INVENSTIGATION OF RETAIL LIGHTING IN ISTANBUL

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SUMMARY

Shops are spaces of exhibition aiming to sell various products. The use of light namely, lighting is necessary for visual perception of the displayed objects like food, clothing, car, etc. Therefore, lighting techniques and systems change according to the specifications of the product. In this paper, the main principles of retail (shop) lighting is mentioned and the lighting systems of different shops in Istanbul have been investigated and assessed.

INTRODUCTION

A manufacturer's goal is to sell his products. One of the preconditions to sell an object is to create specific target groups by exhibiting the products. Therefore, exhibition environment - shops - must have as interesting and effective features as possible. These conditions can be obtained directly by lighting systems which are correctly designed and integrated with architectural specifications. To be more specific, the lighting system of a shop (interior and window) is established for as below aims,

- creating interest,
- attracting attention of the consumer for buying,
- leading the customer according to the manufacturer's desires,
- creating and emphasising a special image for manufacturer and retailer, etc..

The lighting systems which are basically made according to stated aims, naturally show differences in every item displayed.

The purpose of this study is, to point out the fundamental approach principles in retail lighting system design for shop and shop windows, and to investigate lighting systems of various shops in Istanbul, according to the mentioned criteria and principles.

1. SHOP INTERIOR LIGHTING

Customers can go around and examine the objects (visually and tactually) in shops. The aim of shop lighting is to create,

- correct and perfect visual perception conditions for objects,
- an architecture of illumination suitable for interior design,
- specific and attractive appearance for interior,
- lighting quality that strengthens the architectural style, etc.

Otherwise, shops can be established according to different purposes, for example;

- object type and/or quantity,
- consumption specification of object (essential or luxury etc.),
- price and quality of object (cheap, expensive, rare, etc.),
- sales style, shop image (self-service, private-service, hyper-market etc.)

Retail merchandising areas have various size and architectural specifications. It is obvious that, particular lighting systems should be designed for each shop. However, lighting systems should perform the requirements of lighting techniques in terms of visual comfort. In other words, the

quantity of illumination (illumination level) and quality of illumination (colour of light, direction of light, shadow and distribution of light) should suit the characteristics of the exhibited subject.

As known, visual organ (eye) is able to adapt various illumination levels in every case and condition. But, if quality of light is not suitable/insufficient, eye is not able to avoid this defect by adaptation. Hence, lighting quality is the most important subject in shop interior. When the type of product changes the lighting techniques and lighting quality also changes since visual perception object differs. Therefore, main principles of lighting quality for shops is briefly mentioned below.

1.1. COLOUR OF LIGHT

The colour characteristic -spectral distribution- of light that illuminates an object determines the light that reflects from the object, in other words determines the perceived colour of the object. Unless daylight or white light is used, the real (actual) colour of the object and the perceived colour will always differ. For instance, silver that is perceived like gold under yellowish light, or meat that looks purple under bluish light will mislead the consumer and will result negatively.

In a shop, it is necessary to display the products in their actual colours. For this reason, in the exhibition sections, light sources which have high colour rendering classes (1A, 1B) should be use to avoid colour perception differences (colour shifts). In addition to this, depending on the colour of the object, it is possible to create attractive appearances by using slightly coloured lights without any exaggeration that would strengthen the colour impression.

Beside, the general illumination level obtained in the shops plays important role in the selection of the colour characteristics of the light sources. As principles, if the necessary illumination level is less than 250 lm/m2 "warm", if it is more than 500 lm/m2 cool-white colour of light should be preferred.

1.2. DIRECTION OF THE LIGHT

A light beam may come to a surface only one direction, infinite directions and the mixture of these directions. And these may be respectively named as "direct", "diffuse" and "dominant-direct". The direction of the light must be created in different types according to the specifications of the illuminated subject. For example;

- The mat surfaces (fabric, ceramic, carpet, etc.) have isotropic diffuse reflection and reflected light scatters to all directions. Therefore, direction of the illuminated light is not important for visual perception. In other words, there is no difference between direct and indirect lighting. However, for the mat objects that have three dimensions (mask, vase, plate, etc.) in order to perceive the texture and dimensional peculiarities, "dominant-direct" lighting should be applied.
- The glossy surfaces (glass, mirror, water, etc.) have regular reflection and other objects in the space can be seen on the surface area. To emphasise dimensional characteristics of the glossy object that have three dimensions, light sources should appear on the surface and direct or dominant-direct lighting should be used. It is the same with precious stones-gems (diamond, brilliant etc.) that have small size and regular reflection. Direct lighting provided with small light sources would make them appear glittery, bright and attractive.
- Surfaces that have mixed reflection (isotropic + regular) are both visible themselves and also reflect other objects surrounding them. When the lines or figures on these surfaces should be perceived, diffuse lighting should be used. In opposite cases, just as for glossy surfaced objects, direct or dominant-direct light should be created to emphasise dimensional characteristics.

1.3. SHADOW QUALITY

Objects are perceived through shadows that are formed depending on the direction of the light Shadows have different shapes and characteristics like "harsh-black", "harsh-transparent", "soft-black" and "soft- transparent". In black shadows, there is great contrast between lightened and dark areas; in harsh shadows, border of the shadow area is like the object border shape. For the lighting of the three-dimensional objects (plate, cone, vase, etc.), black and harsh shadows which will create wrong impressions should be avoided. At shops, for the correct perception of the object both in shape and texture, generally, soft-transparent shadows and dominant-direct lighting should be designed.

Besides, at circulation areas of a shop vertical and horizontal exhibition elements should not produce black and harsh shadows on each other or on the floor.

1.4. DISTRIBUTION OF ILLUMINATION LEVELS

At shops, generally, 300 lm/m^2 is sufficient on exhibited objects. However, this value may increase to 1000 lm/m^2 depending on the object size, object reflection factor, the contrast between object and background, perception time, shopping speed etc. Illumination should be uniform on exhibited objects. For example, the illumination levels on a carpet placed on the wall should not vary from one point to other; there should not be difference in vertical and horizontal illumination on the shelves.

For the general appearance of the shop to attract and to lead customers, usually illumination level on the exhibiting areas should be higher than the circulation areas. In addition to this, to attract attention, to display a certain object, to create a specific image for the shop and so on, local lighting which has higher illumination level and warmer light than general lighting may be used at some areas.

2. SHOP WINDOW

Windows are the fist point that consumer meets the products visually. A shop window is made to exhibit objects and to attract the consumers' attention. Therefore, the aim of window lighting is to make objects perceptible, to emphasise a special product and to create effectiveness etc. At this part of the study, basic principles of window lighting is explained.

2.1. MIRROR EFFECT

The first subject in window lighting is to prevent the mirror effect. This fact occurs when the luminance of the objects in the window are less than the reflected luminance: i.e. the luminance of external objects and surfaces, on the window glass. Quantities of the reflected luminance on the window glass change according to the reflectance factor of glass and luminance of the primary (sun, lamp etc.) and secondary (sky, building, pavement etc.) sources.

To avoid mirror effect the first precautions should be taken in the choice of the window glass (low reflection factor) and during the architectural design of the window. If these precautions are not taken or if is not sufficient, luminance of the displayed objects should be increased by using higher illumination level in the window interior. When illumination level of the window' interior reaches to 1/10 of the external illumination level or more, generally, the mirror effect disappears.

2.2. COLOUR OF LIGHT

Effective results in terms of object colour is obtained by strengthening the colour saturation. This case can be provided directly by using coloured light that has same or close hue with the object colour. In other words, when warm coloured objects (red, orange) are illuminated with warm coloured light or cool coloured objects (blue, green) are illuminated with cool coloured light, it is possible to create unreal but exaggerated, attractive and saturated appearances. In windows to draw attention, coloured lights, which are not changing the hue of the object colour, can be use.

2.3. DIRECTION OF LIGHT AND SHADOW

Window lighting is different than the shop interior lighting and its purpose is not to show all qualities of the objects explicitly. Interesting and remarkable appearances can be produced, especially, by using shadows which is related to the direction of the light. Black shadows which are effective, tiresome and have huge luminance contrasts can be used in windows. And also, harsh shadows that will create linear or two dimensional appearances and unusual impressions may be produced. In windows, transparent and soft shadows should not be preferred, because they create natural and accustomed impressions.

2.4. DISTRIBUTION OF ILLUMINATION LEVELS

It is sufficient that the illumination level on the exhibited objets is 1000 lm/m^2. However, this may decrease or increase up to 10.000 lm/m^2 depending on day or night, and the exterior illumination of the window.

In terms of illumination distribution, instead of uniform general lighting, local lighting that will emphasise the objects should be applied and it is not necessary to display all products of the shop in the window. And, it is suggested that objects be grouped in 2 or 3 and local lighting with 3 - 4 times more than general lighting should be applied.

3. INVESTIGATION OF SHOPS AND RESULTS

In this study, 50 shops which are placed in different regions of Istanbul have been investigated in terms of criteria stated in chapter 2 and 3. They have similar specifications in product price, quality, shop image etc. These shops are classified in three basic groups according to the objects; clothing, china-glass and car. General assessment of shops are briefly given below and some examples are shown in Table 1.

<u>**Shop Interiors**</u>:

- Investigated shops are mostly big and deep spaces and lighting were made by using artificial sources such as incandescent, fluorescent, halogen and metal halide lamps. Especially, fluorescent has low colour rendering and so colour shifts were occurred.. Incandescent lamp (warm light colour) had been used for high illumination levels and fluorescent lamp (cool light colour) had been used for low illumination levels.
- Generally, diffuse lighting had been created and illuminations of the object were insufficient in terms of light direction and shadow quality. In some shops, harsh and close to black shadows were observed.
- Illumination levels were suitable for general lighting. On the other hand, especially vertical illumination distributions are not uniform.

- On the internal surfaces, the use of dark (low reflectance) and saturated colours were not common.
- No measures were taken to prevent the mirror effect caused by glossy floor material and glass showcases.

Windows:

- For shop windows which are not in shopping malls but on the street, mirror effect was observed.
- Fluorescent, halogen and metal halide lamps were used. In most windows, lamps were unsuccessfully hidden. Therefore, glare was observed.
- More attention was given to window designs compared to shop interiors. Different light directions and shadows were used for creating attractive impressions. It can be noted that some of them were successful in terms of lighting quality.

Table 1: Examples of investigated shop interior

object type	shop	lamp type	colour tempera. (K)	colour rendering Ra	general ill. (horizon., lm/m2)	local illum. (lm/m2)	illumina. distribu.
clothing	Ykm	fluorescent incandesce. halogen	4000-6500 2900 3100	2A - 2B 1A 1A	200 - 500	50 - 300	non uniform
	Kip	halogen	3100	1A	200 - 250	100-200	non uni.
	Beymen	fluorescent	3000	1B	200- 300	50 - 150	non uni.
	She	fluorescent incandesce.	6500 2900	2B 1A	200 - 300	400 - 600	non uniform
	Derimod	fluorescent halogen	6500 3100	2B	500 - 600	200 - 300	non uniform
glass, metal	Güral	fluorescent incandesce. halogen	4000-6500 2900 3100	2A - 2B 1A 1A	400 - 600	250 - 350	uniform
	Pasabahçe	fluorescent incandesce.	6500 2900	2B 1A	200 - 500	500 - 750	non uniform
	Jumbo	fluorescent halogen	4000 3100	2A - 2B	300 - 400	600 - 800	uniform
car	Volvo	fluorescent	6500	2B	250 - 350		non uni.
	Ford	fluorescent	4000	2A	200 - 400		non uni.
	Daewoo	fluorescent	4000	2A	300 - 600		non uni.

Shop interiors are live spaces where products are displayed and consumers have the change to circulate. However, windows are closed spaces where consumer first meets the products. Shops aim to display the objects (products) in the best way and correctly, to lead the consumer and to create comfortable shopping environments. Lighting plays vital role in matching process between consumer and shop. Therefore, all requirements of lighting techniques should be made both on exhibited objects and at circulation areas. Windows aim to attract, stimulate and force the consumer to buy. For this reason, in window lighting, it is not necessary to achieve all lighting requirements. To reach necessary standards in retail lighting, the lighting designer and architect should be study together.

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THE ANALYSIS OF EXTERIOR LIGHTING SYSTEMS. REHABILITATION. OPTIMUM SOLUTIONS

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