of campuses, and invest in funding models where preventive maintenance holds a larger percentage than reactive fix-it cultures. Generally, sustainable facility management is a viable strategy for shock-proofing South African vocational schools, maintaining business continuity, and achieving balanced learning returns in uncertainty. Building resilience through SFM is therefore a development necessity and strategic bet on safeguarding vocational education against an increasingly dynamic socio-technical context.

7. Recommendations for Future Studies

While the current research is a valuable addition to the construct of institutional resilience through sustainable facility management (SFM) of South African vocational education institutions, certain elements need to be examined more thoroughly to further expand and consolidate knowledge bases. The longitudinal design is a critical factor that would enable researchers to scrutinize cause-and-effect and determine escalating intervention effects compared to relying on cross-sectional analysis. Cross-sectional comparison by levels of education and geographical cross-sectional comparison for vocational training schools, technology universities, community colleges, or private training schools would also enhance knowledge regarding variation in context and best practice. The data would enlighten the policy makers and managers of institutions in making targeted

strategies towards diversity in South African educational institutions. Furthermore, quantitative models and simulation experiments will be carried out for quantifying the contribution of sustainable indicators of facility management, such as energy efficiency, water conservancy, waste minimization, and space utilization, towards institutional resilience dimensions (adaptive capacity, risk reduction, and continuity of service). Combining statistics and system-dynamics modelling will enhance predictability and inform evidence-based policy development. Additionally, future research must examine socio-behavioral factors, how individuals' worker participation, leadership buy-in, and stakeholder engagement shape the adoption of SFM plans and behavior.

Mix-method research involving surveys, interviews, and focus groups can provide additional information pertaining to detractors and enablers of behavior. Moreover, research efforts on digital transformation in facility management, such as smart building technology, data-driven decision-making, and information systems for sustainability, foresee an encouraging way forward towards institutionally robust institutional development. Priority is to be assigned to continued research on the use of technology for the strengthening of monitoring, maintenance effectiveness, and performance in the environmental aspect of resource-scarce vocational institutions, more specifically for South Africa. Lastly, policy-informing research would have to reconcile the challenge of formulating a consensus national plan in line with South Africa's vision of sustainable development, TVET policy reform, and climate-resilience policy. Such models would be capable of incorporating sustainability imperatives, stimulating accountability, and facilitating capacity development for institutional facilities managers. Overall, follow-up studies would have to deal with complete, longitudinal, comparative, and technology-enabled studies linking facility management sustainability with evidence of institutional resilience. The study would develop a theory and, additionally, offer solutions that are practicable for propelling South Africa's vocational education and training forward amidst transforming environmental, economic, and social realities.

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