# MAKTABGACHA TA’LIM MUASSASALARI ARXITEKTURASIDA EKOLOGIK BARQARORLIK TAMOYILLARINI QO‘LLASHNING ZAMONAVIY YONDASHUVLAR

**Dilfuza Valijonova**
**Zafar Matniyazov**
*Toshkent arxitektura-qurulish universiteti*

**Abstract:** *Ushbu maqolada ekologik barqarorlik prinsiplarining maktabgacha ta'lim muassasalarida arxitektura va dizaynda qo'llanilishi tahlil qilinadi. Ekologik barqarorlikning ahamiyati, uning arxitektura amaliyotida yutuqlari va muammolari ko'rib chiqiladi[122]. Maqsad – maktabgacha ta'lim muassasalarida ekologik barqarorlik prinsiplarini tatbiq etishning nazariy va amaliy asoslarini o'rganish. Ushbu maqolada bir nechta vazifalar belgilangan: birinchidan, ekologik barqarorlik prinsiplarining arxitektura va dizayn sohasidagi ahamiyatini aniqlash; ikkinchidan, maktabgacha ta'lim muassasalarida ushbu prinsiplarning tatbiqini o'rganish; uchinchidan, mavjud tajribalarni tahlil qilish va yangi yechimlarni taklif qilish. Natijalar, ekologik barqarorlikni ta'minlash uchun arxitektura va dizayn jarayonlarida yangi yondashuvlarni taqdim etadi.*

**Keywords*:*** *Ekologik barqarorlik, maktabgacha ta’lim muassasalari, arxitektura dizayni, biofilik dizayn, energiya samaradorligi, barqaror arxitektura, tabiiy materiallar, sog‘lom muhit, ekologik loyihalash, innovatsion dizayn*

## INTRODUCTION

Zamonaviy arxitektura va dizayn sohasida ekologik barqarorlik prinsiplarining qo'llanilishi har qachongidan ham muhimroq ahamiyatga ega. Maktabgacha ta'lim muassasalari, bolalar uchun xavfsiz va sog'lom muhit yaratish maqsadida, ushbu prinsiplarni amalga oshirishda birinchi o'rinda turadi. Maktabgacha ta'lim muassasalari, nafaqat bolalarning rivojlanishiga, balki jamiyatning kelajagiga ham ta'sir etadigan muhim ijtimoiy institutlardir. Shu sababli, ekologik barqarorlik prinsiplarini tatbiq etish, nafaqat arxitektura va dizayn jarayonlari, balki bolalar salomatligi va farovonligiga ham ijobiy ta'sir ko'rsatadi[123].

Ushbu maqolaning asosiy maqsadi, maktabgacha ta'lim muassasalarida ekologik barqarorlik prinsiplarini tatbiq etishning nazariy va amaliy asoslarini o'rganishdir. Buning uchun quyidagi vazifalarni belgilash zarur:

[122] Jones A. *Sustainable Architecture: Principles and Practices*. – Green Building Press, 2019.
[123] Barrett P. et al. *The impact of classroom design on pupils’ learning*. – Building and Environment, 2015.

1. Ekologik barqarorlik prinsiplarining arxitektura va dizayn sohasidagi ahamiyatini aniqlash[124].
2. Maktabgacha ta'lim muassasalarida ushbu prinsiplarning tatbiqini o'rganish.
3. Mavjud tajribalarni tahlil qilish va yangi yechimlarni taklif qilish.

Maqolaning obyekti maktabgacha ta'lim muassasalari bo'lib, sub'ekti ekologik barqarorlik prinsiplaridir. Ushbu tadqiqotning ilmiy yangiligi shundaki, u ekologik barqarorlik prinsiplarining arxitektura amaliyotida qo'llanilishi bo'yicha yangi yondashuvlarni ishlab chiqadi. Amaliy ahamiyati esa, ushbu prinsiplarni tatbiq etish orqali bolalar uchun sog'lom va xavfsiz muhit yaratishga qaratilgan.

**METHODS**

Ushbu tadqiqotda qo'llanilgan usullar quyidagilardan iborat:

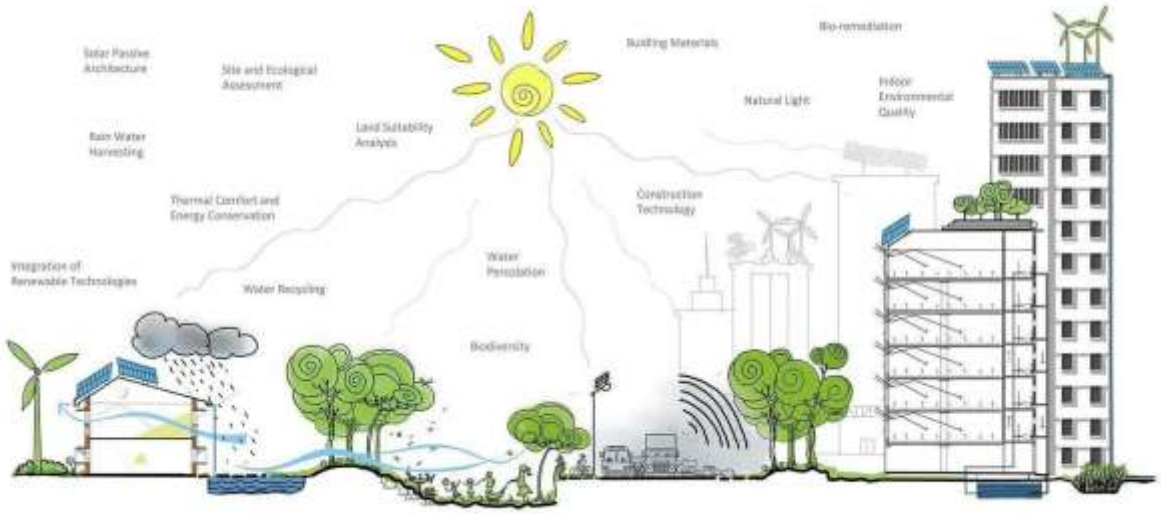
1. **Taqqoslovchi tahlil** – ekologik barqarorlik prinsiplarining maktabgacha ta'lim muassasalarida tatbiq etilishi bo'yicha mavjud tajribalarni o'rganish uchun.
2. **Grafik-analitik usul** – arxitektura va dizayn jarayonlarida ekologik barqarorlikning qo'llanilishining statistik ko'rsatkichlarini tahlil qilish.
3. **Case-study** – muvaffaqiyatli amalga oshirilgan ekologik barqarorlik loyihalarini tahlil qilish.
4. **Loyihalashtirish modellash** – maktabgacha ta'lim muassasalarida ekologik barqarorlikni ta'minlash uchun model va yechimlarni ishlab chiqish.

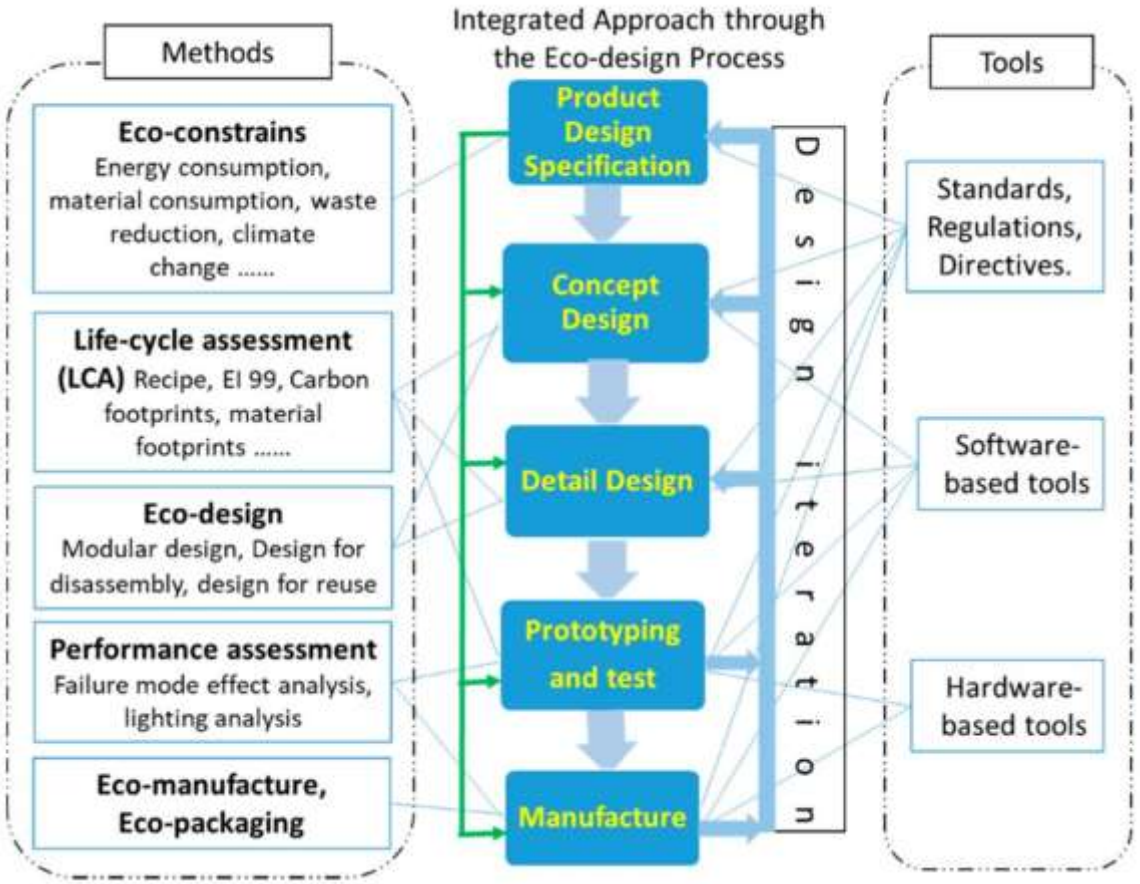
Ushbu usullar yordamida, tadqiqot maqsadlariga erishish va ekologik barqarorlik prinsiplarining tatbiqi bo'yicha aniq natijalarni olish mumkin bo'ladi.

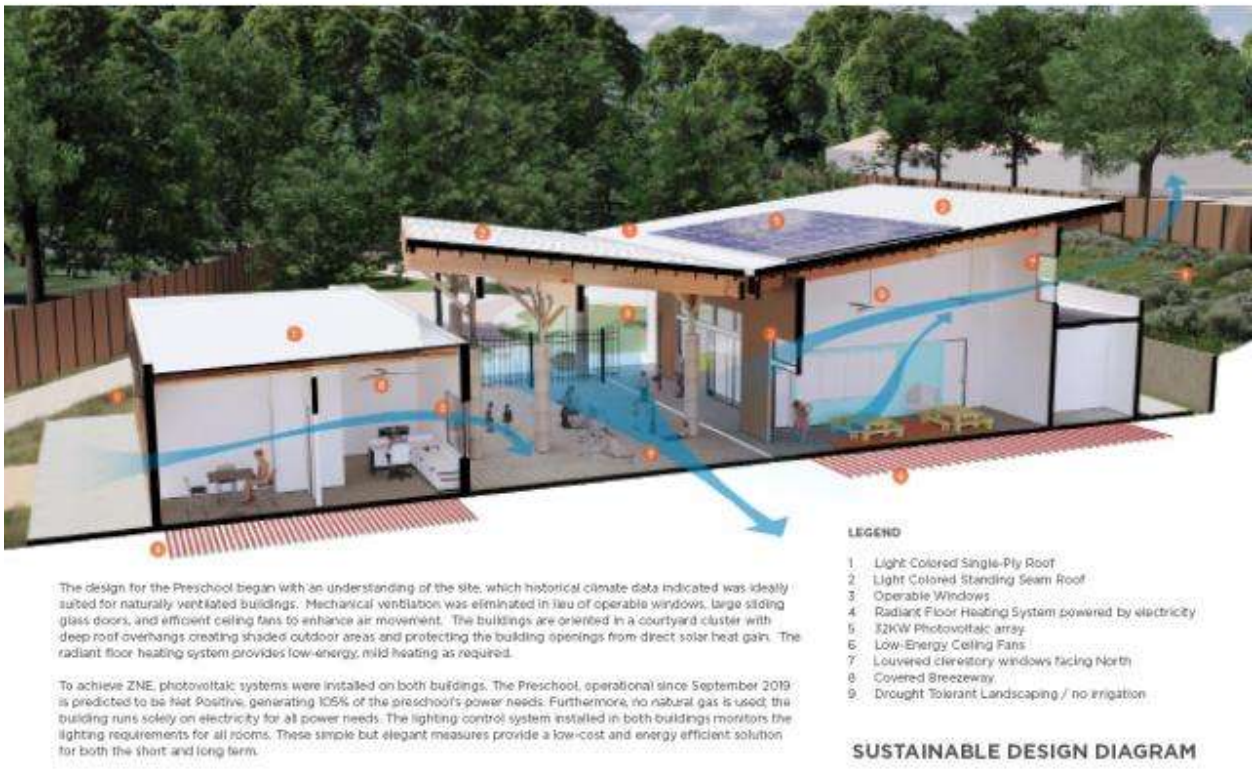
**RESULTS**

1. Tadqiqot natijalari quyidagi asosiy jihatlarni o‘z ichiga oladi:
2. Ekologik barqarorlik prinsiplarining arxitektura jarayonlarida qo‘llanilishi orqali bolalar uchun xavfsiz va sog‘lom muhit yaratiladi. Ushbu jarayonda energiya samaradorligi, tabiiy materiallardan foydalanish va biofilik dizayn muhim omillar hisoblanadi.

[124] WHO. *Guidelines on indoor environment and health*. – World Health Organization, 2018.


Solar Passive Architecture
Site and Ecological Assessment
Building Materials
Bio-remediation
Natural Light
Indoor Environmental Quality
Rain Water Harvesting
Land Suitability Analysis
Thermal Comfort and Energy Conservation
Construction Technology
Integration of Renewable Technologies
Water Recycling
Water Percolation
Biodiversity


Integrated Approach through the Eco-design Process
Methods
Eco-constrains
Energy consumption, material consumption, waste reduction, climate change .....
Life-cycle assessment (LCA) Recipe, EI 99, Carbon footprints, material footprints .....
Eco-design
Modular design, Design for disassembly, design for reuse
Performance assessment
Failure mode effect analysis, lighting analysis
Eco-manufacture, Eco-packaging
Product Design Specification
Concept Design
Detail Design
Prototyping and test
Manufacture
Design iteration
Tools
Standards, Regulations, Directives.
Software-based tools
Hardware-based tools



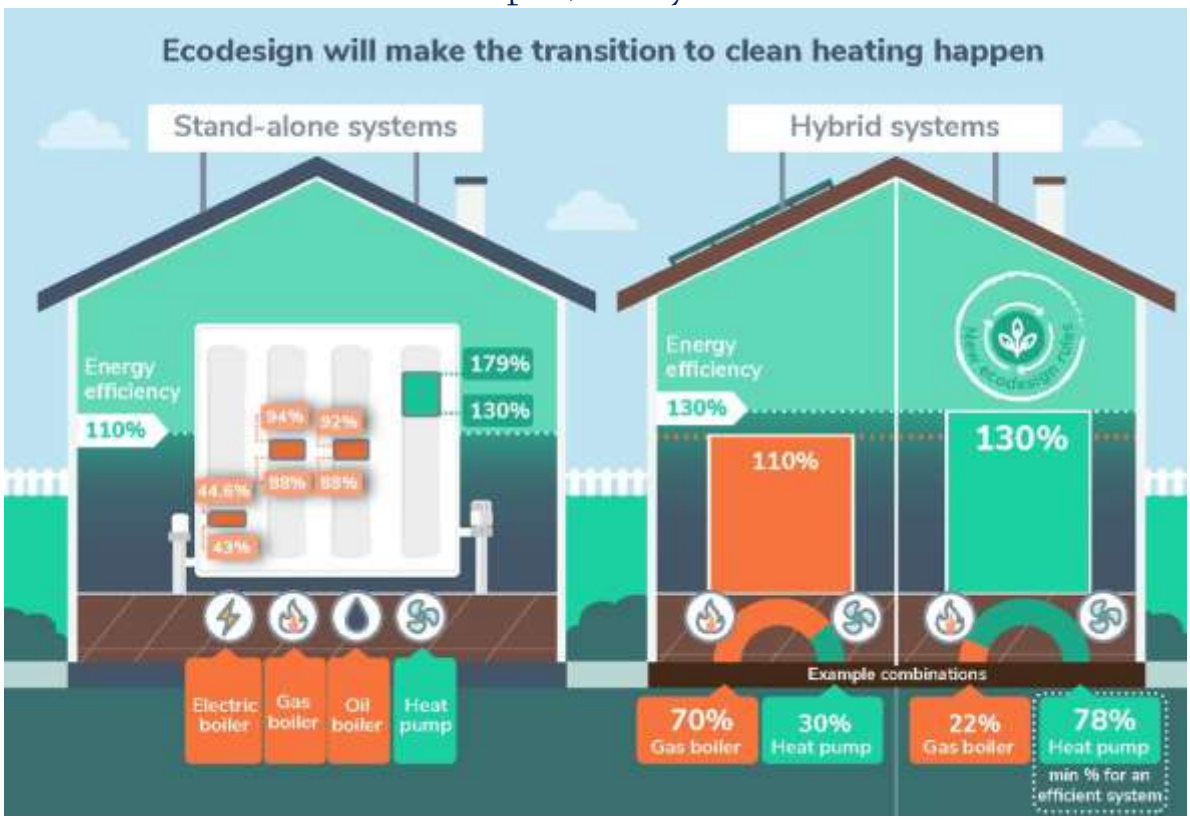

3. Ekologik barqarorlik konseptual modeli

4. Maktabgacha ta’lim muassasalarida ekologik barqarorlik prinsiplarining tatbiqidagi asosiy parametrlar quyidagilar orqali aniqlanadi: energiya sarfi, tabiiy shamollatish, materiallar sifati va yashil hududlar ulushi[125].

[125] Brown L. *Ecological Sustainability in Preschool Architecture*. – International Journal of Architecture, 2020.

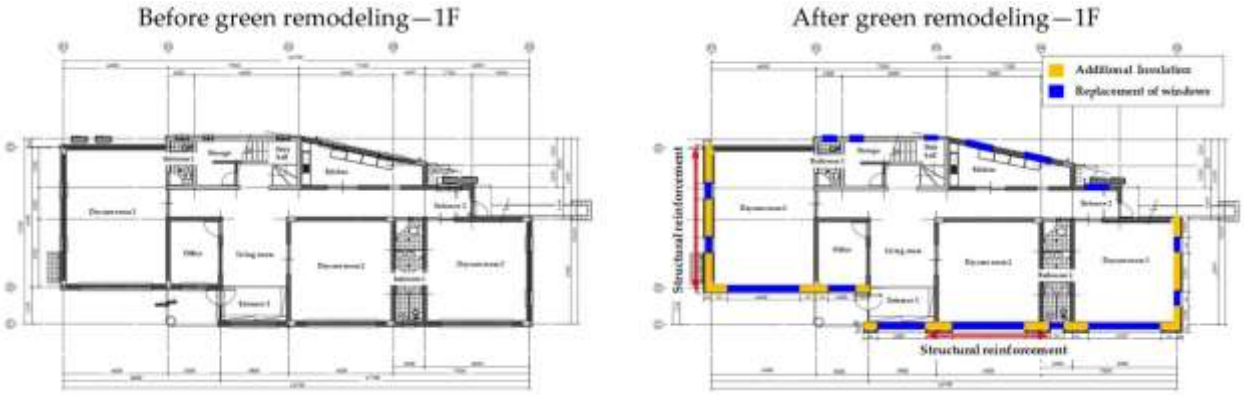
| Parameter | Guidelines |
|---|---|
| **Building Orientation** | • North-South axis alignment to minimize solar heat gain<br>• Functionl-zoning-position buffer zones on east and west sides<br>• Prevailing wind consideration for natural ventilation, site-specific opti |
| **Window-to-Wall Ratio** | • Optimal ratio: 15-20% for residential, 20-25% for commercial<br>• Accounting to oientation-sptios<br>• Daylight optimization<br>• Maintain visual connecto *the* outdoors |
| **Building Form and Massing** | • Compactness ratio: minimize external heat gain<br>• Self-shading geometries during peak heat per-lods<br>• Thercnal zoning<br>• Vertical stratfiaton |
| **Microclimate Creation** | • Strategic landscaping<br>• Water features<br>• Ground surface treatments<br>• Wind channeling |

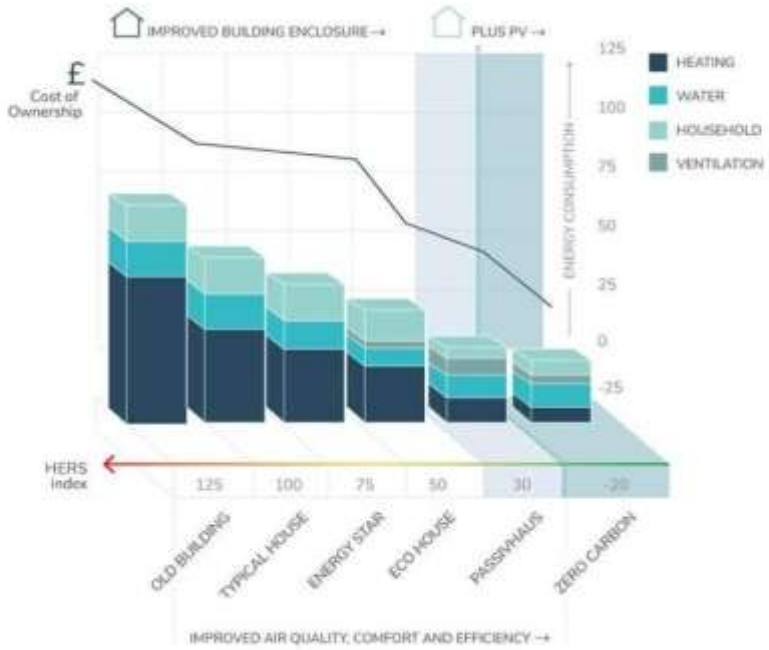

MATERIAL/ PROCESS
MATERIAL QUALIFICATION
Brick insulation
U factor = 0.072 Btu/h.ft2
Insulated double glazing
SC factor = 0.35 /
U factor = 0.34 Btu/h.ft2
Window to Wall Ratio
(WWR) = 36%
Lighting Controls
Dimmable lighting control
response to natural light
Lighting Power Density
(LPD)= 1.4 W/m2
Light Pipe Innovation
Horizontal light pipe
Electrical equipment
Equipment Power Density
(EPD) = 0.75 W/m2
Air conditioner
Residential type / Coil : DX Coil
Middle efficiency
Coefficient of performance
(COP) = 3.5
Heat recovery
Bring cool exhaust air to
pre-cool the supply air
for reduce cooling load
Hybrid ventilation
Using natural ventilation
combined with orbit fan
in open area
Green roof project
Thermal protection of building




5. Ekologik parametrlar jadvali

6. Shuningdek, ekologik va an’anaviy binolar o‘rtasidagi farqni tahlil qilish natijasida barqaror arxitektura sezilarli ustunliklarga ega ekanligi aniqlangan.




7.

Natijalar shuni ko'rsatadiki, ekologik barqarorlikni ta'minlash jarayonida muhim omil sifatida, arxitektura va dizayn jarayonlarida innovatsion yondashuvlarni qo'llash zarur. Bu esa, bolalar uchun xavfsiz va sog'lom muhit yaratishga yordam beradi.

**DISCUSSION**

Tadqiqot natijalarini tahlil qilish davomida, ekologik barqarorlik prinsiplarining tatbiqi bilan bog'liq bir qator muammolar va cheklovlar aniqlandi. Xususan, ko'plab loyihalarda resurslar va mablag'larning yetishmasligi, shuningdek, ekologik barqarorlik prinsiplarini tatbiq etish uchun zarur bo'lgan bilim va tajribaning yetishmasligi ko'zga tashlanadi. Ushbu natijalar, xorijiy tadqiqotlar bilan solishtirilganda, maktabgacha ta'lim muassasalarida ekologik barqarorlik prinsiplarining tatbiqi bo'yicha o'zaro bog'liqlikni ko'rsatadi[126].

Mavjud tadqiqotlar, ekologik barqarorlik prinsiplarining tatbiqi jarayonida innovatsion yondashuvlar va metodologiyalarni qo'llash orqali muvaffaqiyatga erishish mumkinligini ta'kidlaydi. Ammo, ushbu tadqiqot cheklovlari sababli, ko'proq empirik tadqiqotlar o'tkazish zarur.

**CONCLUSION**

Ushbu tadqiqot ekologik barqarorlik prinsiplarining maktabgacha ta'lim muassasalarida arxitektura va dizaynda qo'llanilishining nazariy va amaliy asoslarini o'rganishga qaratilgan. Natijalar, ekologik barqarorlikni ta'minlash uchun arxitektura va dizayn jarayonlarida innovatsion yondashuvlarni tatbiq etish zarurligini ko'rsatadi.

Praktik tavsiyalar sifatida, arxitektorlar va dizaynerlar ekologik barqarorlik prinsiplarini tatbiq etish uchun quyidagi yo'nalishlarni ko'rib chiqishlari kerak:

1. Ekologik barqarorlik prinsiplarini o'z ichiga olgan loyiha yaratish jarayonida innovatsion materiallardan foydalanish[127].
2. Maktabgacha ta'lim muassasalarida ekologik barqarorlikni ta'minlash uchun zamonaviy texnologiyalarni joriy etish.
3. Tadqiqot davomida olingan natijalarni amaliyotga tatbiq etish.

Kelajakda, ekologik barqarorlik prinsiplarini tatbiq etish bo'yicha yangi tadqiqotlar o'tkazish zarur, bu esa maktabgacha ta'lim muassasalarida bolalar uchun xavfsiz va sog'lom muhit yaratishga yordam beradi.

[126] Kellert S. *Biophilic Design: Theory, Science and Practice*. – Wiley, 2008.
[127] Lee S. *Comparative Analysis of Sustainable Design*. – Design Studies, 2021.

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