

Cluster 3: Opening Shift. This shift is from 8:00 pm to 5:00 am. Under the Cluster 3, it indicated that irregular mealtimes, noise level and physical setup, considering coping, are strongly ($0.70 \leq r < 0.90$) correlated to performance; and shift rotation, number of rest days, social life, domestic life disruption, irregular sleep, performance demand, workplace relationships, and workplace temperature, considering coping, are moderately ($0.40 \leq r < 0.70$) correlated to performance.

Looking at the r^2 values of the risk factors under Cluster 3, the shift rotation, number of rest days, social life disruption, performance demand, irregular mealtimes, workplace relationships, noise levels, workplace temperature, physical setup, considering coping, are moderate ($0.25 \leq r < 0.80$) predictors of performance in terms of AHT, and, domestic life disruption and irregular sleep, considering coping, are poor ($0 \leq r < 0.25$) predictors of performance.

3.5. ANOVA and Tukey's Test

One-Way ANOVA using the overall health risk levels of the three clusters was done in order to determine whether the risk levels calculated is the same per cluster. The p-value at significance level of 0.05 was 6.14506E-06 indicating that at least one of the overall health risk levels of a cluster is significantly different from the other clusters. Thus, Tukey's Test was used to determine which among the risk factors contributed to the significance of the model. The results are presented in Table 5 below.

Table 5. Tukey's Test Results on Difference Between Pairs of Means

Clusters	$ X_a - X_b $	$(q_{\alpha, v, k})(S_x)$
1 & 2	13.55454545	5.826614083
2 & 3	10.76727273	5.826614083
1 & 3	2.787272727	5.826614083

Table 5 showed that absolute values of the difference of the means of clusters one and two and clusters two and three are both greater than the 5.8266; while, the absolute value of the difference of the means of clusters one and three is less than 5.8266. This means that clusters one and two and clusters two and three are significantly different from each other while cluster one and three are not significantly different from each other. With these, the risk levels for overall health considering coping, gender and shift were ranked. The ranks are presented on the table below.

As presented in Table 6, Clusters 1 and 3 showed irregular mealtimes, noise level, workplace temperature, physical setup, and social life disruption as the top 5 among the risk factors' risk levels. While Cluster 2's top 5 rank of risk factors were workplace relationships, number of rest days, and irregular mealtimes, social life disruption, and domestic life disruption. The ranks were based on the overall health risk factor.

Table 6. Overall Risk Factor Ranking

Risk Factors	Cluster 1 & 3: Closing & Opening		Cluster 2: Middle	
	Risk Level	Rank	Risk Level	Rank
Shift rotation	7.77	6	5.78	11
Number of Rest Days	4.50	11	25.27	2
Social Life Disruption	9.52	5	24.7	4
Domestic Life Disruption	4.63	10	24.69	5
Irregular Sleep	6.74	7	16.27	9
Performance Demand	5.08	9	22.15	7
Irregular Mealtimes	17.38	1	24.9	3

Workplace Relationships	5.73	8	27.13	1
Noise Level	15.37	2	24.55	6
Workplace Temperature	10.90	3	21.9	8
Physical Setup	9.95	4	13.96	10

On the other hand, Clusters 1 and 3 ranked irregular mealtimes, noise level, social disruption, physical setup, and shift rotations as the top 5 risks on job performance. Also, Cluster 2 ranked social life disruption, performance demand, irregular mealtimes, irregular sleep, and workplace relationships as the top 5 risks on job performance.

4. Conclusion

From the result of the analysis in the data obtained from 180 respondents of the study, the following conclusions were drawn:

- (1) Using regression analysis, it was determined that significant risk factors associated with occupational stress of call center agents were shift rotation, number of rest days, social life disruption, domestic life disruption, irregular sleep, performance demand, irregular mealtimes, workplace relationships, noise level, workplace temperature, and physical setup. While gender and lighting condition were both found to be insignificant causes of stress.
- (2) The significant risk factors identified using regression analysis were further treated and analyzed in order to determine the effects of significant risk factors to the consequence of stress. Based on the result of correlation analysis, only physical health, mental health, anxiety and poor average handling time (AHT) were considered as the true consequence of stress.
- (3) Cluster analyses, both K-means and joining clustering were done in order to determine if work shifts differ in terms of significant risk factors affecting health, psychological condition and job performance of call center agents. There were three clusters considered in the study: cluster 1 is composed of the closing shift (3:30am-12:30pm); cluster 2 is composed of the middle shift (10:00pm-7:00am) and cluster 3 is composed of the opening shift (8:00pm-5:00am). Based on the results of K-means Clustering, it was found out that in each of the shifts, the occupational risk factors contributing to stress level of call center agents and the consequence of stress differ.
- (4) Based on the overall risk level calculation, the risk factors resulting to stress based on coping mechanism of call center agents in each work shift are as follows: (a) closing shift: shift rotation, social life disruption, domestic life disruption, irregular sleep, performance demand, irregular mealtimes, workplace relationships, noise level, and physical setup (b) for middle shift: number of rest days, shift rotation, social life disruption, domestic life disruption, irregular sleep, performance demand, irregular mealtimes, workplace relationships, noise level, and physical setup; and (c) opening shift: number of rest days, shift rotation, social life disruption, irregular sleep, performance demand, irregular mealtimes, workplace relationships, noise level, and physical setup.
- (5) In order to determine whether the risk levels calculated per cluster or work shift is significantly different, one-way ANOVA and Tukey's Test were employed. Based on the result, cluster 1 (closing) and cluster 3 (opening) were not significantly different, however, both are significantly different from cluster 2 (middle). The risk levels of each cluster were then ranked in order to determine the occupational risk factors affecting the stress level of call center agents. The results indicated that for cluster 1 (closing) and 3 (opening) shifts, top 5 risk factors affecting stress are irregular meal times, noise level, workplace temperature, workplace setup and social life disruption. For cluster 2 (middle) shift, top 5 risk factors are workplace relationships, number of rest days, irregular mealtimes, social life disruptions and domestic life disruptions. Therefore, the identified risk factors affecting stress would serve as the basis for organizations in call center industry to develop stress management programs that would help improve call center agents' overall performance and wellbeing.

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