Occupational Health Problems and Issues of Sleep Deprivation among Inbound Call Center Agents using Structural Equation Modelling

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Abstract. Business process outsourcing (BPO) employees encounter sleep deprivation, referred to as a severe physical condition affecting individual work performance. This study evaluates the work condition, individual, psychophysical, and domestic factors, as ergonomic criterions and its relationship to sleep quality. Survey was conducted among 148 randomly selected inbound call center agents in a BPO company, and analyzed using structural equation modelling (SEM). Results show that approximately 6 out of 10 sick leaves and absences that were recorded was due to lack of sleep, and 68.42% of employees sleeping in daytime encounters 20% call satisfaction inefficiency leading to the presence of chronic ailment symptoms such as burn out stress syndrome, fatigue, insomnia, and disruptive biological rhythms among the samples. The study recommends to improve the human factors aspect of the selected parameters and to provide an elegant solution in promoting a holistic work-life balance.

Keywords: sleep deprivation, structural equation modelling, business process outsourcing, ergonomics, human factors

1. INTRODUCTION

Over the past decade, business process outsourcing (BPO) industry have successfully contributed to global economic growth (Bangko Sentral ng Pilipinas, 2013). According to latest statistics of International Data Corporation (IDC), business process outsourcing (BPO) worldwide market is expected to increase at 5.7% annual growth rate, which will generate $209.7 billion sales (Estrada et al., 2007). This economic and global market share allowed rapid mobility, dynamic customer care, and profound shift for service compliance (Cabuay et al., 2012). Dubbed as the "sunshine industry" of the Philippines, BPO's industry revenue can reach $25 billion this year, almost the same to expected overseas Filipino workers' (OFWs) remittances (Estrada et al., 2007). BPO companies particularly call centers, either international, national, or transnational, basically serve customers from developed countries such as United States, Singapore, etc. wherein majority of work are performed for 24 hours due to time zone differences (Bhasin et al., 2015). One of these work schedule often known as *graveyard shift* starting around midnight (12:00AM) running through early morning (8:00AM) causes fragmented nocturnal sleep and greatly affects daytime body functions resulting to impaired vigilance and performance. This work schedule goes against circadian rhythm wherein people must biologically be awake during the day and sleep at night (Shwetha and Sudhakar, 2013; Bhasin et al., 2015). Thus, BPO employees are facing physiological challenges in providing consistent efficiency and customer service satisfaction (Shwetha and Sudhakar, 2012). Proper sleep, which is often ignored, has a vital role in maintaining excellent work productivity and performance (Bhasin et al., 2015). This study examines the work condition, individual, psychophysical, and domestic factors in order to improve employees overall wellbeing and promote holistic work-life balance. Studies claimed that employees permanently assigned to graveyard shift have an average sleep duration of 5.8 – 6.4 hours per day, whereas rotating shift work employees only sleep for 5.25 – 5.5 hours per day, making sleep deprivation a serious health concern (Arand and Bonnet, 1995). Turbulent and long working hours, long travel time, work pressure, and inadequate breaks are some factors triggering stress, anxiety, and depression among BPO employees (Shwetha and Sudhakar, 2012; Bhasin et al., 2015). Long night shift duties cause deleterious psychophysical health effects. Coping mechanisms such as peculiar eating habits (i.e., skipping meals,

exposure to junk foods, and overeating) and high stimulant intake such as tea, cola or coffee often result to chronic health problems specifically, fatigue, irregular and poor sleep quality, obesity and higher risks of acquiring cardiovascular diseases (Arand and Bonnet, 1995; Singh and Sujata, 2011; Shwetha and Sudhakar, 2012; 2013; Bhasin et al., 2015).

1.1. Problem Statement

According to the company data, 148 shift workers of inbound customer care department have a time distribution composed of 61.54% actual working hours, 15.38% overtime period, and only 7.69% allotted time for partial sleep (bed quarters time) duration, resulting to poor work performance – 20% call satisfaction inefficiency and chronic health problems – 6 out of 10 sick leaves and absences, wherein there are 1 case of fatigue, 2 case of insomnia, and 3 cases of gastrointestinal problems recorded for the month of August 2015. This corresponds to a total estimated loss of $150 billion in a year (Colten and Altevogt , 2006).

1.2. Objectives of the Study

T The study aims to evaluate the work condition and environment, individual, psychophysical, and domestic factors that affects individual work performance of BPO inbound customer care call center agents.

1. Valuate the prevalence of anxiety, depression, and stress its respective predictors using Depression Anxiety Stress Scale-42 (DASS-42).
2. Determine sleep quality using an 8-item Athens Insomnia Scale.
3. Measure the irregularity and poor sleeping habits using Epworth Sleepiness Scale.
4. Assess the overall well-being and condition of inbound call center employees and customer service representatives through survey of shiftworkers (SOS) questionnaire.

1.3. Scope and Limitations

The study focuses on 148 inbound customer care employees subject to graveyard shift (12:00AM – 8:00AM; UTC +8:00) wherein time distribution is composed of the following (1) Actual Working Hours, (2) Official Breaks, (3) Overtime and Bed Quarters Period. Call handling and satisfaction requirements along with diagnosed condition based on medical records for the month of August 2015 – April 2016.

The attrition feedback level of respondents was noticeably low for survey of shiftworkers (SOS) questionnaire compared to other test questionnaires. The willingness of randomly selected respondents to answer another set of survey questionnaire had declined. Method of missing values as part of preliminary statistical analysis was conducted based on alternative procedure preferred by some authors (Schumacker and Lomax, 2010; Khine, 2013). The data are clustered in terms of sample size, type of organization, employment level and role, and various socio-demographic classification. Observed indicator variables as measurement tool for quantitative data analysis were selected based on high availability of widely used method of applications, references and resources.

2. LITERATURE REVIEW

In various industries, call centers are used to provide phone-based and customer support services to manage client and company relations. It is an important mode of communication to acquire a new customer and or maintain customer loyalty (Pontes and Kelly MBA, 2000). The initiation of conversation direction between customer and employee can be distinguished as inbound, outbound, or blended call center (Stolletz, 2003; Bergevin et al., 2010). In an inbound call center, employees wait and receive calls from outside random customers at different arrival times, whereas outbound call center conduct sales activities, market surveys, product selling, etc. (Lin et al., 2010; Bergevin et al., 2010). Blended operations handle both inbound and outbound calls (Bergevin et al., 2010). Customer satisfaction can be achieved through short waiting times and fast complaints settlement. Call handling, a number of resolved calls, conversation and waiting time, service availability, and customer commendation or complaints are some factors considered in measuring technical performance (Bergevin et al., 2010). These components correspond to high workforce demand and predictive growth rate, leaving behind the emerging problems (i.e., the increasing labor turnover, adverse working condition, stressful work environment and poor career development) that can seriously impact the economic condition and productivity of business process outsourcing sector (Stolletz, 2003; Budhwar et al., 2009; and Bergevin et al., 2010). It has been reported that 27.1% of inbound call center employees are experiencing biological, psychological, social, and work-related problems namely, sleep disturbance, cognitive inefficiency, irregular dietary habits, gastrointestinal problems, menstrual cycle for women, cardiovascular and neuropsychic diseases, unusual behavior, stress, anxiety, and depression, fatigue and exhaustion, stimulant, alcohol, and narcotics consumption as coping mechanisms, withdrawal, alienation, and irritability, work accidents, labor turnover and intentions, and absenteeism. (Stolletz, 2003; Colten & Altevogt , 2006; Estrada et al., 2007; Budhwar, Varma, Neeru, & Mukherjee, 2009; Kunikullaya U, Suresh, Tech, Venkatesh, & Jaisri, 2010; Lin, Chen, Hong, & Lin, 2010; Singh & Sujata, 2011; Cabuay et al., 2012; Lozano-Kuhne, et al., 2012; Shwetha & Sudhakar, 2014; Bhasin et al.,

2015). Health complaints were considered as common (i.e., Those pertaining to eyes, cough and colds, and voice disorders) and dependent to work environment (such as migraine, back pain, stress, etc.) (Lozano-Kuhne et al., 2012). Long working hours and frequent shift changes, leading to disrupted circadian rhythm, sleep deprivation, and atypical eating behavior are some contributing factors inducing detrimental effects on cognitive performance (Budhwar et al., 2009; Lin et al., 2010; Lozano-Kuhne et al., 2012; Bhasin et al., 2015), specifically in learning, memory, executive function, and visual memory domain (Shwetha & Sudhakar, 2014) In terms of body mass index (BMI) classifications of adults, 15% of call center employees are overweight, obese, or underweight. Excessive daytime sleepiness was determined to be usual among shift workers. The prevalence of abnormal daytime sleepiness, insomnia, restless leg syndrome, and obstructive sleep apnea are 55%, 36%, 4%, and 7.4% respectively. Other studies revealed severe biological health effects of shift work such as higher risk of acquiring cancer, cardiovascular and metabolic pathologies (Lozano-Kuhne et al., 2012). Shift worker are going through job-related psychosocial stress primarily due to high workload, job insecurity, extreme supervision and monitoring, and irregular work schedules. Bhasin et al., (2015) also investigated and claimed the psychological effects of shift work schedule among international call center agents of New Delhi. Results shows that the pervasiveness of stress, anxiety, and depression are 46.7%, 57.1%, and 62.9% respectively, wherein abnormal sleep quality, lack of relaxation facilities at work and prolonged travel time are the predictors of stress and depression. Whereas part-time / temporary employment, presence of physical ailments (i.e., musculoskeletal disorder) and absence of hobbies, and long travel distance to work were found to be the significant predictors of anxiety – a direct effect of night shift work (Lozano-Kuhne, et al., 2012). Tedious and stressful work environment, adverse working condition, peculiar working hours as determined by geographic location, learning foreign accent, estrangement, assuming pseudo identities, altered social and family life, harboring risk related to working in a prominent industry, inability to handle work – life balance (Singh & Sujata, 2011), job disillusionment, and lack of personal and career growth opportunities are the emerging causes of high labor turnover (Budhwar et al., 2009). NASSCOM and Indian call center managers claimed a labor turnover rate of 15 – 20%, other BPO organizations tend to put it at 25% (Lozano-Kuhne, et al., 2012) For some business process outsourcing firms, call center employees ae required to acquire foreign accent, change names, and develop a new interest to promote better conversation and satisfy their customers which may lead to "multiple personality disorder" – a disturbance in identity, and yet organizations often ignore its long-term impact (Budhwar et al., 2009).

2.1 Research Gap

Most studies that were cited are from foreign countries, particularly from India which concentrates in management, sociology, and psychology domain, with few in public health. There are limited studies and resources in the country (Philippines) and variables do not allow comparison with other state. This study examines the relationship and correlation of factors namely, cognitive efficiency and performance, sleep quality and duration, lifestyle as determined by stimulants, alcohol and narcotics consumption, physical ailments (i.e., musculoskeletal disorders), and body mass index (BMI) classification relevant to age, work environment, and call handling and satisfaction requirements among inbound call center employees.

2.2. Conceptual Framework

Figure 1 shows the conceptual framework.

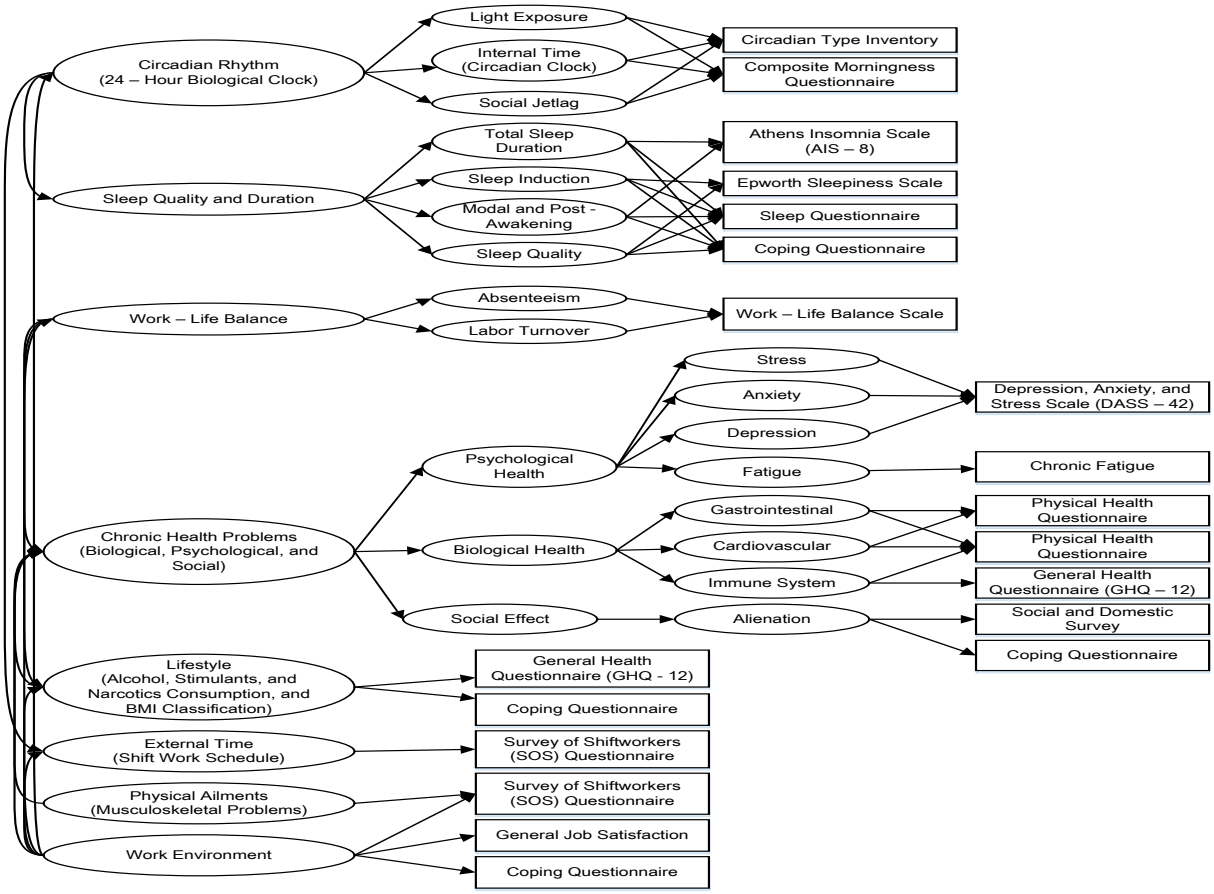

Figure 1. Conceptual Framework

3. METHODOLOGY

This study used structural equation modelling to examine different constructs and ergonomic factors that were claimed to have indirect and direct relationship with shiftwork.

3.1. Participants

Three hundred (300) shift workers, particularly as inbound customer service representative and call center agents from different organizations were selected as respondents for the study. In terms of individual modified responses, 66.7% and 33.3% of respondents are 20-25 and 30-39 years-old respectively. 50% are male and female, 83.3% are single, 67% have at least 3 dependents living with them, 80% have worked altogether ranging from 2 – 4 years. The series of survey test questionnaires and scaling system greatly varies to independent variables, factors, and predictors.

3.2. Materials

It has been determined that the factors investigated in this study requires ergonomic criterion to assess the overall well-being and condition of the concerned population. These survey test questionnaires are frequently use in clinical neurophysiology and/or psychology, psychosomatic research, public health, and other related interest to evaluate the individual conditions of shiftwork employees from different industries.

3.2.1. Depression, Anxiety, and Stress Scale (DASS)

DASS is a 4-point severity scale that contains a set of three (3) self-account scales, which are subdivided into 2-5 similar-content items devised to measure core symptoms of depression, anxiety, and stress namely, dysphoria, devaluation of life, lack of interest or involvement, hopelessness, self-deprecation, inertia, anhedonia. skeletal muscle effects, autonomic arousal, situational, subjective experience of

anxious effect, nervous arousal assessment, relaxation difficulty, impatient, irritability or over-reaction and agitation. It has a reliability test result of 0.71, 0.86, and 0.88 for depression, anxiety, and stress respectively (Lovibond, 1995; Barlow et al., 1997; Crawford and Henry, 2003; Bhasin et al., 2015).

3.2.2. Athens Insomnia Scale (AIS)

The AIS is an 8-item questionnaire designed in accordance with the ICD-10 criteria for insomnia. It assesses sleep initiation difficulties, sleep maintenance, duration, and quality, and early morning awakenings for the first five (5) items. The remaining three (3) items evaluate daytime impairment aspects which includes well-being, sleepiness, and physical and mental function (Pallesen, et al., 2008; Yen et al., 2010). Both the 8-item and 5-item versions provide good reliability with Cronbach alpha and 2-week test-retest reliability around 0.90, mean total item correlation coefficient and validity of 0.70 and 0.90 respectively (Soldatos et al., 2000; 2003; Chung et al., 2011).

3.2.3. Epworth Sleepiness Scale (ESS)

ESS questionnaire utilizes different method of evaluating sleep propensity based on retrospective reports of dozing behavior in eight different situations with a subject rating scale from 0 to 3. Circumstances were selected based on *a priori* grounds which assesses three main soporific nature levels. Scores were found to be significantly but not highly correlated in multiple sleep latency tests (MSLTs). ESS can appraise patient groups with diverse sleep disorders. It has a high level internal consistency and test-retest reliability amid its eight items (Johns, 1994).

3.2.4. Survey of Shiftworkers (SOS) Questionnaire

SOS questionnaire is a long translated version of standard shiftwork index (SSI) which contains battery of questionnaires with corresponding rating scales covering shift work system, individual resilience and difference to shiftwork measures. The scales were chosen based on precision, easy-administration, good psychometric properties which tackles the most admissible issues in shiftwork research. The following scales and questionnaires are General Job Satisfaction, Sleep Questionnaire, Chronic Fatigue, Physical Health Questionnaire, General Health Questionnaire, Cognitive-Somatic Anxiety Questionnaire, Social and Domestic Survey, and Coping Questionnaire.

4. RESULTS AND DISCUSSIONS

Using ordinal data, test scores and required sample size, all the tests questionnaires have passed the assumptions for performing structural equation modelling. Table 1 the data assumptions.

Table 1. Data Assumptions

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.405[a]	.164	.141	80.389

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	369419.108	8	46177.389	7.146	.000[b]
	Residual	1880555.892	291	6462.391		
	Total	2249975.000	299			

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-15.41	264.63	150.50	35.150	300
Std. Predicted Value	-4.720	3.247	.000	1.000	300
Standard Error of Predicted Value	6.920	27.117	13.453	3.595	300
Adjusted Predicted Value	-18.55	282.90	150.57	35.167	300
Residual	-237.635	166.915	.000	79.306	300
Std. Residual	-2.956	2.076	.000	.987	300
Stud. Residual	-3.068	2.109	.000	1.002	300
Deleted Residual	-255.901	172.238	-.068	81.794	300
Stud. Deleted Residual	-3.113	2.122	.000	1.004	300
Mahal. Distance	**1.219**	**33.026**	**7.973**	**5.272**	**300**
Cook's Distance	.000	.080	.004	.006	300
Centered Leverage Value	.004	.110	.027	.018	300

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	82.510	85.300		.967	.334		
ESS	2.472	1.677	.080	1.475	.141	.969	1.032
DASS	2.777	.401	.382	6.932	.000	.944	1.059
AIS	-.944	1.786	-.029	-.528	.598	.934	1.071
PHQ-D	-1.220	1.853	-.035	-.658	.511	.990	1.010
PHQ-C	-1.944	1.543	-.068	-1.260	.209	.975	1.026
GHQ	-1.186	1.656	-.039	-.717	.474	.976	1.024
CSAQ-C	2.685	4.378	.033	.613	.540	.968	1.033
CSAQ-S	-.484	2.864	-.009	-.169	.866	.952	1.050

Datasets were evaluated using IBM SPSS Statistics v.23 software. The assumptions of multivariate normality and multicollinearity were performed using linear regression with all the observed variables as the predictors, and sample identification as dependent variable. Based on residual

statistics, mahalanobis distance condition was applied, no cases were eliminated. In coefficients section, VIF values were not greater than 10, and tolerances were consistent.

Table 2. Variance Analysis

Descriptive Statistics			
	N	Mean	Variance
ESS	300	11.77	7.932
DASS	**300**	**60.43**	**142.646**
AIS	300	11.82	7.256
PHQ-D	300	20.02	6.359
PHQ-C	300	32.45	9.310
GHQ	300	30.03	8.076
CSAQ-C	300	3.07	1.165
CSAQ-S	300	6.01	2.768
Valid N (listwise)	300		

Using descriptive statistics for checking the assumption that no variance is ten times greater than the other variances of constructs, it has been identified that DASS-42 must be eliminated before performing further analysis.

Scatterplot matrix was also executed to test the homoscedasticity of data, yielding a regression standardized predicted value with loess line. For sample size determination, the anticipated effect size was set at 0.3, with a desired statistical power level of 80%, probability level of 50%, 7 latent variables, and 19 observed variables. Hence, there must be minimum sample size of 170 to detect the effect, and recommended minimum sample size of 247.

The latent variables were extracted using principal component analysis with rotation method of varimax with Kaiser normalization. Based on correlation matrix, there is a determinant of 0.862. Therefore, the assumption of positive definiteness was satisfied.

Reliability, exploratory factor analysis and factor analysis was performed to test the existence of all constructs and assess if the data fits the theoretical model. The following results were obtained from the model:

- There is a negative correlation between circadian rhythm and work environment constructs.
- DASS-42 as an observed indicator variable have high value in factor analysis and therefore non-existent factor to shiftwork.
- In AIS-8, there is a negative weak correlation between final awakenings and sleep induction, the rest have positive strong correlation.
- ESS have high mean scale and therefore affects all the constructs.
- There is a direct relationship between work environment, circadian rhythm, physical ailments, and chronic health problems to work-life balance and external time (shiftwork schedule).
- Chronic health problems have a direct relationship with lifestyle as determined by alcohol, stimulants, narcotics consumption and body mass index classification.

The battery of test questionnaires of survey of shiftworkers (SOS) were consistent in reliability analysis but still subject for further improvement of scoring methods and extensive evaluation.

5. CONCLUSIONS AND RECOMMENDATIONS

Improvement of working environment and diminution of working hours should be addressed to call center firms. Massive recruitment of highly qualified employees is recommended in order to create a good work environment, better labor intentions, lower employee turnover, and eminent career development with best compromise between the work demand and employees' needs. Involvement of occupational health advisors, management, and call center employees, irrespective of functional areas, should participate in planning, analysis, and design phases of shiftwork schedules. Given the job related and environment factors associated with shiftwork, BPO companies should prioritize the overall well-being, safety, and health of call center employees since it can greatly reduce accidents, illness, and injuries. Thus, increasing work efficiency.

5.1. Work Relaxation Facilities

Inbound call centers have structured procedures and monotonous work nature which leads to high stress environment. Currently, stress management consumers less than four percent of training time in call centers. A need for relaxation facilities like gymnasium, meditation, library, and counseling is highly suggested. Health examination depending on individual cases may be required periodically for early detection, diagnosis, and treatment of psychological and other lifestyle problems through employing psychologists, psychiatrists, physicians, and other concerned health experts. Fostering stress-free and healthy lifestyle should be emphasized through frequent information, education, and communication (IEC) activities.

5.2. Career Planning and Development

High salary pay and health insurance have become "pull" factors in attracting and retaining qualified applicants. However, career-minded employees tend to leave due to lack

of promotion and career advancement, further aggravating the increasing labor turnover and resignation intentions. An established career progression models, development, and advancement though crucial, may help the human resource management to promote organizational commitment among employees and to convince qualified candidates to choose call centers as career option, not just a job.

5.3. Internal Marketing Strategy

Internal marketing strategy intends to essentially satisfy both the wants and needs of internal customers (i.e., employees) so as to deliver excellent service and high external customer satisfaction. A well-structured and efficient internal marketing strategy is important to improve employee-management relations and overall organizational keenness and performance. This would help call center organizations to pull qualified employees who can bring excellent customer service.

5.5. Family Involvement

Family, as one of the predictors of work-life balance is critical, specially to female call center employees. Female shift workers are having difficulty to balance work and personal life compared to male employees. Inviting family for recreation activities could develop a better figure call centers. Indeed, some call center firms created "family day" events and accounted for noticeable improvement of employees' involvement and performance.

5.7. Employee Welfare and Public Assistance

It is recommended that call center firms may create or follow specific family-friendly policies such as child and / or elder care, and flexible time arrangements, family leave policies, and other employee assistance programs. This could serve as competitive advantage and accomplishment of encompassing objective of corporate social responsibility.

5.8. Human Resource Management Interventions in Policy Implications

In public sector companies, employees are not aware of work-life balance program and campaign as part of organizational policies. It is recommended to develop and carry out effective work-life balance related policies and encourage shiftwork employees to utilize these schemes. This can also be use as part of induction program for positive reinforcement of work-life balance.

1. Campaigns fostering existing work-life balance policies, followed by a review and allowances for current options.
2. Work-life balance issues, as they arise, must be addressed through mentoring, counselling, and interpersonal conversation / advising.
3. Conducting counselling sessions in order to promote and sustain healthier work-life balance. This could also serve as motivation factors for others to benchmark.
4. Acknowledgement and prominence must be given to build female-friendly work environment, job sharing, pay quality policy and telecommuting options.

The policy department must take necessary measures to help call center employees create work and personal life balance. Further help of supervisors and management through assistance and empathizing issues concerning requests may alleviate work and family conflict. Family and peer group support is also important in handling both personal and work-related problems. A complementary and considerate work environment may help female call center employees perform efficiently, utilizing their potential and future organizational benefits.

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