

# IMPLICATION STUDY OF DAYLIGHTING ON ENERGY EFFICIENCY IN OFFICE BUILDING

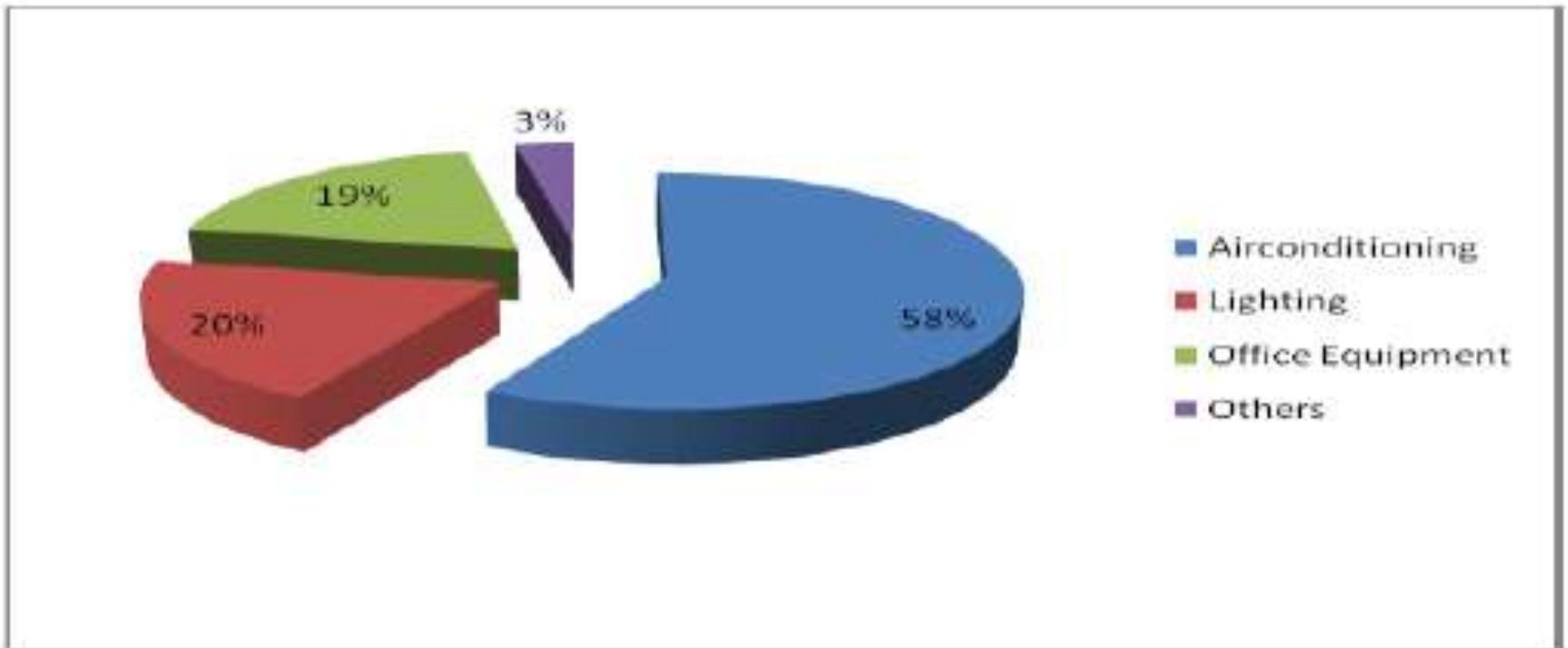
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# Introduction

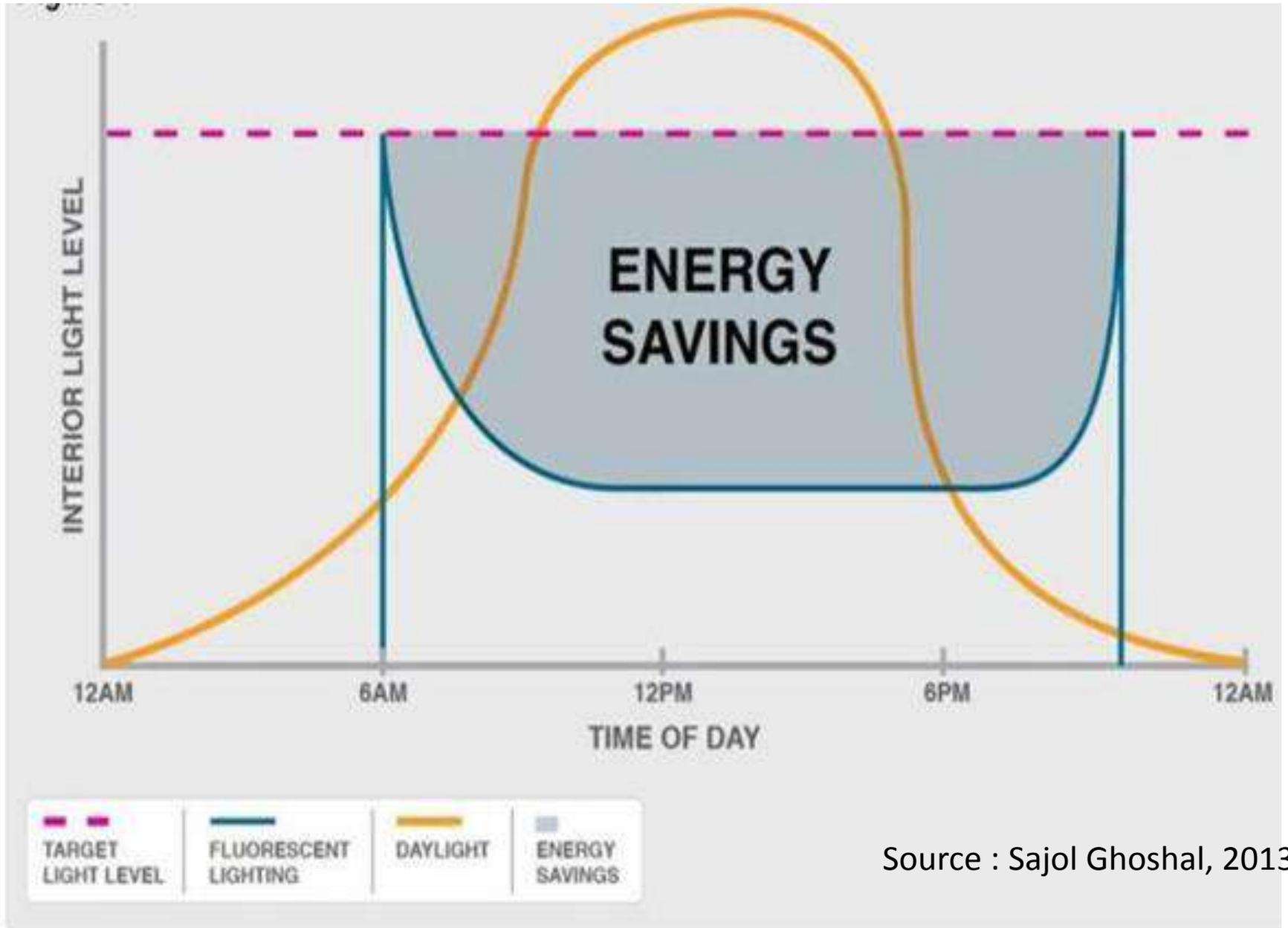
- Lighting design can consider as an important issue for buildings which can involves about natural and artificial lights as well as to meeting energy distribution goals.
- Efficiency of daylighting in terms of saving energy or saving money not only measured with economic or photometric methods but also can measured by using psychological and aesthetic benefits which mean another hand that can translate into financial benefits.

# Problem Statement

- In Malaysia, the demand for electricity is growing in tandem with its GDP growth. The growth forecasted for electricity has shown an increase of 3.7% in 2012 compared to 3.2% in 2011, driven by strong demand from the commercial and domestic sectors.
- Lighting contributes significantly to the energy use and operating costs in business. Increasing the price of energy highlight the need to reduce the cost of lighting.



Source : S.Sadrzadehrafiei et al, 2011



Source : Sajol Ghoshal, 2013

# Aim

- To study the implication of day lighting on energy efficiency in office building.

# Objectives

- To analyze the efficiency of day lighting techniques and technology have on office building.
- To investigate and identify the day lighting design in office building.
- To study the applications of day lighting design in office building.
- To identify the visual comfort of daylight to the building user.

# Influencing Factors

## **1. Physical Environment**

- Conditions of Skylights

## **2. Building Designs**

- Building Orientations
- Sizes and Design of Openings
- Glazing Materials
- Shading Designs

## **3. Human Factor**

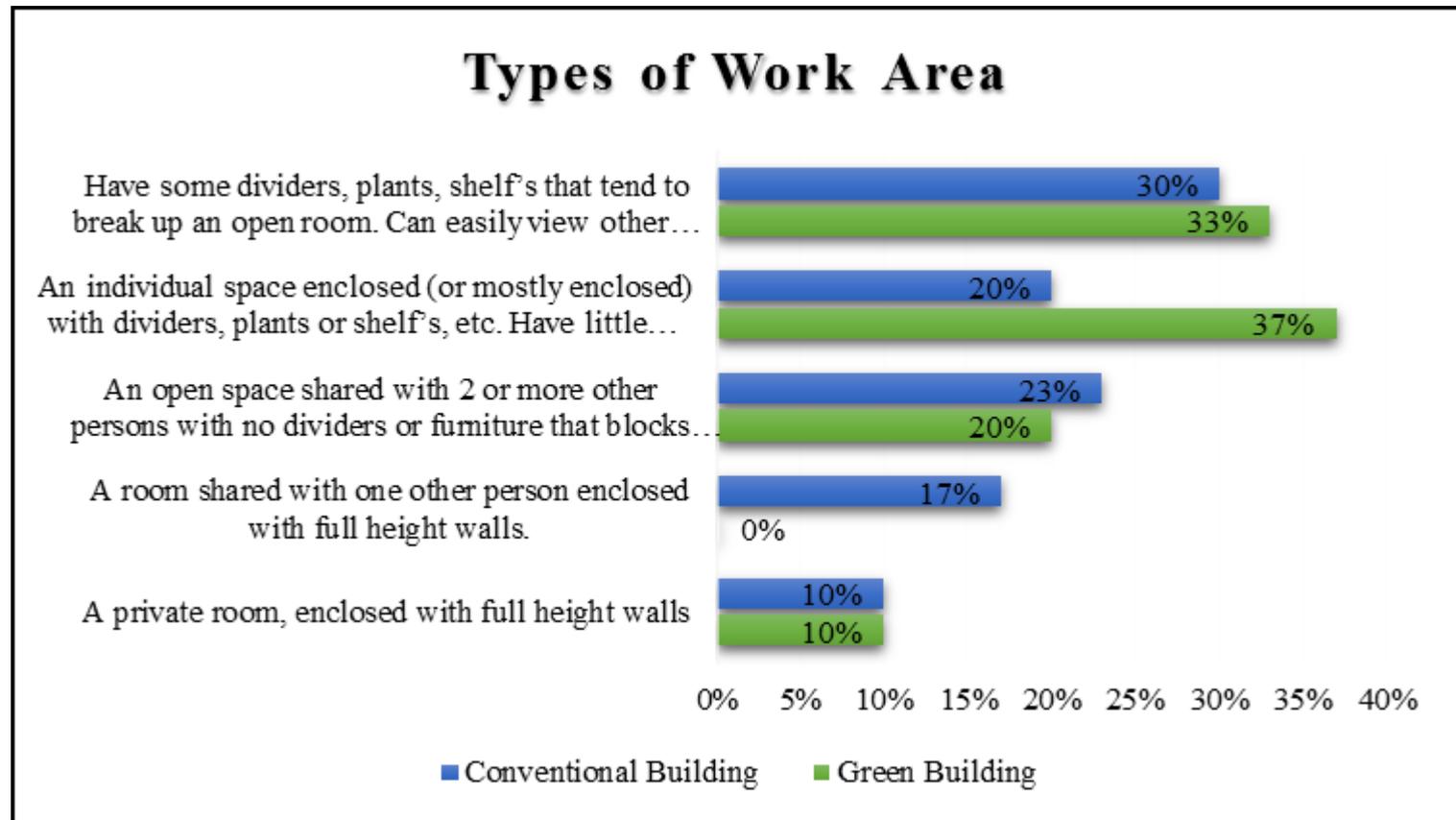
- Visual Requirements

# Research Methodology

- In this research, the method of data collection are carried out through Questionnaire survey (Quantitative) and In-depth interview (Qualitative).
- Target group – 30 Users of the office buildings from each building studied.
- Buildings Studied - Diamond Building (Green Office Building) and One Media Tower (Conventional Office Building).

# Results of Analysis

- Working Environment

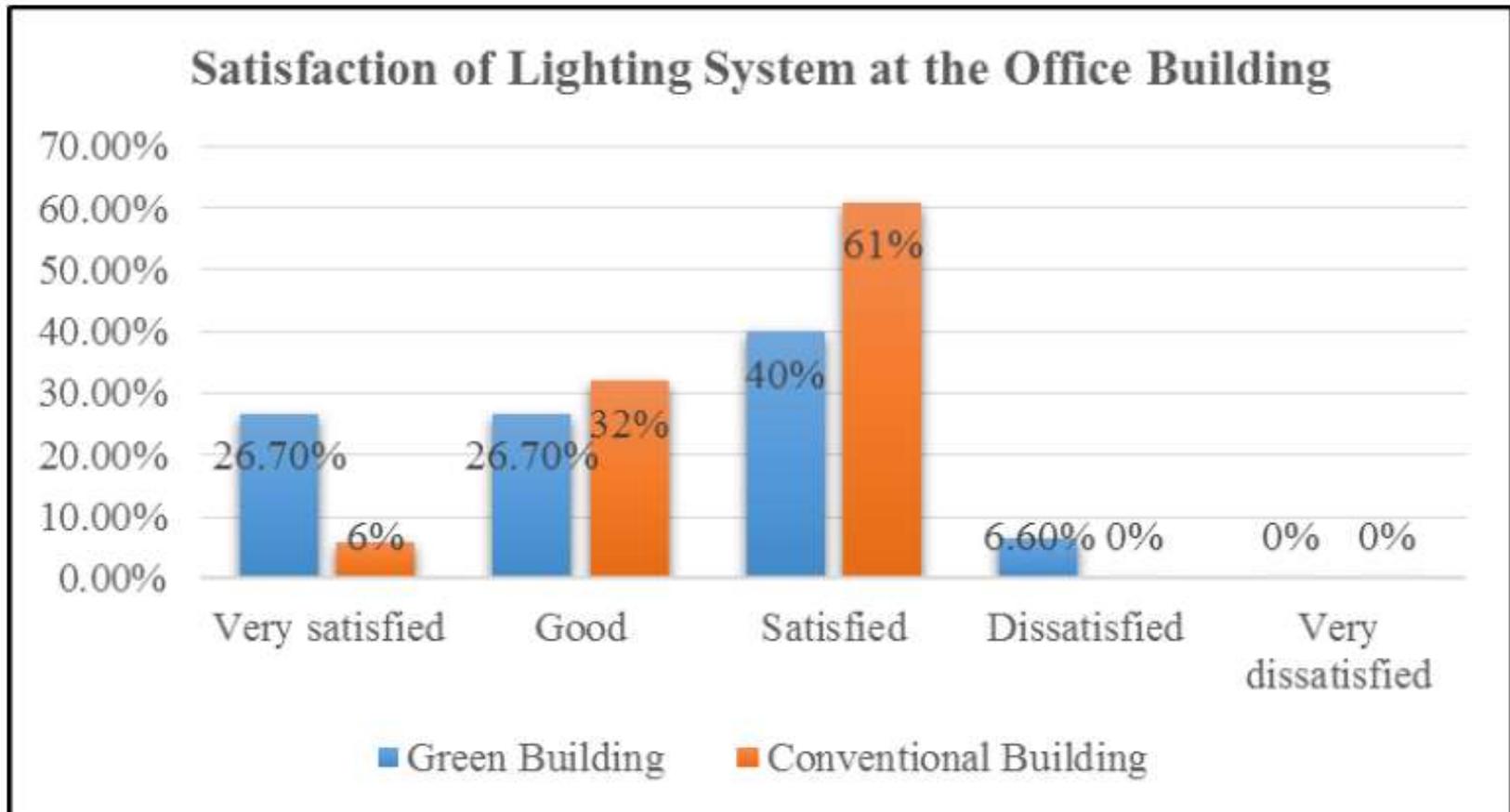


# Results of Analysis

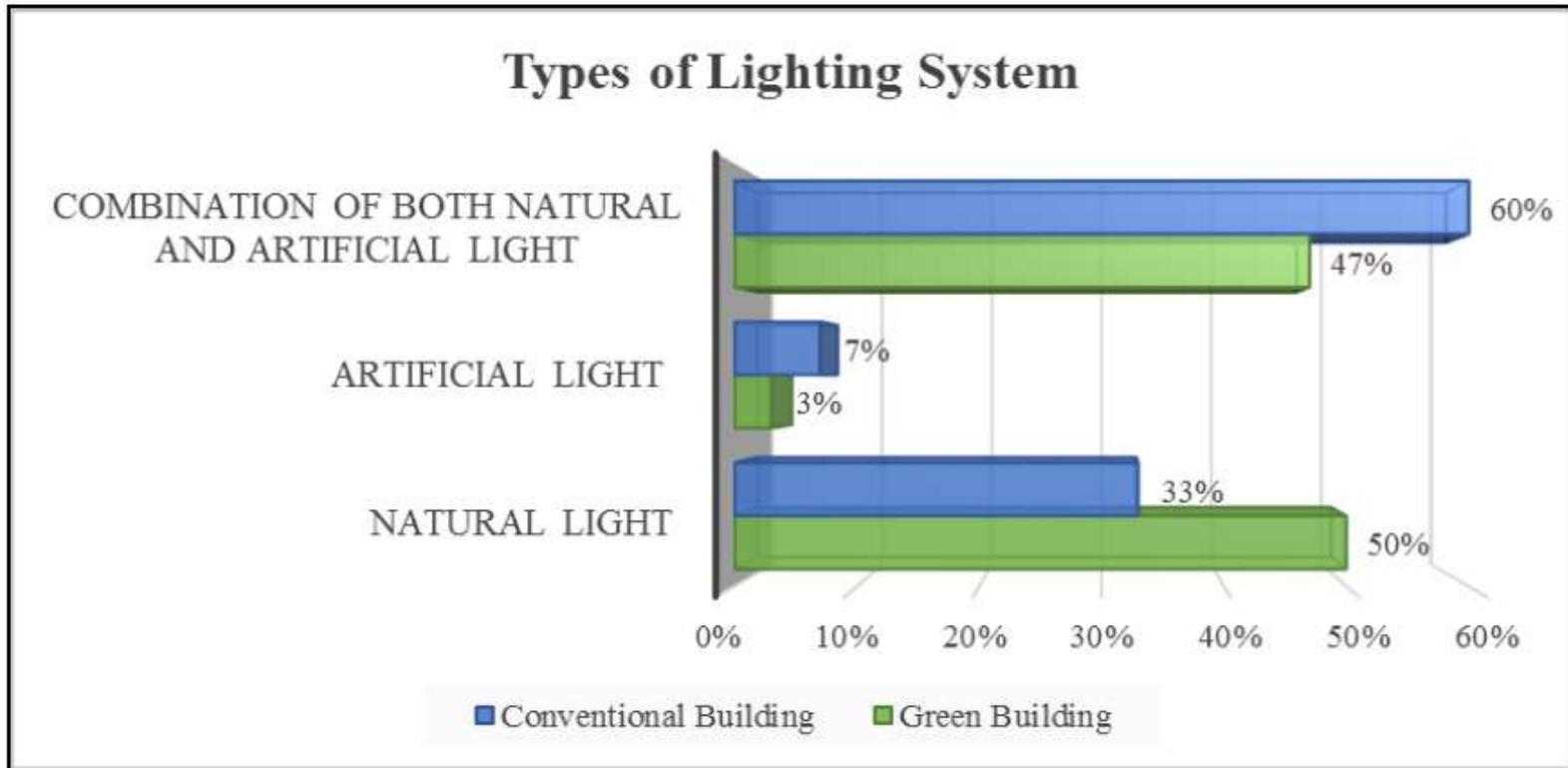
Main Criteria's of Pleasant Work Place	Green Building	Conventional Building
Temperature	25%	17%
Lighting system	23%	17%
Privacy	14%	16%
Ventilation system	16%	5%
Space	16%	20%
Window(s) size	2%	4%
View	2%	18%
General Environment	2%	2%
Other	0%	0%

Correlation	95% Confidence (5% two tailed test)	
62%	Regression, $F$	ANOVA, p-value
R2	0.0751 > 0.025	0.9793 > 0.025
0.3839	Accept	Accept
	There is no difference between GB and CB	

# Results of Analysis

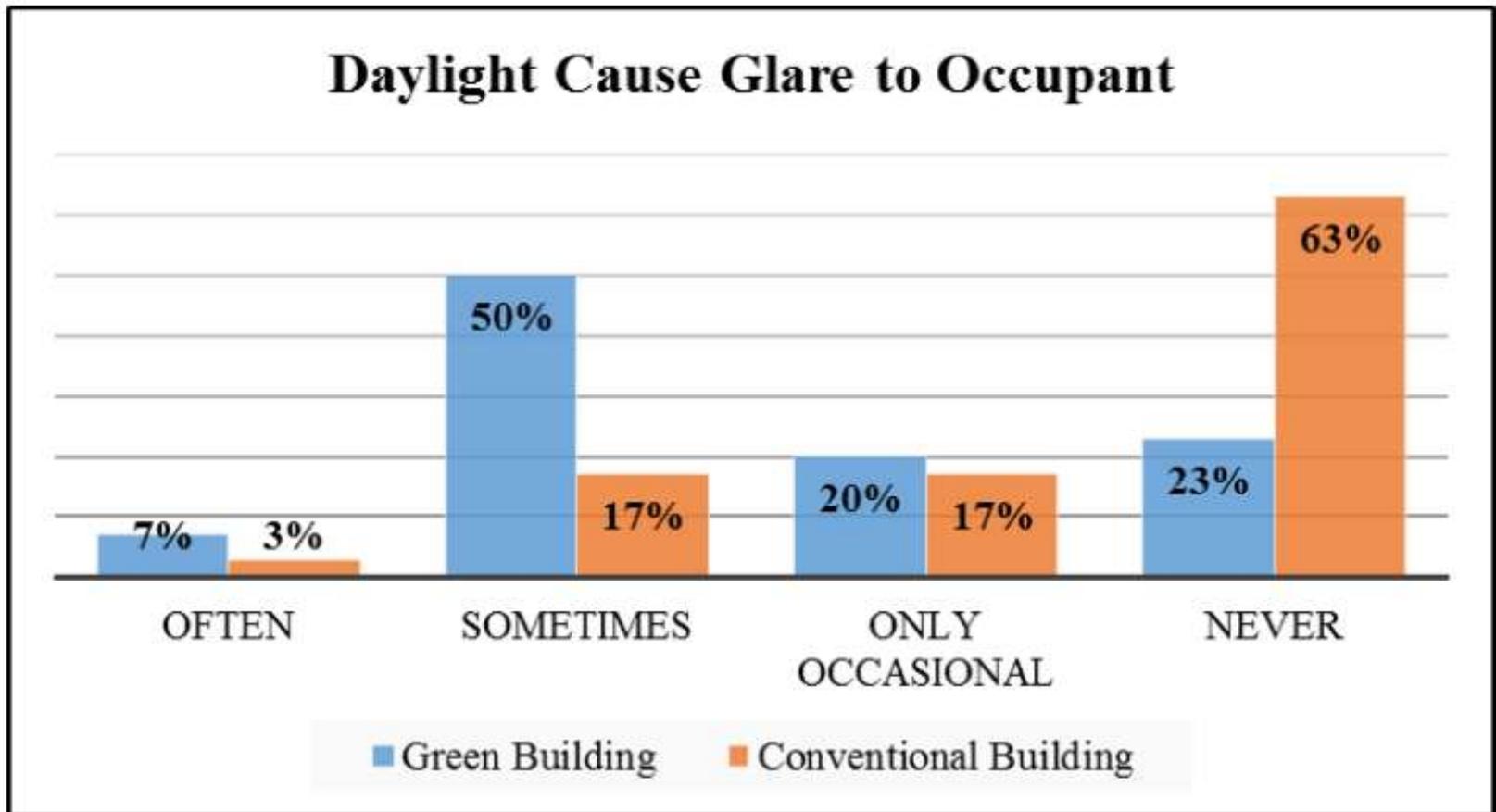


# Results of Analysis



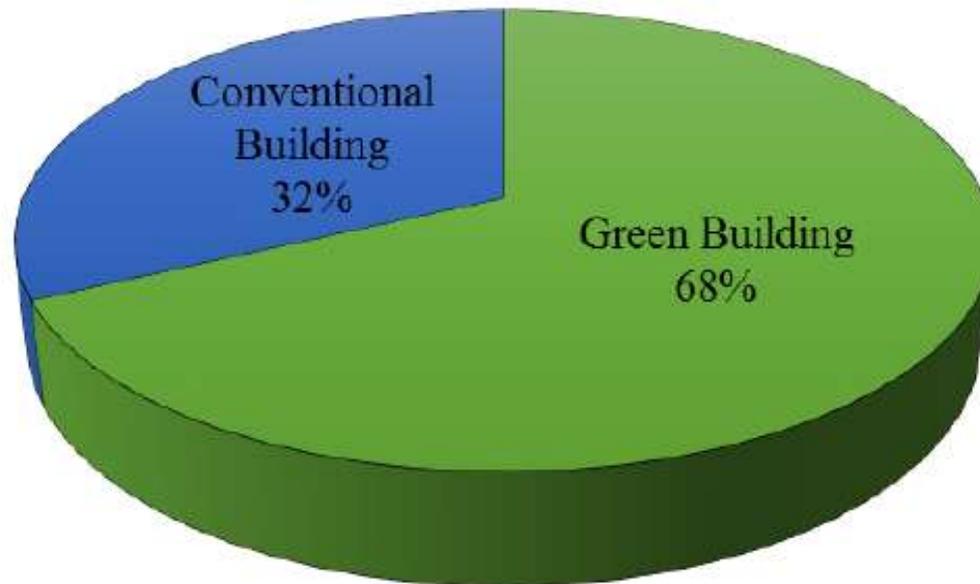
Correlation	Regression, $F$	ANOVA, p-value
83%	$0.3766 > 0.025$	$1.000 > 0.025$
R2	Accept	Accept
0.6890	There is no difference between GB and CB	

# Results of Analysis



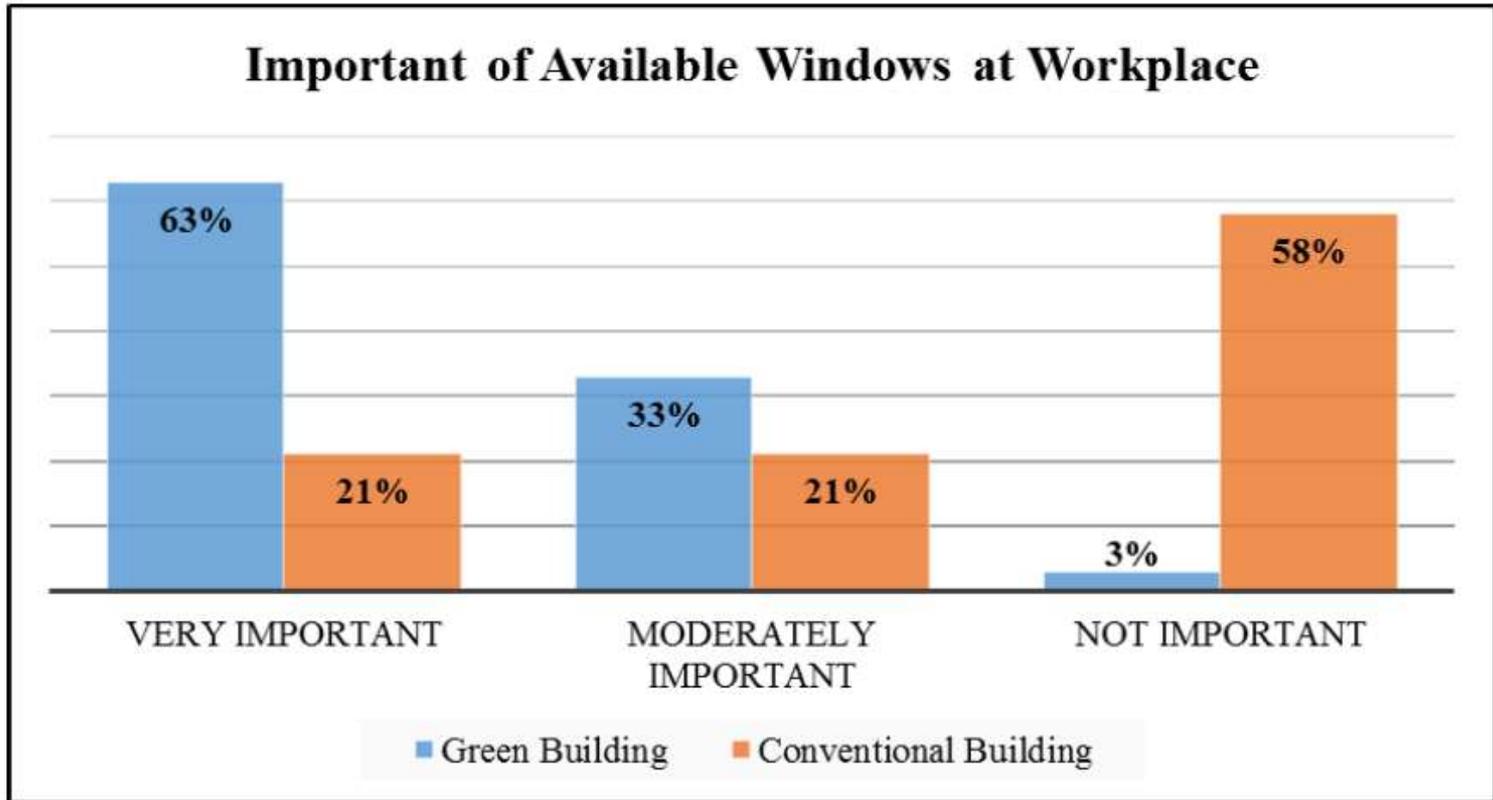
# Results of Analysis

**Available of Windows at Workplace**



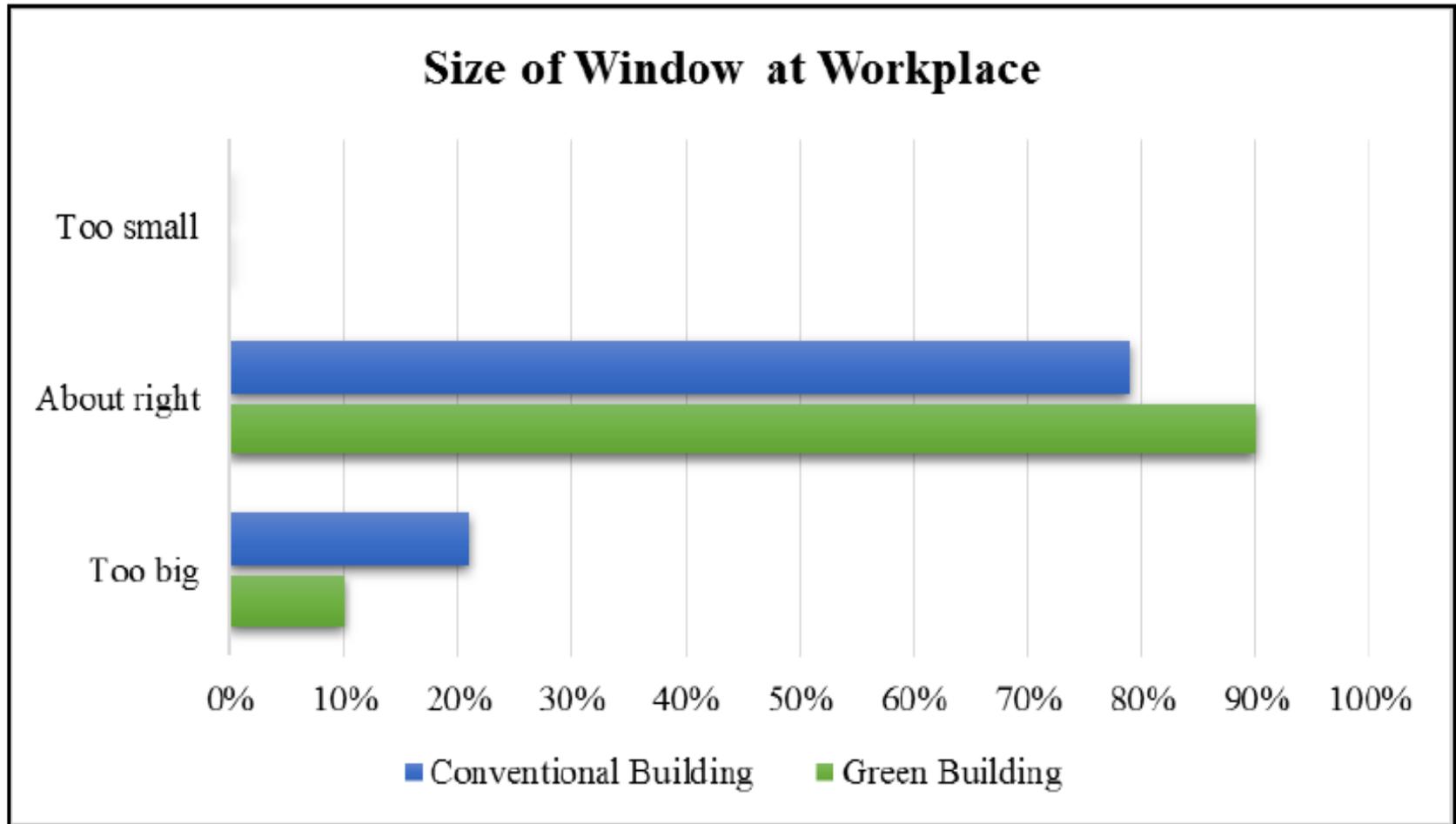
■ Green Building   ■ Conventional Building

# Results of Analysis



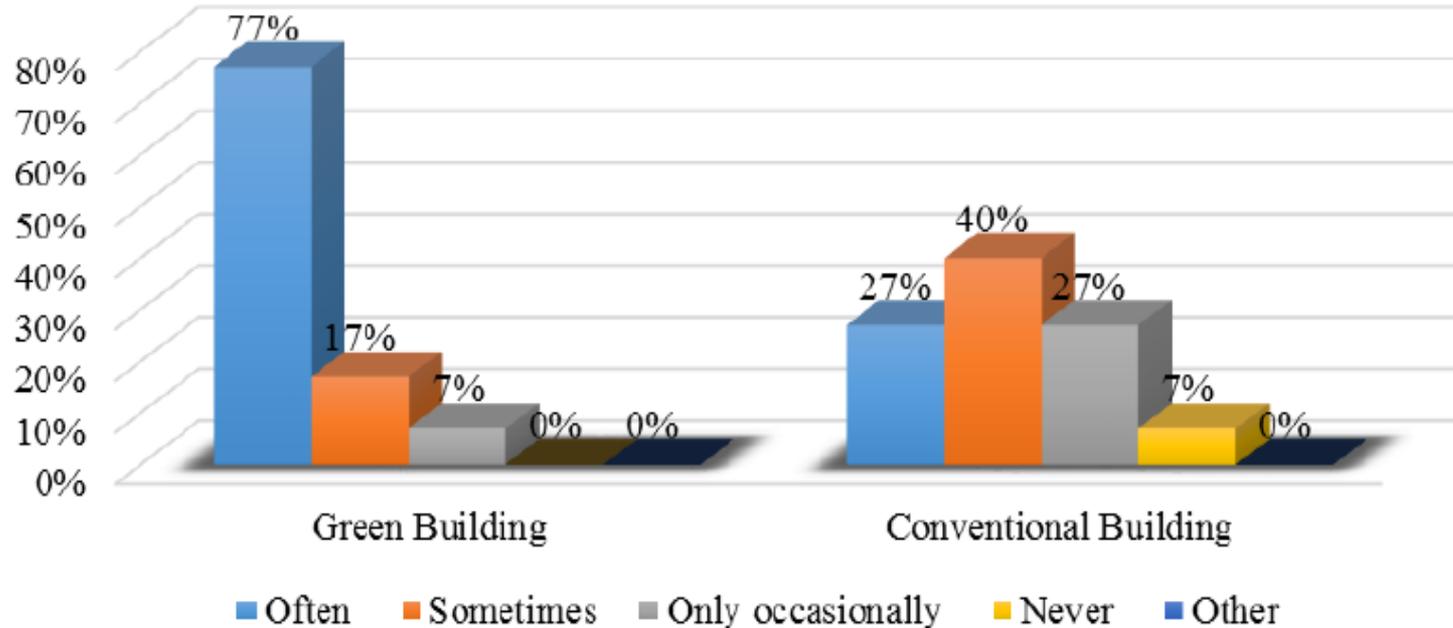
Correlation	Regression, $F$	ANOVA, p-value
87%	$0.3333 > 0.025$	$0.9882 > 0.025$
R2	Accept	Accept
0.7500	There is no difference between GB and CB	

# Results of Analysis



# Results of Analysis

## User Preference of Using Daylight



# Findings

- Human visual requirements are basically fulfilled in both case studies.
- Window sizes and locations of windows within the working spaces do play influencing roles to adjust lighting distribution.

# Recommendations

- Considerate local conditions and individual building designs, and further, integrate with software to provide more comprehensive designs.
- More efforts need to focus on openings (windows and other types of walls) designs and construction materials to give more effective penetration of day lights.

**THANK YOU**

Any Question(s) ?