A Cross-Sectional Study on Occupational Risk Factors of BPO Agents in the Philippines

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Abstract

The Business Process Outsourcing (BPO) industry in Asia remains to be optimistic in the past years. This is evident in the Philippines since the industry is hitting big due to its huge potential workforce that it caters. A large percentage of BPO workers are into telemarketing or call center sub-sector. The total number of persons employed in BPO industry was estimated at 576,000 of which nearly seven out of eight employees (88%) works in the call center subsector. Due to increasing demand of call center agents in the country, the reported occupational risks of agents are also apparent. According to recent data from PSA (2015), The BPO industry registered a total of 257 cases of occupational injuries. Most of the affected workers were employed in call centers (86.4% or 222 cases). Call center agents encounter daily stressors from work. Researches have shown that call center employees work in a distracting environment. They face high customer expectations and experience pressure to meet company standards. Thus, they experience stress as a result of the conflicting demands of the company, managers, co-workers, and customers (Ruyter, K., Wetzels, M., and Feinberg, R., 2001). Occupational risk factors have major effect on the stress level of workers. These risk factors affect the health, psychological and job performance of call centers agents. Previous researchers on occupational risk factors studied the effects of stress to job performance. However, the effect of occupational risk factors to the stress level based on the coping mechanism and work shift of agents were not yet considered in the study. Thus, this paper intends to identify significant risk factors affecting the agents' overall performance in terms of health condition, psychological condition and job performance and measure the risk level associated with occupational stress of call center agents based on their coping mechanism and work shift. Data were gathered from 180 inbound call center agents who work in 3 shifts (opening, middle and closing). Results showed that for opening and closing shifts, occupational risk factors affecting the stress level of agents are irregular meal times, noise level, workplace temperature, workplace setup and social life disruption; while for middle shift, 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.

Keywords
call center agents, occupational risk factors, stress level, coping mechanism

1. Introduction

The call center industry is one of the biggest and fastest growing industries not only in the Philippines, but also, all over the world. As a sub-sector of the business process outsourcing (BPO) industry, call centers in the Philippines remain as a major contributor of the country's economy. Call centers began in the Philippines as providers of email response and managing services that broadened to industrial capabilities for almost all types of customer relations. The calls managed by a number of Philippine call centers can be categorized into one of two types: outbound calls and inbound calls. Outbound calls include advisories, sales verification, customer services, surveys, collections and telemarketing. Inbound calls include account inquiries, verification, technical support, sales and various customer services. (Wikipedia contributors. 2018, April 3).

Call center agents encounter daily stressors from work. Researches have shown that call center employees work in a distracting environment. They face high customer expectations and experience pressure to meet company standards. Thus, they experience stress as a result of the conflicting demands of the company, managers, co-workers, and customers (Ruyter, K., Wetzels, M., and Feinberg, R., 2001). Furthermore, excessive workload, extended working hours and continuous night shift also contribute to call center agents job stress (Latha and Panchanatham, 2010).

Stress within the call center is a pervasive issue that impacts most agents. ACA Research (1998) reported that of the 433 call center agents surveyed, 25% stated that stress in their job is very high; 47% reported a medium amount of stress; 70% reported experiencing at least one stress symptom and 80% requested training in stress management. Findings from this study suggest that stress is prevalent in the call center environment and agents are interested in reducing stress.

Occupational risk factors have major effect on the stress level of call center agents. These risk factors affect the health, psychological and job performance of call centers agents. According to study of James (1998), the average turnover rate in the call center industry due to occupational stress is approximately 40% and the estimated cost of turnover is $10,000 per agent. This amounts to $2.4 million per year in a 1,000-seat call center.

Several studies have identified risk factors associated with occupational stress and their relationship to call center agents' overall performance. The studies of Dela Cuesta (2004), Co (2009) and Gyes, (2006) identified that work shift has significant effect on job performance in terms of absenteeism, stress level, productivity and health of call center agents. While similar studies of De Ruyter et al. (2001), Ahsan et al. (2009) and Subbulaxmi (2002) looked into the role of stress and its effect on job satisfaction. The results also found that leadership style of supervisors and managers contributes to the stress level of agents. Statistical tools such as correlation, regression and analysis of variance were used in order to determine the relationship of identified stress factors to the overall health and performance of call center agents.

Although numerous researches were done to identify causes of occupational stress in the call center industry, other stress factors were not yet considered in the previous studies such as (1) health factors in terms of gender, number of rest days, irregular sleep time and irregular meal time; (2) environmental factors in terms of lighting condition, noise level, workplace temperature and physical setup; (3) behavioral factors in terms of social life disruption, domestic life disruption and workplace relationship; and (4) task-related factors in terms of shift rotation and performance demand. Given this condition, the authors intend to determine the effect of identified stress factors to call center agents' overall performance in terms of health condition, psychological condition and job performance. Similarly, the authors also aim to measure the risk level associated with occupational stress of call center agents based on their work shift in order for the organizations to develop a stress management programs that would help improve call center agents' overall performance and wellbeing.

2. Methods

2.1. Data Collection

Stress level measurement of call center agents were obtained from Depression, Anxiety and Stress Scale (DASS) instrument. It is a 42-item questionnaire, which includes three self-report scales designed to measure the negative emotional states of depression, anxiety and stress of an individual. Respondents are asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state over the past week. The reliability of the three scales has been proven to be reliable because it underwent the rest-retest process for checking the reliability. The scale correlated with the Beck Anxiety Inventory of 0.81 (Lovibond & Loviband, 1995). The adaptation of call center agents to stress, which is also called coping mechanism were obtained from Coping Questionnaire taken from Standard Shiftwork Index (SSI). The 32-item questionnaire is based on the Coping

Strategies Inventory, developed by Tobin et al. (1989). The Coping Questionnaire was used as the tool to measure the respondents' degree of usage of engagement and disengagement as a coping mechanism.

Surveys were administered to 180 inbound call center agents, with 60 agents for each shift: opening, middle and closing. Frequency count and rubrics scaling was used to standardized the interpretation of data obtained from the interview and the survey results.

2.2. Statistical Analysis

The risk factors affecting stress level of call center agents were identified through review of related literatures, studies and conduct of interviews from call center agents, supervisors and managers. Descriptive measures were used to provide an analysis of summary of collected data. Regression analysis was used to identify significant risk factors associated with occupational stress of call center agents. Dependent variables considered in the regression analysis are the stress level of call center agents obtained from DASS instrument and independent variables are risk factors identified from studies that are categorized under (1) health factors, (2) environmental factor, (3) behavioral factor and (4) task related factor. The summary of risk factors and sub-factors are presented in the Table 1 below. In addition, correlation analysis was done in order to determine the relationship of significant risk factors to the consequence of stress in terms of the following: health condition, psychological condition and job performance of call center agents. K-Means cluster analysis and Joining analysis were also employed in order to establish significant difference in stress level and risk factors between gender and work shift of agents.

Subsequently, risk level per work shift were calculated based on Biron et al., (2006) Framework of Risk Level Calculation. The risk level can be computed using the formula: Risk Level = E x K x C, where E stands for exposure to stressors, K for coping and C for consequences. E or Exposure pertains to the data on the significant causes of stress obtained from regression analysis; K or coping refers to the result of coping mechanism; and, C or consequences is equal to the second degree polynomial regression of the interactive effect of stress exposure and coping (ExK) on stress outcomes, which are the health condition, psychological condition and job performance obtained from correlation analysis. Thus, calculation of risk level gave way to finding out if the significant causes of stress do or do not affect the stress levels of call center agents considering their coping mechanism. Finally, analysis of variance and pairwise comparison on the differences of means using the Tukey's Test were utilized to determine whether the risk levels calculated for each work shift is significantly different. The identified risk factors in the study would help the organizations in the call center industry to develop a stress management programs that would help improve call center agents' overall performance and wellbeing.

3. Results

3.1. Relationship of Occupational Risk Factors to Stress Level

The table below shows the result of regression analysis to identify significant occupational risk factors associated with stress level of call center agents. The risk factors and sub-factors considered in the study are categorized under: (1) health: age, gender, number of rest days, irregular sleep time and irregular meal time; (2) environmental: lighting condition, noise level, workplace temperature and physical setup; (3) behavioral: social life disruption, domestic life disruption and workplace relationship; and (4) task-related: shift rotation and performance demand. The result of the analysis is presented in the Table 1 below.

Table 1. Result of Regression Analysis

Regression Statistics	
Multiple R	0.958
R Square	0.918
Adjusted R Square	0.911

Standard Error		0.67		
Observations		180		

Factors:	Sub-Factors	Coefficients	t Stat	P-value
	Gender	-0.066	-0.636	0.525522241
	Number of Rest Days	0.208	7.899	3.66E-13
Health factors	Irregular Sleep	0.238	9.304	7.80E-17
	Irregular Mealtimes	0.158	5.055	1.13E-06
Task related factors	Shift Rotation	0.264	9.221	1.30E-16
	Performance Demand	0.213	8.379	2.17E-14
	Social Life Disruption	0.194	6.688	3.30E-10
Behavioral factors	Domestic Life Disruption	0.189	8.12	1.00E-13
	Workplace Relationships	0.283	10.318	1.35E-19
	Lighting Condition	-0.032	-1.128	0.260822106
	Noise Level	0.151	5.736	4.48E-08
Environmental factors	Workplace Temperature	0.114	5.142	7.60E-07
	Physical Setup	0.218	8.494	1.08E-14

The result of multiple regression proved that all factors identified in the study have significant effect to the stress level of call center agents except for gender and lighting conditions. Moreover, at a significance level of $\alpha = 0.05$, the regression model incurred an adjusted R^2 of 91.13% that gives a coefficient correlation (R) value of 0.958 which explained that the occupational risk factors such as no. of rest days, irregular sleep, irregular mealtime, shift rotation, performance demand, social life disruption, domestic life disruption, workplace relationships, noise level and workplace temperature are strong predictors of the stress level of call center agents.

3.2. Effects of Significant Risk Factors to Consequence of Stress

In order to determine the effect of significant risk factors to the consequence of stress in terms of the following: (1) health condition: physical health and mental health; (2) psychological condition: depression, anxiety, and (3) job performance: satisfaction, average handling time (AHT) and attendance, correlation analysis was performed. The result of the analysis is shown in the Table 2 below.

Table 2. Correlation Coefficient of Risk Factors to Consequence of Stress

Consequence of Stress		R	R^2
Health condition	Physical Health	0.9149	0.8370
	Mental Health	0.9688	0.9387
Psychological condition	Depression	0.4903	0.2404
	Anxiety	0.9278	0.8608
Job Performance	Job Satisfaction	-0.0778	0.0061
	Performance (AHT)	0.9566	0.9150
	Absence	0.0705	0.0050

Based on the result of correlation analysis, only physical health, mental health, anxiety and performance have strong relationship to the significant risk factors associated with stress level of call center agents having coefficient correlation (r) values of 0.9149, 0.9688, 0.9278, and 0.9566, respectively. Meanwhile, the correlation of job satisfaction and absence to stress level are negligible. Depression, although it has moderate correlation with stress

level, its r^2 value of 0.2404 showed that it is not a good predictor of the stress level. For these reasons, only physical health, mental health, anxiety and performance were considered as the true consequence of stress.

3.3. Cluster Analyses

Cluster analyses, both K-means and Joining (Tree) Clustering were done in order to consider shift in the determination the effect of the significant risk factors to health, psychological condition and job performance risk levels. Based on the results of K-means Clustering, there were three clusters in the data and cluster one is composed of the closing shift (3:30am-12:30pm), cluster two is composed of the middle shift (10:00pm-7:00am) and cluster three is composed of the opening shift (8:00pm-5:00am). Joining (Tree) Clustering verified this result. Figure 1 below shows the mean values of the identified factors affecting stress per cluster.
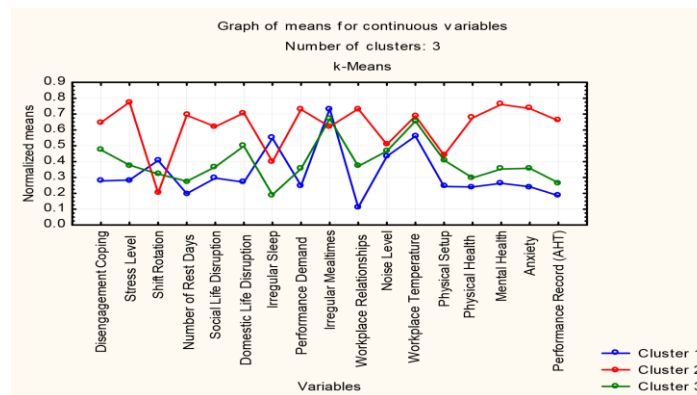

Figure 1. Means of Factors Per Cluster

Cluster 1: Closing Shift. This shift starts are 3:30 am and last until 12:30 pm. The graph of the cluster 1 is denoted by the blue line. At a glance, it can easily be deduced that this cluster uses disengagement coping the least and has the least stress level among the three clusters. The disengagement coping value is 3, which means that agents from this shift avoid thinking or doing anything about the situation; wish the situation would go away somehow or be over with; criticize themselves for what is happening; and spend more time alone rarely. This cluster's stress level is 4, which indicated that this cluster experiences mild stress from work.

As for the stressors, compared to the other clusters, workers from this cluster are the most affected by shift rotation, irregular sleep, and irregular mealtimes. The cluster's shift rotation has a value of 5, which means that agents from this cluster find changes in shift type or rotating shifts stressful. On the other hand, irregular sleep and irregular mealtime got a rating of 6 and 8, respectively. This means that agents in this cluster find irregular sleep a lot stressful and irregular mealtime very stressful. Members of this cluster perceived workplace relationships very slightly stressful; number of rest days, domestic life disruption, performance demand, and physical setup slightly stressful; social life disruption quite a bit stressful; workplace temperature a lot stressful; and, noise level quite a lot stressful.

As for the effects of stress, it can be inferred, by looking at the graph, that agents from this cluster, suffer adverse effects of stress in physical health, mental health, anxiety and job performance the least. The physical health, mental health, anxiety and job performance have ratings of 3, 3, 3 and 2, respectively. This means that agents from this cluster are slightly unhealthy physically and mentally, has bordering moderate anxiety and has a performance level that exceeds requirements of the call center company.

Cluster 2: Middle Shift. This shift starts are 10:00 pm and ends at 7:00 am. The graph of the cluster 2 is shown by the red line. It can easily be extrapolated that this cluster uses disengagement coping the most and has the most stress level among the three clusters. The disengagement coping value is 7, which means that agents from this shift avoid thinking or doing anything about the situation; wish the situation would go away somehow or be over with; criticize

themselves for what is happening; and spend more time alone very frequently. This cluster's stress level is 8, which indicated that this cluster experiences severe stress.

As for the stressors, compared to the other clusters, workers from this cluster were the most affected by number of rest days, social life disruption, domestic life disruption, performance demand, workplace relationships, noise level, workplace temperature, and physical setup. The number of workdays, along with social life disruption, has a value of 7, which shows that agents from this cluster find the allotted rest days of the company insufficient and finds it quite a lot stressful and that agents from this cluster finds lack of social life a lot stressful. Performance demand and workplace relationships have a value of 8, which means that the performance demand and relationships in the workplace are perceived by members of this cluster as very stressful. Domestic life disruption, irregular mealtimes, noise level and workplace temperature have a value of 7, respectively, which indicated that members of this cluster perceive the aforementioned stressors as quite a lot stressful. And, physical setup have a value of 5, which means the physical setup of the workplace in terms of space, design and orderliness are found to be stressful. Members of this cluster perceive shift rotation as slightly stressful and irregular sleep as stressful.

As for the effects of stress, it can be inferred from the graph, that agents from this cluster suffer adverse effects of stress in physical health, mental health, anxiety and job performance the most. The physical health has a value of 6, and mental health, anxiety and job performance have values of 8, 7 and 6 respectively. This means that agents from this cluster are unhealthy physically, very unhealthy mentally, has extremely severe anxiety and has a performance level that needs improvement for call center company.

Cluster 3: Opening Shift. This shift begins at 8 pm and ends at 5 am. The graph under this cluster is a green line. This cluster uses disengagement coping more than the first cluster (closing shift) but less than the second cluster (middle shift) and has a stress level that is generally in between the first cluster and the second cluster. The disengagement coping value is 5, which means that agents from this shift avoid thinking or doing anything about the situation; wish the situation would go away somehow or be over with; criticize themselves for what is happening; and spend more time alone to a considerable degree. This cluster's stress level is 4, which shows that this cluster experiences mild stress, which is above normal.

As for the stressors, compared to the other clusters, workers from this cluster are the least affected by irregular sleep. The irregular sleep has a value of 3. This means that irregular sleep due to work is perceived by members of this cluster as slightly stressful. Members of this cluster perceive number of rest days as slightly stressful; shift rotation, performance demand and workplace relationships as quite a bit stressful; social life disruption, domestic life disruption, physical setup as stressful; and, irregular mealtimes, noise level and workplace temperature as quite a lot stressful.

As for the effects of stress, it seemed that agents from this cluster, suffer adverse effects of stress in physical health, mental health, anxiety and job performance more than cluster 1 (closing shift) but less than cluster 2 (middle shift). The physical health has a value of 3, and mental health, anxiety and job performance have values of 4, 4 and 3, respectively. This means that agents from this cluster are slightly unhealthy physically, bordering quite unhealthy mentally, has moderate anxiety and has a performance level that meets the requirements of call center company.

3.4. Overall Risk Level Calculations and Correlation Analysis

Risk level calculations were done per cluster. This was based on Biron, et al's framework (2006) and risk levels were calculated using the equation: Risk Level = Exposure (E) x Coping (K) x Consequence (C). This equation was used in order to consider coping mechanism in the determination of the effect of the significant risk factors to health, psychological condition and job performance risk levels. The results of the calculations of risk levels for the health risks were summarized in Table 3.

Table 3. Overall Health Risk Level Per Cluster

Risk Factors	Cluster 1 (Closing)	Cluster 2 (Middle)	Cluster 3 (Opening)
Shift rotation	9.68	5.78	5.85
Number of Rest Days	1.76	25.27	7.24
Social Life Disruption	7.67	24.70	11.36
Domestic Life Disruption	3.57	24.69	5.68
Irregular Sleep	9.66	16.27	3.82
Performance Demand	3.52	22.15	6.63
Irregular Mealtimes	11.95	24.90	22.80
Workplace Relationships	3.63	27.13	7.82
Noise Level	13.11	24.55	17.62
Workplace Temperature	12.03	21.90	9.76
Physical Setup	5.62	13.96	14.28

A correlation analysis was undertaken in order to consider coping mechanism in the determination of the effect of the significant risk factors to job performance. The results were summarized in Table 4.

Table 4. Correlation Analysis between the Interactive Effect of Exposure and Coping (ExK) and Performance

Risk Factors	Cluster 1 (Closing)	Cluster 2 (Middle)	Cluster 3 (Opening)
Shift rotation	0.7205	0.5974	0.5194
Number of Rest Days	0.4200	0.6792	0.5550
Social Life Disruption	0.6448	0.7388	0.6613
Domestic Life Disruption	0.4184	0.6314	0.4782
Irregular Sleep	0.5360	0.7089	0.4524
Performance Demand	0.4473	0.7312	0.6518
Irregular Mealtimes	0.6316	0.7218	0.7973
Workplace Relationships	0.5449	0.6609	0.5296
Noise Level	0.6585	0.6922	0.7209
Workplace Temperature	0.6390	0.7064	0.5141
Physical Setup	0.5555	0.6951	0.7286

Cluster 1: Closing Shift. This shift begins at 3:30 am and ends at 12:30 pm. Considering coping, it can be seen under the cluster 1 column that shift rotation is strongly correlated ($0.70 <= r < 0.90$) to performance. While the 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 are moderately correlated ($0.40 <= r < 0.70$) to performance. This means that only shift rotation, considering coping, has a strong linear relationship with performance and the rest of the risk factors share a moderate linear relationship with performance.

Focusing on the r^2 values, it can be inferred that shift rotation, social life disruption, irregular sleep, irregular mealtimes, workplace relationships, noise level, workplace temperature and physical setup, considering coping, are moderate ($0.25 <= r^2 < 0.80$) predictors of performance in terms of AHT; and, number of rest days, domestic life disruption and performance demand, considering coping, are poor ($0 <= r^2 < 0.25$) predictors of performance.

Cluster 2: Middle Shift. This shift starts at 10:00 pm and lasts until 7:00 am. The r values of the risk factors under cluster 2 showed that social life disruption, irregular sleep, performance demand, irregular mealtimes and workplace temperature, considering coping, are strongly correlated ($0.70 <= r <= 0.90$) to performance; and, shift rotation, number of rest days, domestic life disruption, workplace relationships, noise level, and physical setup, considering coping, are moderately correlated ($0.40 <= r < 0.70$) to performance.

With regard to the r^2 values o the risk factor under cluster 2, it was evident that 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 are moderate ($0.25 <= r < 0.80$) predictors of performance in terms of AHT.

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	$|X_a - X_b|$	(qa,v,k)(Sx)
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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