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Integrating Sustainability in Interior Retrofitting for Private Day School in Perspective with Project Management: A framework for Pune

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Abstract: ***This research investigates project management guidelines for implementing sustainable interior finishes in private day school buildings in Pune. In light of growing environmental concerns and the need for energy-efficient educational infrastructures, the study integrates project management strategies with sustainable design practices. It evaluates eco-friendly materials, waste reduction methods, and cost-effective lifecycle study to balance performance, durability, and environmental impact.***

The framework developed emphasizes adherence to Sustainability and local regulatory standards, ensuring that project outcomes not only meet aesthetic and functional requirements but also promote long-term environmental benefits. The proposed guidelines serve as a decision-making tool for architects, project managers, and school administrators, facilitating the planning and execution of interior finishing projects that are both sustainable and economically viable.

Keywords: Project management guidelines, sustainable interior finishes, tabulating materials, school administrators, comprehensive roadmap, five-phase retrofit.

I. AIM, OBJECTIVE, SCOPE AND LIMITATION

A. *Aim*

To Develop a structured framework for Integrating Sustainability in Interior Retrofitting for Private Day School in Pune.

B. *Objective*

- To understand and analyse the existing interior conditions for private day school buildings in Pune.
- To propose a project management-based retrofitting model for integrating sustainability in Interior Finishes.

C. *Scope*

- Typology – Institutional – Private Day School Interiors
- Focus – Integrating Sustainable Interiors

D. *Limitation*

While the study provides project management guidelines, the actual implementation may depend on institutional policies, financial feasibility, and administrative willingness.

II. INTRODUCTION

Schools play aimportant role in shaping young minds, and the physical environmentsignificantly impacts student's learning outcomes. Traditional interior finishes often contain harmful chemicals, contribute to indoor air pollution, and have a high environmental footprint. Sustainable green interior finishes offer a healthier and eco-friendly alternative, ensuring that school environments support both academic performance and long-term sustainability goals.

III. LITERATURE REVIEW

Pune, also referred as the "Oxford of the East," as it is recognized as one of India'seducational hubs. The city boasts a long-standing tradition of academic excellence, home to prestigious universities, renowned private schools, and leading research institutions.
With more than 2,000 private schools, Pune offers a wide range of educationacross multiple curricula such as CBSE, ICSE, IB, IGCSE, and the Maharashtra State Board, catering to a diverse student population.

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Sustainable design is the approach to creating buildings and spaces that reduce environmental harm while supporting social and economic well-being. This design philosophy emphasizes the use of eco-friendly materials, energy efficiency, and the reduction of waste and pollution.

IV. PHYSICAL SURVEY

A. Regional Settings

Pune is a major metropolitan city in the western Indian state of Maharashtra, located on the Deccan Plateau at an elevation of 560 meters (1,837 feet) above sea level.

B. Location and area

Geographical Coordinates: 18.52°N latitude, 73.85°E longitude
Total Area: Approx. 331.26 sq. km

C. Urban and Suburban Expansion:

The eastern corridor (Hadapsar, Kharadi) is a rapidly developing IT hub.
The western corridor (Hinjawadi, Wakad) is dominated by IT parks and residential developments.

V. INFRASTRUCTURE AND SUSTAINABILITY IN PRIVATE DAY SCHOOL, PUNE

A. Increasing Demand for Sustainable Infrastructure –

With growing urbanization and pollution, Pune's educational institutions are adopting green building concepts to improve energy efficiency, air quality, and student well-being.

B. Government Initiatives & Policies for Sustainable Schools

The Maharashtra Energy Development Agency (MEDA) promotes green energy solutions in schools.

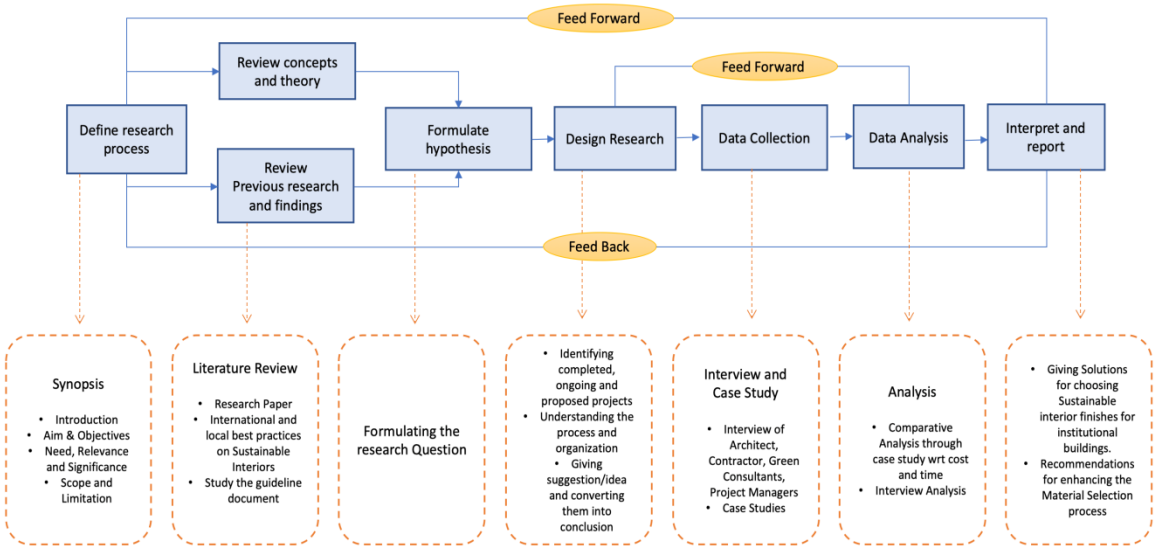
VI. RESEARCH METHODOLOGY AND RESEARCH PROCESS

Mixed Research Methodology–Both Qualitative and Quantitative Approach

- Qualitative Approach – Case Studies and Interviews with School administrative and Architects.
- Quantitative Approach – Material Matrix, Survey of School Designers.

Data Collection Tools – Site Observations, Green Rating Audits, Material Datasheets and Offline / Online Survey.

Research Process –



(Fig 1.2 Source Author – Reseach Methodology Chart)

VII. DATA ANALYSIS AND FINDINGS

A. User Needs:

- 78% of teachers have reported poor acoustics and lighting.
- 65% of students complain regarding thermal discomfort.
- 82% of staff agree that the interiors does affect student concentration and well-being.

B. Interior Components in Poor Condition:

- PVC flooring, low-VOC paints, and wooden furniture are outdated or damaged.
- Lighting lacks natural daylight integration.
- Ventilation and IAQ were below recommended standards in 3 out of 5 schools.

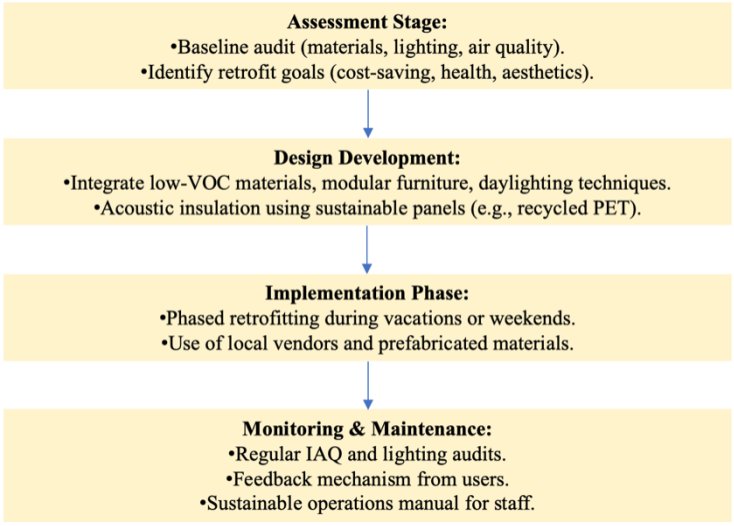
C. Barriers to Sustainable Retrofitting:

- Budget constraints and lack of planning.
- Lack of technical knowledge and awareness.
- Fear of disruption to academic operations and focus on functioning.

D. Design Gaps:

- Lack of zoning in the interior spaces
- Inflexible lighting schemes and indoor air quality planning
- No maintenance plan for interiors focusing on sustainability.

VIII. PROJECT MANAGEMENT APPROACH PROPOSED FRAMEWORK–



(Fig 1.3 Source Author – Proposed framework Chart)

IX. SUSTAINABLE INTERIOR FINISHES

Element	Sustainable Alternative	Benefits
Flooring	Linoleum / Bamboo / Cork	Biodegradable, low VOC, durable
Walls	Lime plaster / VOC-free paint	Natural insulation, moisture control
Lighting	LED + daylight harvesting	Energy savings, improved productivity
Furniture	Modular, FSC-certified	Space flexibility, eco-certification
Ceilings	Acoustic panels, exposed slabs	Reduced noise, thermal comfort

(Fig 1.4 Source Author – Sustainable Interiors Chart)

X. PILOT DESIGN CONCEPT

A. Key Actions :

- Cork flooring can be used to improve acoustics and indoor air quality

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- Solar-tube skylights for daylight harvesting indoors
- Replaced plastic laminate tables with bamboo ply
- VOC-free wall paints with educational infographics
- Modular storage for flexible classroom layouts.

B. Results (Approximate Values) :

- 25% reduction in lighting energy use
- 15% improvement in attention span (reported by teachers)
- Higher parent enrolment interest noted in annual feedback

XI. RECOMMENDATION

1) Schools should prioritize long-term sustainability while planning in their budgeting decisions, rather than concentrating solely on upfront expenses.
2) To support sustainable retrofitting government should promote by incentives and subsidies given to schools for implementation.
3) Additionally, training sessions should be organized to raise awareness among stakeholders about sustainable materials and environmentally responsible practices.

XII. CONCLUSION

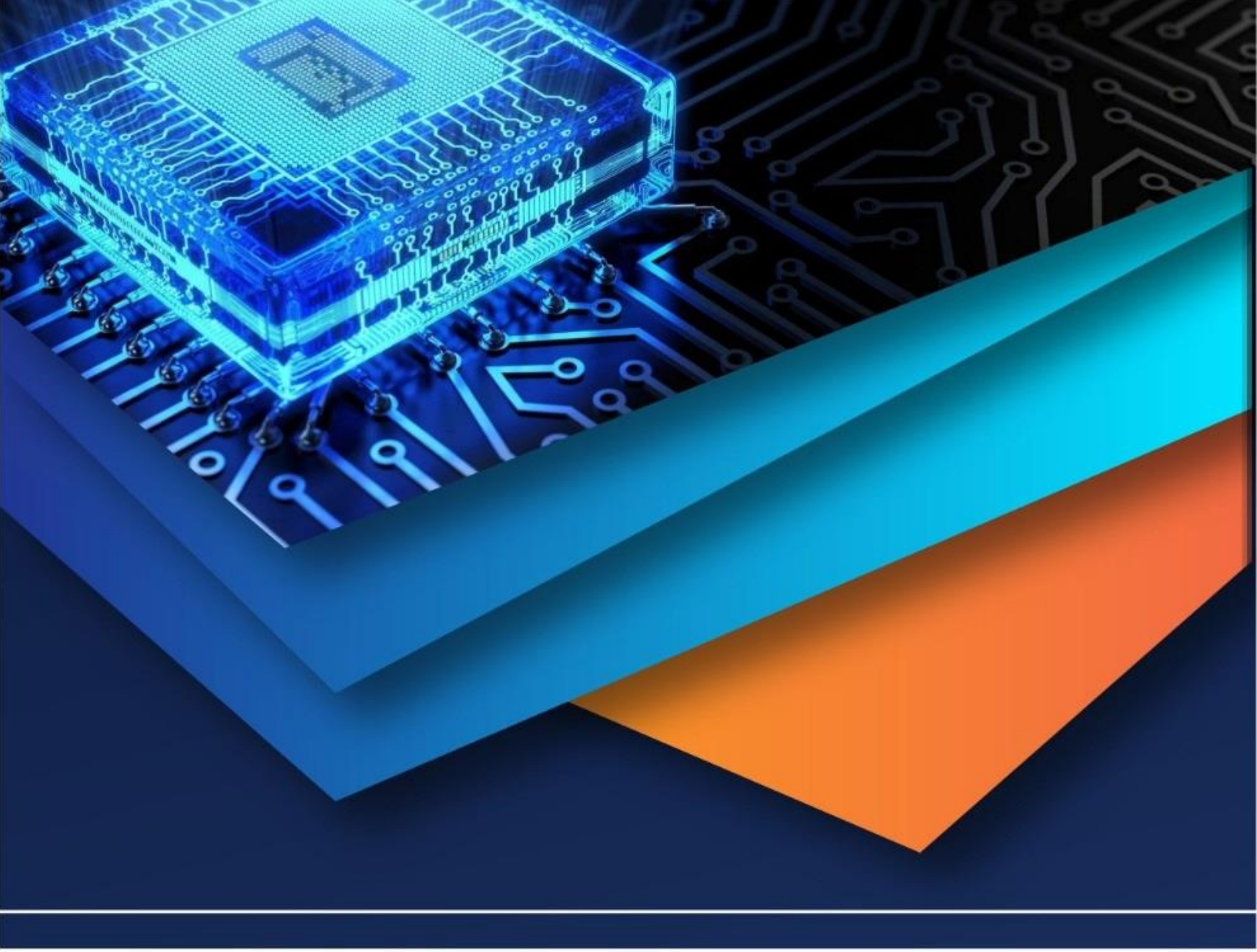
Sustainable interior retrofitting in private day schools is not just crucial for the environment, but it also helps save money in the long run. This study combines project management methods with the use of eco-friendly materials andfinishes and smart execution plans to create a clear path for effective and green retrofitting. The results can help school leaders and project managers make choices that are both sustainable and cost-effective.

XIII. ACKNOWLEDGEMENT

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REFERENCES

[1] Indian Green Building Council (IGBC), "Green Schools Guidelines," 2022.
[2] PMI – *PMBOK Guide: Project Management Institute*
[3] Environmental Protection Agency (EPA), "Sustainable Interior Materials," 2021.
[4] Kumar, A., & Sharma, R. (2020). "Lifecycle Cost Analysis of Green Building Materials," Journal of Sustainable Architecture.



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