

Impact of Lighting on the Perception of Visual Discomfort, Mood and Alertness of Sales Person in Retail Cloth Stores

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Abstract: *Lighting design in commercial establishments should be oriented towards product sales and satisfying the consumers taking into consideration the health, well-being of salespersons and purchasing behaviour of consumers. A major challenge in recent times in the illumination field has been to define how light affects health, not only in aspects related to work but also related to visual discomfort, mood and alertness. The objectives of the study mainly to explore the perception of visual discomfort, mood and alertness of salespersons under lighting in retail cloth stores. For the study, ten retail cloth stores were selected in Hyderabad and Secunderabad, the twin cities of Andhra Pradesh. The study was conducted on 100 sales person who were working in these retail cloth stores. The data was collected by using an interview schedule. The findings of the study revealed that the impact of the artificial lighting on perception of visual discomfort, mood and alertness of salespersons was found to be moderate. Bright lighting played a significant role on the sales person mood.*

Keywords: Lighting factors, sales person, visual discomfort, mood and alertness

1. Introduction

Lighting conditions can impact human performance through the visual system, circadian effects, such as alertness and through the perceptual system, such as mood and motivation. Light is the key factor for visual performance via the visual system, while there are more factors concerned with the other two paths (the circadian and perception systems). Visual performance is affected by illuminance, luminance distribution and the spectral power distribution of light. Perceptual system is affected by different lighting conditions, such as light sources, colour temperature and luminous intensity; this influences our mood and behaviour. Hence, different colours of light sources impact the atmosphere of a working space.

Lighting is a critical tool in human functioning. Humans are affected both psychologically and physiologically by the different spectrums provided by the various types of lighting (Robbins, 1986). Light impacts human health and performance by enabling performance of visual tasks, controlling the body circadian system, affecting mood and perception and by enabling critical chemical reactions in the body (Boyce et al., 2003, Veitch and Shelley, 1993).

A research was undertaken by De kort and smolders (2010) revealed that the dynamic lighting on office sales person had shown no significant differences on alertness whereas Kakooei et al. (2010) revealed that bright light tended to increase cortisol levels and body temperature which significantly improved alertness. Wilhelm et al. (2011) revealed that the alertness had shown significant differences between the three illuminance conditions (500 lux, 1500 lux and 2500 lux). Subjective alertness was the only parameter

that was rated to be significantly greater at 2500 lux than at 500 lux.

Cloghan et al. (2010) revealed that there were systematic influences of lighting on mood from lighting parameters within the range of those encountered in everyday interior conditions. Boeing (2010) had indicated that alertness and mood can be affected by red and blue light at night without necessarily stimulating the circadian system. Kullera et al. (2006) had shown the sales person's mood was at its lowest when the lighting was experienced as much too dark. Sales person mood was improved and reached its highest level when the lighting was experienced as just right, but when it became too bright the mood declined again.

Visual performance quantifies how well people can see based on the performance of a task. Lighting can certainly be used to enhance the visual performance of tasks requiring the resolution, but there are also tasks that benefit when lighting is used to modify behaviour (Rea and Ouellette, 1991, CIE 2002). Lighting can influence feelings to make things visible. Changes in feelings can influence the performance of all types of tasks by changing mood and motivation (Dacey et al., 2005, Duffy and Wright, 2005, Whiteley et al., 1998). Research reveals the mechanism for how light is essential for human functioning (Boyce et al., 2003). Light is a strong enabler for visual performance (Grangaard, 1995), regulates a large variety of bodily processes such as sleep and alertness (Dijk and Cajochen, 1997; Takasu et al., 2006; Viola et al., 2008; Wright et al., 2006), is essential for cognition and mood (Taras et al., 2005; Veitch and Shelley, 2001), enables production of important hormones such as melatonin and cortisol (Dijk and Cajochen, 1997; Leproult et al., 2001), and is essential for a healthy rest-activity pattern (Wurtman,

1975). The purpose of the study is to find out the impact of lighting on salesperson perception of Visual Discomfort, Mood and Alertness in retail cloth stores.

2. Methodology

2.1 Sampling Procedure

Exploratory research design was selected for this study. From each store, the list of ten salesperson were selected to find out their perception of visual discomfort, mood and alertness and demographic characteristics by using an interview schedule. The researcher conducted a study with a sample size of 100 salesperson of different age groups randomly selected in retail cloth stores of Hyderabad and Secunderabad, the twin cities of Andhra Pradesh.

2.2 Variables and their Measurement

The independent variables of the study were age of the salesperson, number of years of work experience and quantity of lighting parameters in retail cloth stores. The dependent variables selected for the study perception of visual discomfort, mood and alertness. In the present investigation the quantity of illumination in retail cloth stores was taken as a base for understanding the differences among retail cloth store. According to **United States environmental protection agency (1997)**, the quantitative parameters of illumination are luminous flux (lm), illuminance (lux), luminance (cd/m^2). Hence these lighting parameters were taken as independent variables. These parameters were measured on floor, ceiling, backside of the consumer seating (wall 1), left hand side of the consumer seating (wall 2), wall facing the consumer seating (wall 3) and right hand side of the consumer seating (wall 4).

2.3 Tools used

Perception of visual discomfort, mood and alertness were measured by developing an interview schedule.

2.4 Data Analysis

Frequencies and percentages were calculated for the profile of the respondents on the variables. The four outcome groups based on the similarities of lighting conditions were treated as independent variables for data analysis. The data was subjected ANOVA, to find out the association between independent and dependent variables of the study. The data collected on salesperson perception of visual discomfort, mood and alertness was tabulated, presented and discussed below. Hypothesis was formulated to test the relationship between independent and dependent variables.

3. Results and discussion

3.1 Demographic Data

The participants for the study were mostly middle aged persons, aged 34.04 ± 8.96 years (mean \pm SD). Years of work experience of the selected salespersons ranged from 2-35 years. Comparatively, a larger proportion (38%) of the sample bared a work experience of 6-15 years. Twenty eight

per cent of the sample had > 16 years of experience as sales person.

3.2 Perception of Visual Discomfort

Impact of lighting in retail cloth stores on the perception of visual discomfort of the salesperson was studied. The respondents were asked to indicate whether lighting in retail cloth stores inculcates positive or negative or neutral visual discomfort while working. The respondents were asked to indicate the frequency of experiencing their perception of visual discomfort symptoms in terms of always, sometimes and never by the end of the day due to exposure to illumination in work environment.

Table 1: Distribution of sample by perception of visual discomfort

1	Perception of visual discomfort	Always	%	Sometimes	%	Never	%
1.1.	I feel eyestrain by the end of the day due to exposure to over illumination	32	32	61	61	7	7
1.2.	Due to bright lights I feel discomfort in my vision	34	34	46	46	20	20
1.3.	My vision becomes blurred due to the lights	22	22	67	67	11	11
1.4.	I experience the feeling of double vision due to over-illumination	0	0	21	21	79	79
1.5.	Excessive blinking happens when seeing the materials	8	8	27	27	65	65
1.6.	Under prevailing lighting condition checking the quality of clothes is stressful	6	6	32	32	62	62
1.7.	Exposure to lighting in the shop leads to watering of eyes	12	12	60	60	28	28
1.8.	Reflections of light is causing irritation in the eye	16	16	72	72	12	12
1.9.	Blurring in the vision is experienced	3	3	83	83	14	14
1.10	Feeling of visual exhaustion is experienced after completing work	4	4	66	66	30	30

From the (Table 1), it showed that majority (34%) of the salespersons felt positively discomfort in their vision always due to bright lights, (83%) of the salespersons experienced sometimes blurring in their vision and never (79%) of the salesperson experienced the feeling of double vision due to over-illumination.

It showed that minority of the salesperson sometimes (21%) experienced the feeling of double vision and never (7%) of the sales person felt eyestrain by the end of the day due to over-illumination

The impact of the artificial lighting on visual discomfort of sales person was found to be moderate. Mostly the respondents were experiencing the symptoms related to visual discomfort sometimes.

3.2.1 ANOVA among groups in the perception of visual discomfort with regard to lighting effect

According to perception of visual discomfort, Analysis of variance was performed among groups of retail cloth stores. The 'F' value was found to be non significant (Table 2).

Table 2: Analysis of variation among groups in the perception of visual discomfort with regard to lighting effect

Effect	Within groups	Between groups	F - Value	Probability F-Value	Level of significance
Group	3	96	2.12 ^{NS}	0.0471	0.05

** - significant at 0.01 level, *- significant at 0.05 level, NS - Non Significant

Hence, the null hypothesis was accepted.

There exists no relationship between lighting conditions in retail cloth stores and visual discomfort of the salesperson. According to the study no impact of lighting condition in retail cloth stores on visual discomfort of the salesperson was found. The findings of the study differ with the study conducted by Newsham et al. (2003), wherein it was reported no significant effect of light on visual discomfort.

3.3 Mood

Impact of lighting in retail cloth stores on the mood of salespersons while working was explored. The respondents were asked to indicate whether lighting in retail cloth stores inculcates positive mood or negative mood or neutral mood while working. The respondents were asked to indicate the changes in mood in terms of always, sometimes and never by the end of the day due to exposure to illumination in work environment.

Table 3: Distribution of sample by mood

3.	Mood	Always	%	Sometimes	%	Never	%
3.1	Well lighted environment in the shop makes me feel energetic	24	24	39	39	37	37
3.2	While working in illuminated shop, I experience the feeling of anxiety	19	19	48	48	33	33
3.3	I get irritate while showing materials	4	4	58	58	38	38
3.4	Unknowingly I get into depression when I working in the shop	0	0	57	57	43	43
3.5	Continuous lighting in the shop disturbs my work and puts my mood off	21	21	71	71	8	8
3.6	I feel tired after sometime	14	14	72	72	14	14
3.7	I experience the feeling of loosing concentration in workplace	27	27	66	66	7	7
3.8	I get feeling of worthlessness, hopelessness or inappropriate guilt	2	2	75	75	23	23
3.9	I experienced difficulty in concentrating or making decisions	2	2	41	41	57	57
3.10	Overwhelming and intense feeling of sadness or grief	0	0	50	50	50	50

From the (Table 3), it showed that majority (27%) of the salespersons always experienced the feeling of loosing concentration in their workplace, sales persons sometimes (75%) felt worthlessness, hopelessness or inappropriate guilt and never (57%) of the sales person experienced difficulty in concentrating or making decisions.

It showed that minority of the salespersons always unknowingly get into depression when they working in the retail cloth stores, sometimes (39%) of the salesperson felt energetic in well lighted environment and never (7%) of the salesperson experienced feeling of loosing concentration in their workplace.

The impact of the artificial lighting on mood of the sales person working as sales person was found to be moderate. Mostly the respondents were experiencing the symptoms related to mood only sometimes.

3.3.1 ANOVA among groups in the perception of visual discomfort with regard to lighting effect

According to mood, Analysis of variance was performed among groups of retail cloth stores. The 'F' value was found to be significant at 0.05 level (Table 4).

Table 4: Analysis of variation among groups in the mood of sales person with regard to lighting effect

Effect	Within groups	Between groups	F - Value	Probability F-Value	Level of significance
Group	3	96	2.86*	0.0412	0.05
** - significant at 0.01 level, * - significant at 0.05 level, NS - Non Significant					

For further study pairs of groups were tested at 1 per cent level and 5 per cent level of significance by using 't'-test (Multiple Comparison Test). Computed 't' values revealed significant difference between group 1 and 3 at 0.01 level, between group 3 and 4 at 0.05 level and between group 3 and 4 at 0.05 level (Table 5).

Table 5: Mean comparison and significant probabilities between the scores of different groups due to exposure to lighting on mood

Effect	Group	_Group	Estimate	Standard Error	DF	t-Value	Probability >t-value	Level of significance
Group	1	2	1.2	0.8139	96	1.47 ^{NS}	0.1437	NS
Group	1	3	2.55	0.8916	96	2.86 ^{**}	0.0052	0.01
Group	1	4	0.8667	0.8139	96	1.06 ^{NS}	0.2897	NS
Group	2	3	1.35	0.8139	96	1.66 ^{NS}	0.1005	NS
Group	2	4	-0.3333	0.728	96	-0.46 ^{NS}	0.6481	NS
Group	3	4	-1.6833	0.8139	96	-2.07 [*]	0.0413	0.05
** - significant at 0.01 level, * - significant at 0.05 level, NS - Non Significant								

Hence, the null hypothesis was rejected.

There exists a relationship between lighting conditions in retail cloth stores and mood of the salesperson. Sales person who were exposed to lighting in retail cloth stores had their change in mood in different sections of the day. The lighting conditions in retail cloth stores showed impact on the mood of the sales person. The sales person were found experiencing the feeling of energetic while working in illuminated shop, feeling of anxiety, feeling of irritation while showing materials, getting into depression when working in the shop, disturbance due to continuous lighting in the shop, feeling of loosing concentration in workplace, feeling of worthlessness, hopelessness or inappropriate guilt, difficulty in concentrating or making decisions and overwhelming and intense feeling of sadness or grief under illuminated work environment. The findings of the study differ with the study conducted by Knez (2001), where no direct influence of lighting on participant's mood was observed.

3.4 Feeling of alertness

Impact of lighting in retail cloth stores on the feeling of alertness of sales person was explored in the present study. The respondents were asked to indicate the frequency of experiencing symptoms of alertness.

Table 6: Distribution of Sample by the feeling of alertness

6.	Alertness	Always	%	Sometimes	%	Never	%
6.1	Well lighting in retail cloth stores makes me feel alert	37	37	53	53	10	10
6.2	Continuous exposure of lighting slips off my concentration and I get confused	0	0	50	50	50	50
6.3	Bright light disturb my alertness and I tend to make mistaken	0	0	50	50	50	50
6.4	Due to the continuous exposure of lighting in store, I lose concentration and show wrong materials	0	0	21	21	79	79

From the (Table 6), it showed that majority of the salesperson always (37%), sometimes (53%) felt alert under well lighted environment and never (79%) of the sales person lost concentration and show wrong materials due to continuous exposure of lighting in store.

It showed that minority of the salespersons always felt that continuous exposure of lighting slips off concentration, get confused, lose concentration and shows wrong materials and bright light disturbs their alertness and tends to make mistaken. Only ten per cent of the sales person never felt alertness when working under well lighted environment. Twenty one percent of salesperson sometimes felt that they are losing their concentrating due to the continuous exposure of lighting in store.

The impact of the artificial lighting in the retail cloth stores on the feeling of alertness of sales person was found to be moderate. Mostly the respondents were experiencing the symptoms related feeling of alertness sometimes.

According to lighting factors the retail cloth stores were significantly classified into four groups. According to feeling of alertness, Analysis of variance was performed among groups of retail cloth stores. The 'F' value was found to be non significant (Table 7).

Table 7: Analysis of variation among groups in the feeling of alertness of sales person with regard to lighting effect

Effect	Within groups	Between groups	F - Value	Probability F-Value	Level of significance
Group	3	96	1.94 ^{NS}	0.1279	NS

** - significant at 0.01 level, * - significant at 0.05 level, NS – Non Significant

Hence, the null hypothesis was accepted.

There exists no relationship between lighting conditions in retail cloth stores and feeling of alertness of the salesperson. Out of the three psychological health variables studied. Only the mood of the salesperson was found to be influenced by the lighting environment in retail cloth stores. The findings of the study differ with the study conducted by Grunberger et al. (1993), which revealed higher light level had a positive effect on participants' alertness.

4. Conclusions

An attempt was made to study the impact of highly illuminated environment in retail cloth stores on perception

of visual discomfort, mood and alertness. All the sales person reported that they had to work continuously for longer periods of time under lighting conditions. They performed their jobs throughout the year without any rotations and were employed full-time for the assigned work. The results of the study revealed that the impact of the artificial lighting on visual discomfort, mood and alertness of workers was found to be moderate. According to the study there was no impact of lighting on visual discomfort and feeling of alertness on the salesperson but there was an impact of lighting on the mood of the salesperson in retail cloth stores.

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