한국의 어린이 건강과 에너지 효율성을 기반으로 한 친환경 리모델링을 위한 우선순위 전략 프레임워크

A strategic framework for green remodeling based on children's health and energy efficiency in South Korea

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Abstract : Promoting energy-efficient retrofit of existing buildings to achieve carbon neutrality by 2050 is critically vital and challenging. The bulk of outdated educational buildings in particular are of grave concern since they are not only have a significant negative impact on the environment but also dangerous to inhabitants'health. This study laid the groundwork for understanding the connection between occupant health and energy efficiency. This study proposes a prioritized strategic GR framework in South Korea's aging preschools. The possible prospects and levels of development in the GR plan are identified by this evaluation. Policy markers, educators, and other key stakeholders may help to create a more sustainable and healthy environment by putting the recommended framework into practice.

키워드 : 그린 보수, 에너지절약, 공중보건, 탄소중립
Keywords : green retrofit, energy saving, public health, carbon neutrality.

1. Introduction

1.1 Background

Energy demand is increasing worldwide, which is driving energy crisis and climate change. Buildings contribute to 37% of worldwide greenhouse gas (GHG) emissions and account for 36% of total final energy consumption[1]. South Korea government has implemented various building sector[2]. The plan focuses on Digital New Deal and Green New Deal national strategies for the post-COVID era[3]. South Korea has declared its intentions to achieve a 32.8% emissions reduction in the building sector by 2030 and attaining carbon neutrality by 2050[4]. This paper proposes a framework for Green Remodeling aimed at enhancing energy efficiency and improving children's health in older daycare centers across South Korea throughout propose prioritized measures. The GR process can also serve as an educational opportunity to instill in children the significance of environmental stewardship and sustainable living practices, and promoting a healthy learning environment.

1.2 Correlation of energy performance elements and the effects of energy efficiency on daycare centers and children's health

Previous literature has highlighted the relationship between energy-effective buildings on Children's health and learning in the kindergarten building. The effect of green remodeling while considering zero-energy building certification on various building factors: Heating, Cooling, Domestic Hot water, Ventilation and Lighting. By employing appropriate strategies, energy effectiveness can be designed. It is important to prioritize the well-being of children, considering their increasing reliance on energy for educational, recreational, and social activities.

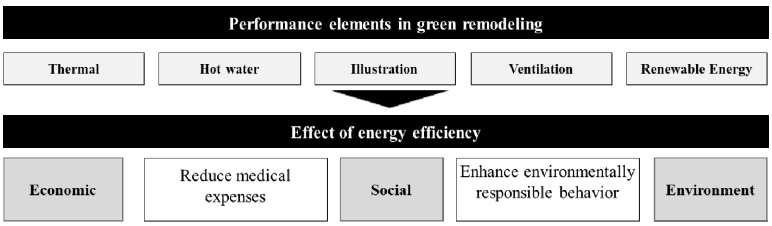

Figure 1. Correlation of energy performance elements and the effects of energy efficiency on children's health

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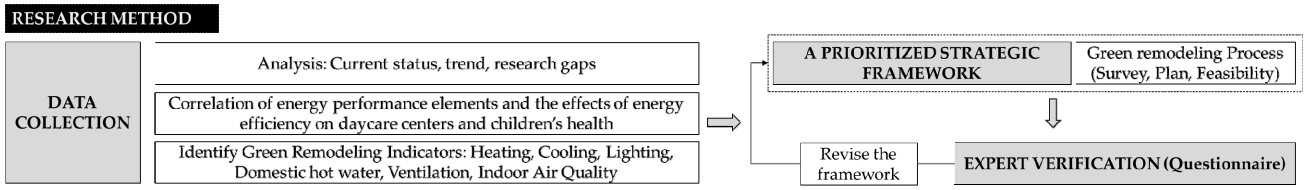
2. Research method

2.1 Research flow



2.2 A prioritized strategic framework for green remodeling in South Korea's daycare centers

Table 1. Summary of the three approach groups and a prioritized strategic framework for Green Remodeling

	Strategies	Technical items	Energy Factors
Passive	Thermal Prevention (Envelop Insulation, Airtightness)	Window/ Door Replacement	H, C, L
		Roof	H,C
		Insulation Reinforcement	H,C
		Painting Replacement	H,L
	Natural Lighting and control	Optimal daylighting	L,H
	Natural ventilation system	Increase natural ventilation: Wind cooling system	C,V
Active system (Mechanical equipment and Technologies)	Heating Equipment	High-efficiency EHP replacement	H,C
	Cooling equipment		
	Water & DHW	High-efficiency condensing gas hot water boiler	H, DHW
	Ventilation system	Waste heat recovery ventilation system	H,V
		Air filtering	V
	Lighting system	Efficiency lightening Equipment _LED replacement	L, H
	Technology application (Install the integrated controller and automatic device)	Heating & Domestic Hot Water (DHW) Monitoring	H, DHW
		Automatic Door	H,C
		Monitoring Thermal environment using Sensor	H,C
		Measure light using sensors, controller and automatic device	L
		HVAC control system	H,C,V
Renewable energy	Solar energy, wind energy, Biomass system), Kinetic	Install the solar PV panel, lighting Photovoltaic system	R

* H- Heating, C- Cooling, DHW- Domestic Hot Water, V- Ventilation, L- Lighting

3. Conclusion

This paper proposes a prioritized strategic framework to significantly improve energy efficiency of these daycare centers through a combination of passive, active, and renewable energy retrofit measures. It contributes to the overall comfort and productivity of children and educators . The results of this study give the future of the renovation sector direction and inspiration, and they have the ability to significantly lower global greenhouse gas emission.

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