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Research Article

The Effect of Indoor Physical Work Environment on Employees Performance

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ABSTRACT

Purpose: The purpose of this study was to investigate the effect of indoor physical work environment on the employees performance; a case study of Dejen Aviation Industry (DAVI).

Methods: Descriptive research design and quantitative research approach was used and sample of 100 employee's; 35 from DAVI staff and 65 from DAVI factory. During the study, data was collected from the respondents using questionnaires. Data analysis was done using Statistical Package for Social Science (SPSS) software and information was presented through tables, bar charts and pie charts.

Results: The regression out revealed that all independent variables have a positive and significant impact on employee's performance in DAVI.

Unique contribution to theory, practice and policy: It will help to highlight the effect of the indoor physical work environment on the employee's performance in the Dejen Aviation Industry. The study will help the management to look into the problems to improve on its environment and to increase employee's performance.

Keywords: Physical work environment; Indoor physical work environment; Noise; Employee performance and lighting

INTRODUCTION

Cohen [1] has defined the working environment as the totality of forces, actions and alternatives prestigious factors that are presently and probably competitive with the employee performance. Work environment may be defined as the floor space or the place that was occupied by the workers, manager and a group of machines.

Ismail, et al. [2] state that physical environment in which employee performs has an impact on their performance as well as it limits the prosperity of the organization. The physical working environment that is set in place impacts employee morale, productivity and engagement-both positively and negatively.

An indoor Physical work environment means ergonomic factors such as that noise, lighting, temperature, air quality and color that affect people's ability to work. Ergonomics is the study of the relationship between people, the equipment they use and the physical environment in which they work.

Several challenges are existed in DAVI. There are many indoor physical environments that affect employee's performance. This research only focuses on five independent variables or indoor physical work environments like; physical work environment, temperature, noise level, lighting illumination and air quality condition in DAVI that affects the employee's performance.

Basic questions in this study are; what are the effects of physical work environment, temperature, noise, lighting and air quality on employee's performance in DAVI.

The aim of this study is to investigate the impact of indoor physical work environment on employee's performance and to examine the effects of physical work environment, temperature, noise, lighting and air quality that affect employee's performance in DAVI.

The proposed hypothesis are; the effect of physical work environment, temperature, lighting and air quality have a positive and significant impact on employees performance, but noise variable has a negative and significant impact on employees performance in DAVI.

This study covers the impact of the indoor physical work environment on employee's performance in the case of the Dejen Aviation Industry and does not include other industries in the region.

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Definition of working environment

Cohen [1] defines the working environment as the totality of forces, actions and alternatives prestigious factors that are presently and probably competitive with the employee performance [3]. The working environment is the sum of the interrelationship that exists within the staff and also the environment during which employees work. Factors of work environment that affect workers performance are;

Physical work environment factors

Ismail, et al. [2] state that physical environment in which employee performs has an impact on their performance as well as it limits the prosperity of the organization. And also they state that the physical work environment consists of internal and external office layout, temperature, comfort zone and also the work setting or arrangement.

According to Vischer, the spatial layouts, noise, furniture and lightning are included under the physical working condition factor [4]. The physical work atmosphere includes comfort level, ventilation and lighting. This option assists in the practical and aesthetic facet, the interior decoration and the style of the work atmosphere that ultimately improves employee expertise and necessitates higher performance.

The comfort level and temperature additionally well influence the health of workers and that if there is a high temperature the performance of the employee is reduced and the low temperature has a relation to the performance of manual tasks [5]. Office-style encourages staff to figure in a very bound manner by the way their workstations are designed. Spatial layout contributes plenty towards however the workers perform their tasks [6].

Noise: They reveal that exposure to high levels of sound might lead to cardiovascular disease, endocrine, and digestive reactions, especially in complex jobs not in simple jobs. Millar and Steels [7] claim that subjects who were exposed to intense (93dB) noise showed more vasoconstriction, thus, with greater physiological arousal, compared to a control group working in a quieter condition. Hence, the study was done by Cohen and Weinstein [8] also stated that working at noisy industrial sites shows detrimental health effects, especially cardiovascular disease.

Lighting: Two kinds of light are available to the office: natural light and artificial light. Natural light is a free resource that enters the office through a window or skylight, whereas artificial light is the kind of light that is produced and designed by manufacturing. A poor lighting system may reduce employee performance as well as efficiency because those who have to work-related to reading might have a serious problem with their vision, which in turn may cause fatigue or eyestrain [9].

Temperature: Temperature plays a significant role in a workplace environment, especially how the human body tries to maintain an ideal temperature. A theory of effective temperature proposed four components, namely; air, temperature, humidity, airflow and temperature of objects in the environment. It indicates that how hot or cold our environment makes us feel [10].In addition, the effective temperature is affected by the heat radiation from other objects in the working environment.

Air quality: According to Osama, et al. [11], indoor air environmental quality is very important to the health, comfort as well as job performance of employees. As far as it is concerned, indoor pollutant levels frequently exceed outdoor levels and most of the time an individual worker might spend up to 90% of the time alone indoors. Some of the most potentially hazardous indoor pollutants are radon, asbestos, inorganic, environmental tobacco smoke, organics, biological and non-ionizing radiation [12].

Employee performance

The sustainability of a business organization depends on the talent, skill, knowledge and experience of employees and their performance [13]. Performance is the accomplishment of a given task measured against preset known standards of accuracy, completeness, cost and speed. Employee performance is the contribution of employees to the achievement of organizational objectives. Employees are expected to perform at the acceptable level of the standard and managers follow up and evaluate the performance of employees to attain the stated objective of an organization [13].

EMPIRICAL LITERATURE REVIEW

Various researchers have studied environment as a factor in the performance of employees in organizations. 56.0% of respondents feel that their work environment is thermally comfortable, while the other 44.0% relate the discomforts to cold temperature as they always must maximize the amount of clothing once they arrive at work (during cold weather). Finally, the highest percentage of respondents' ranks reached 68.0% for scale "Strongly Disagree" among the influence of temperature affecting their job performance. Based on the findings above, it can be concluded that the temperature factor has no noticeable impact on the job performance of employees and its influence can be neglected. This is in line with Sehgal [14] that which temperature works best for one's productivity depends on one's body. The impacts of temperature itself are complex and can't be easily understood. There is a need for studying the amount of clothing worn, the type of work being done, etc. Thus, according to this study, temperature factor has no noticeable impact on job performance [15].

60.0% of respondents feel that their work environment is provided with efficient lighting as the ample amount of light comes from artificial light, while the other 40.0% agree that inconvenient lighting affects their enthusiasm for work and causes significant discomfort with reaching 32.0%. Moreover, 60.0% of respondents agree that the spatial arrangement of their office allowed them to be exposed to adequate lighting in their day-to-day work, while 56.0% don't sit near the window. Finally, the highest percentage of respondents' ranks reached 36.0% for scale "neutral" among the influence of poor lighting affecting their job performance. Based on the findings above, it can be concluded that the highest ratio of poor lighting comes from natural light and imply a slightly negative impact on employees [15].

Conceptual framework of the study

Figure 1 depicts the methodology of independent variables on the dependent variable (employee performance).

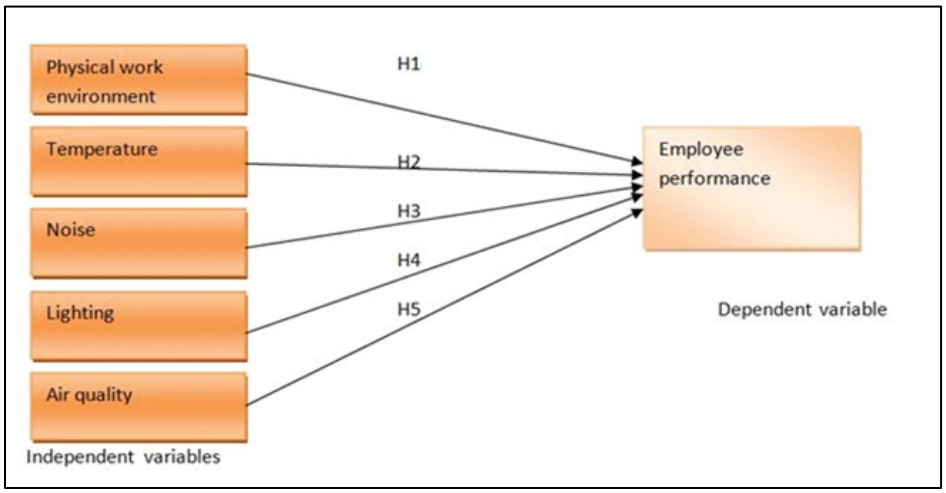

Figure 1: Frame work of different variables.

METHODOLOGY

The study adopted a descriptive research design in investigating the effects of indoor physical work environment on employee performance in DAVI. The research targeted the employees from Dejen Aviation Industry. A sample of 100 employees; 35% from staff and 65% from the staff of DAVI was studied from the total population of 200 Dejen Aviation industry employees. The researcher used questionnaires to collect data from the Dejen Aviation industry employees. The study was applied probability sampling techniques to give equal opportunity for the target population. The researcher measured the reliability of the questionnaire to determine its consistency in testing what they are intended to measure [16]. The Pearson correlation coefficients between independent variables and dependent variable were checked. This study used descriptive statistical techniques, which included percentages, mean and standard deviation to analyze the data. Data collected from the study was organized, classified, edited, coded and analyzed by use of percentages and frequencies and then presented in tables, graphs and pie charts.

RESULT AND DISCUSSION

After the questionnaires were collected, a Descriptive and quantitative way of analysis followed where Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) software.

Questionnaire response rate

The researchers have distributed 100 questionnaires for nine factories and staff in the Dejen aviation industry. Out of which 100 were completed and returned. The response rate for this study is 100% which is considered a very good response rate (Table 1).

Mean score analysis and variables

For generic demographic features, descriptive statistics are used (Table 2).

Pearson's correlation analysis

All variables have descriptive statistics and analysis are depicted in Table 3.

Linear regression analysis

Normality, Linearity, Homoscedasticity and Multicolinearity were checked (Table 4).

Multiple regression analysis

Employee performance summary with all independent factors and Analysis of Variance (ANOVA) for dependent variable

Table 1: Descriptive statistics for general demographic characteristics.

Category		Frequency	Percentage
Gender	Male	60	60%
	Female	40	40%
Age	20-29	29	29%
	30-39	35	35%
	40-49	21	21%
	50 year above	15	15%
Level of work	Manager	7	7%
	Supervisor	36	36%
	Technician	57	57%
Department of unit	DAVI staff	35	35%
	Factory	65	65%
Length of service	0-1	11	11%
	02-Mar	11	11%
	04-Jun	18	18%
	07-Sep	26	26%
	Above 10 years	34	34%

Table 2: Descriptive statistics for all variables.

Descriptive statistics			
	Mean	Std. deviation	N
Noise	3.03	0.83898	100
Physical work environment	3.84	0.72432	100
Temperature	3.796	0.65689	100
Lighting	3.4643	0.77462	100
Air quality	3.6267	0.61323	100
Employee performance	3.5567	0.7533	100

employee performance with all independent variables (predictors) are depicted in Tables 5 and 6 respectively.

Coefficient of determination

Coefficients of regression for DV employee performance with predictors are showed in Table 7.

The regression equation can be stated as:

EP=0.718+0.350N+0.117PWE+0.073T+0.148L+0.148AQ+μ

Where;

Table 3: MSD and endurance scores.

Correlations							
		Noise	Physical work environment	Temperature	Lighting	Air quality	Employee performance
Physical work environment	Pearson Correlation	0.036	1	-	-	-	-
	Sig. (2-tailed)	0.719	-	-	-	-	-
	N	100	100	-	-	-	-
Temperature	Pearson Correlation	0.380**	0.466**	1	-	-	-
	Sig. (2-tailed)	0.005	0	-	-	-	-
	N	100	100	100	-	-	-
Lighting	Pearson Correlation	0.399**	0.353	0.545**	1	-	-
	Sig. (2-tailed)	0	0	0	-	-	-
	N	100	100	100	100	-	-
Air quality	Pearson Correlation	0.530**	0.326**	0.488**	0.632**	1	
	Sig. (2-tailed)	0	0.001	0	0	-	-
	N	100	100	100	100	100	-
Employee performance	Pearson Correlation	0.537**	0.219*	0.367**	0.436**	0.491**	1
	Sig. (2-tailed)	0	0	0	0	0	-
	N	100	100	100	100	100	-

Note: **. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Table 4: Collinearity statistics.

Co linearity statistics	
Tolerance	VIF
0.689	1.451
0.705	1.418
0.545	1.835
0.497	2.013
0.449	2.227

Table 5: Model summary of employee performance with all independent variables.

Model summary[b]									
Model	R	R square	Adjusted R square	Std. Error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
1	.619[a]	0.583	0.35	0.60718	0.383	11.677	5	94	0

Note: [a] Predictors: (Constant), Air quality, Physical work environment, Noise, Temperature, Lighting
[b] Dependent variable: Employee performance

Table 6: Analysis of Variance (ANOVA) for dependent variable employee performance with (predictors).

ANOVA[a]						
Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	21.524	5	4.305	11.677	.000[b]
	Residual	34.654	94	0.369	-	-
	Total	56.179	99	-	-	-

Note: [a]Dependent variable: Employee performance.[b] Predictors: (Constant), Air quality, Physical work environment, Noise, Temperature, Lighting.

Table 7: Regression coefficients for DV employee performance with (predictors).

Model		Unstandardized coefficients		Standardized coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.718	0.45	-	1.597	0
	Noise	0.35	0.088	0.39	4.001	0
	Physical work environment	0.117	0.1	0.112	1.164	0
	Temperature	0.073	0.126	0.064	0.583	0
	Lighting	0.148	0.112	0.152	1.321	0
	Air quality	0.148	0.149	0.121	0.998	0

Table 8: Summary of findings on relations of independent variables and EP.

	Hypotheses	Result	Supported
H_1:	There is a significant relationship between Physical work environment and Employee performance.	p=0.000 (p<0.0005) St.β=0.112	Yes
H_{1a}:	There is significant relationship between Temperature and employee Performance.	p=0.000 (p<0.0005) St.β=0.064	Yes
H_{1b}:	There is significant relationship between Noise and Employee Performance three	p=0.000 (p<0.0005) St.β=0.390	Yes
H_{1c}:	There is significant relationship between Lighting and Employee performance.	p=0.000 (p<0.0005) St.β=0.152	Yes
H_{1d}:	There is significant relationship between Air quality and Employee performance.	p=0.000 (p<0.0005) St.β=0.121	Yes

EP=Employee Performance

N=Noise

PWE=Physical Work Environment

T=Temperature

L=Lighting

AQ=Air Quality

μ=Error term

Hypothesis test

Conclusions on the relationships between independent variables and EP are depicted in Table 8.

Discussion of findings

This study was conducted on 100 employees of DAVI, which is different from the sample has taken by [16]. Many respondents are not agree with the noise parameter. But the findings of this study show that the noise has a significant impact on employee's performance.

Other researchers findings: The research investigated by Al-omari and Okasheh [16] investigated the influence of work environment on job performance in a case of an engineering company in Jordan 100% of respondents agree that there is a noise in their work environment, 44.0% of them must yell to communicate with a person standing right next to them.

CONCLUSION

The finding shows that all Cronbach's Alpha coefficient values for all variables are accepted and reliable for this study. Descriptive statistics of independent variables showed that many respondents are in agreement to the condition of the physical work environment, temperature condition, lighting illumination, and air quality with an average mean of greater than 2.5 mean score and greater than 50% on average. Pearson correlation coefficient results showed that there is a significant positive relationship between the independent variables and employee performance. The regression output revealed that independent variables (PWE, T, N, L, and AQ) have a positive and statistically significant impact on employee performance. The noise level has a strong relationship with employee performance with Beta coefficients of 0.350.So as the noise parameter is increase by 1, the employee performance will increase by 35% in DAVI. The findings show that all hypothesis results are supported. The researchers have summarized that all the basic questions have been answered properly. The effects of physical work environment, temperature, noise, lighting, and air quality on employee performance in DAVI were positive and significant.

RECOMMENDATIONS

The descriptive statistics show that the highest predictor parameter noise has a significant impact on employee performance. Dejen Aviation Industry has to review the noise reduction mechanism of the industry so that it would mitigate the physical work environment parameter noise problem and increase employee performance. The company could reduce the indoor physical work environment parameter noise by working continuously to improve the excessive level of noise, by providing noise protection equipment for its employees like hearing protection equipment (ear muffs, ear plugs and canal caps) and by modernizing the machine types of equipment.

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