EFFECT OF DAYLIGHT HARVESTING ON BUILDING LIGHTING ENERGY CONSUMPTION

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DECLARATION OF THE CANDIDATE AND SUPERVISOR

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Abstract

In the beginning, humans used architecture to protect their selves from nature and unsteady environmental conditions. However, with time, modern buildings become more complex, which need to fulfil the different types of functions [1]. So, humans started to concern more about the visual and thermal comfort and energy efficiency of modern buildings.

Daylight is the perfect source of light that human has adapted with respect to evolution. So, daylight harvesting is highly concerned in modern building designs in order to enhance occupants' visual and thermal comfort and reduce artificial lightings costs. Although this should be wisely done since entering direct sunlight to the building envelope could cause visual and thermal discomfort, increasing heat load which causes additional air conditioning costs.

The effect of daylight harvesting depends on many parameters. Building location, building orientation, building geometry, seasonal variation of the sun, window to wall ratio, window glazing parameters, Solar heat gain coefficient, Window height, Building interior parameters, shading devices, and solar control mechanisms are a few major parameters, which affect the outcome of daylight harvesting.

This research discusses the effect of Seasonal variations, building geometry, window to wall ratio and window orientation for a typical office building situated in tropical countries on daylight harvesting.

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List of Abbreviations

NZEB	Nearly Zero Energy Buildings
BIPV	Building Integrated Photovoltaics
WWR	Window to Wall Ratio
SHGC	Solar Heat Gain Coefficient
HVAC	Heat Ventilation and Air-Conditioning
DNI	Direct Normal Irradiance
USA	United State of America
PV	Photovoltaics
ASF	Adaptive Solar Façade
COP	Coefficient of Performance
LPD	Lighting Power Density