Modelling Approach to the Analysis of the Influence of Human Resource Practices on Quality of Work Life in Call Centre Industries using Optimization techniques

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Abstract

This paper discusses the research conducted by the authors to find out the determinants of Quality of Work Life (QWL) in the call centre industry at Bangalore, the Silicon Valley of India. Questionnaire was designed to elicit information pertaining to various facets of human resource practices prevailing in the call centre industry. The questionnaire contains eight independent variables and one dependant variable. Using random sampling method 364 call centre executives were considered for the study spreading across 9 top-notch call centers. Regression analysis was performed on the data and the results indicate that Organizational Perception, Health, Provisions and Opportunity influence the QWL to a great extent. An optimization model is arrived at based on the research and this can provide a foundation to the academicians and industrial experts to explore the area of human resource management in ITeS sector further for the betterment of the workforce in particular and organization in general.

Key words: Quality of Work Life, Call centre industry, Human resource practices, Linear Programming
Introduction
Quality of Work Life according to the American Society of Training and Development Task Force (1979), is a process of work organizations which enables its members at all levels to participate actively and efficiently in shaping the organizations environment, methods and outcomes. It is a value based process, which is aimed towards meeting the twin goals of enhanced effectiveness of the organization and improved quality of life at the work for employees. Quality of Work Life (QWL) is a philosophy, a set of principles, which holds that people are the most important resource in the organization as they are trust worthy, responsible and capable of making valuable contribution and they should be treated with dignity and respect. The elements that are relevant to an individual’s quality of work life include the task, the physical environment, and social environment within the organization, administrative system and relationship between life and off the job. Quality of Work life is a comprehensive construct that includes an individual’s job related to well being and the extent to which work experiences are rewarding, fulfilling and devoid of stress and other negative personal consequences. Quality of work life plays a crucial role for the organization’s success. This is more so in a human intensive industry such as the call centre industry.

Status of Indian ITeS-BPO industry
The BPO industry is about 12 years old in India. The Indian Business Process Outsourcing (BPO) industry has undergone significant transformation since its inception over a decade ago. The Indian BPO industry can broadly be categorized as Voice based BPO and Non voice based BPO. In Indian context the Call Centre industry is referred to as Voice based BPO. Starting out with basic data entry tasks, the industry rapidly acquired a reputation as the primary low cost destination for voice based customer contact services, finance and a range of back office processing activities. The past few years have seen the scope of these services expanding to include increasingly more complex processes involving rule based decision making and research /analytic services requiring informed individual judgment and domain specific knowledge. BPO is the fastest growing segment of the Indian IT-BPO sector. The sector continues to grow from strength to strength witnessing high levels of activity both on shore and off shore. The segment is currently growing at about 30% and is expected to employ about 7,04,000 in 2007-08 as against 5,53,000 in 2006-07. Export revenues from this sector are estimated to grow from 8.4 billion USD in 2006-07 to 10.9 billion USD in 2007-08 an year-on-year growth of over 30%.

Context of the Research Study
Business Processing Outsourcing industry involves a dyadic relationship between the service provider and the client. However, this research is carried out at the Service providers’ end. Though the industry is contributing a great way to the GDP of the nation, there are some people related issues, which need to be looked into. Industry Reports suggest that the call centre industry is experiencing heavy attrition rates of
upto 50% and in some organizations the levels are even going upto 70%. Various strategies have been thought upon and the industry experts feel that the maturity level of the industry has to do with the issue of these attrition levels. NASSCOM Report (2008) mentions that the total export BPO market opportunity will be around 220-280 billion USD by 2012. While the industry shows a healthy trend, there are doubts about the demand being met. One of the reasons for this could be the little concern the call centre industry management is giving in having healthy HR practices which enable good quality of work life for the industry executives.

Review of literature on QWL suggests that various studies have been carried out in the area of QWL vis-à-vis service and manufacturing sectors, but the QWL in the call centre industry is an under researched area in India. Few studies have been carried out in Call Centers in Australia, UK and other East Asian Countries. Most of the works looked into how the QWL will influence various aspects of employee life in the organization ranging from motivation to turnover intentions. Some studies also looked into the aspect of what factors and management practices in the organization influence QWL. However, very little is researched in the area of HRM vis-à-vis QWL in the industry. It is necessary to acknowledge the fact that the human resource practices prevailing in the organization will have profound influence in determining the QWL, thereby ensuring the employee loyalty towards the organization. This can expect enhance the performance of the executives in the call centre industry.

In the above context the authors have undertaken an empirical study to determine the factors influencing QWL in the Indian call centre industry.

**Methodology of Research**

**Design and Development of the Instrument**

Two sets of questionnaires were designed and they have been categorized into HR questionnaire and Employee questionnaire. The HR questionnaire is designed to document the prevailing human resource practices such as recruitment, selection, orientation and appraisal systems in the call centres. Employee Questionnaire was designed to elicit the views of the employees on various parameters of human resource management prevailing in their organizations. The factors considered for the study include seven independent types and one dependent type and they are: Self actualization, Organizational perception, Family, Health and Ergonomics, Economics, Relations at work, Work stress and QWL. Each of these variables consisted of several sub-variables affecting them. The final questionnaire is designed in consultation with the executives and academicians in the field of human resource management. The input is also obtained from the contact centre executives during the pilot study conducted on fifty executives.

A 5-point response scale with 2.5 being "Strongly Disagree", 10 being "Strongly Agree" and 0 being "Not Applicable" was used. The type of statistical analysis required for this study (i.e. regression analysis) dictated the use of an interval scale, one which guaranteed that the distances between adjacent numbers were the same. As advised by Allen and Rao calculating means and standard deviations are "highly suspect" if ordinal-level scales are used. The simplicity of a 10-point scale is preferred
as compared to the scale of any other number (5 or 7) that may need more explanations. Further, the studies show that for a narrow scale there are low levels of inter-correlation and limited variance.

**Target population and Sampling technique**
The target population for the empirical study is the call centre employees in Bangalore. A random sampling procedure was employed. A total of 500 respondents as a good representative of the target population of approximately 15000 employees were reached over a three-month period. Of the 500 approached the study team received responses from364 executives, thereby making the response rate a good 72.8% . The respondent population was spread across nine major call centers in Bangalore.

**Data Analysis**
The quantitative data collected was subjected to various statistical analyses. Stepwise regression, a method by which each predictor variable is selected for inclusion in the model based on the significance of t-statistics in a step-by-step selection, was chosen based on the premise that multi-collinearity, which is a common problem in multiple regression, could be somewhat circumvented. In this study, a default $\alpha$ (alpha) of 0.05 was used to determine the level of significance. The software used for the analysis is SYSTAT.

**Results & Discussion**
**Level of Quality of Work Life (QWL)**
Based on the ten-point scale used, the minimum QWL rating was 1.875 and a maximum of 10.00 and this gives a range of 8.125. The median QWL rating value was 6.875 with a standard deviation of 1.493. The mean QWL rating was 6.640 implying that overall the level of QWL is good. The 25th percentile of the QWL is 5.625 and the 75th percentile is 7.500 and thus the inter-quartile range (IQR) is 1.875. The values obtained for the 25th and 75th percentile suggest that 50% of the respondents have a QWL rating between 5.625 and 7.500. The 90th percentile of the QWL is 8.125, which mean that 90% of the respondents have a QWL reading of 8.125 or less. In other words, only 10% of respondents obtained a QWL reading of above 8.125.

In accordance with the ratings of below 4 is low, 4-6 is moderate, 6-8 is good and above 8 is excellent as the indication of satisfaction, the employees appeared to have been rather satisfied with their level of QWL. The employees who felt that their level of QWL is good are 48.4%, moderate -30.9%, excellent -12.8% and low - 7.9%.

The findings in (Table1) indicate that the mean ratings for the independent variables in descending order of high to low are Relations at Work (M=7.118, SD=1.232), Organization Perception (M=7.101, SD=1.163), Health (M=6.755, SD=1.334), Opportunity (M=6.600, SD=2.501), Provisions (M=6.476, SD=1.137), Work Stress (M=6.439, SD=1.197), Economics (M=6.420, SD=1.191), Family (M=4.749, SD=2.886).
As depicted in (Table 2), QWL is positively related to Relations at Work ($r = 0.276, P = .001$), Organization Perception ($r = 0.532, P = .001$), Health ($r = -0.080, P = .001$), Opportunity ($r = 0.336, P = .001$), Provisions ($r = 0.423, P = .001$), Work Stress ($r = 0.302, P = .001$), Economics ($r = 0.318, P = .001$), Family ($r = -0.080, P = .001$).

### Table 1: Descriptive Statistics.

<table>
<thead>
<tr>
<th></th>
<th>Org Perception</th>
<th>Family</th>
<th>Health</th>
<th>Economics</th>
<th>Relation</th>
<th>Work Stress</th>
<th>Provisions</th>
<th>Opportunity</th>
<th>QWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>N of Cases</td>
<td>364</td>
<td>364</td>
<td>364</td>
<td>364</td>
<td>364</td>
<td>364</td>
<td>364</td>
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</tr>
<tr>
<td>Minimum</td>
<td>2.500</td>
<td>0.000</td>
<td>2.500</td>
<td>2.500</td>
<td>2.500</td>
<td>3.125</td>
<td>2.500</td>
<td>2.500</td>
<td>1.875</td>
</tr>
<tr>
<td>Maximum</td>
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<td>10.000</td>
<td>10.000</td>
<td>10.000</td>
<td>10.000</td>
<td>10.000</td>
<td>32.500</td>
<td>10.000</td>
</tr>
<tr>
<td>Range</td>
<td>7.500</td>
<td>10.000</td>
<td>7.500</td>
<td>7.500</td>
<td>7.500</td>
<td>6.875</td>
<td>7.500</td>
<td>30.000</td>
<td>8.125</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>1.163</td>
<td>2.886</td>
<td>1.334</td>
<td>1.191</td>
<td>1.232</td>
<td>1.197</td>
<td>1.137</td>
<td>2.501</td>
<td>1.493</td>
</tr>
<tr>
<td>Method = CLEVELAND</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.000%</td>
<td>6.250</td>
<td>2.500</td>
<td>6.250</td>
<td>5.750</td>
<td>6.250</td>
<td>5.625</td>
<td>5.833</td>
<td>5.000</td>
<td>5.625</td>
</tr>
<tr>
<td>75.000%</td>
<td>7.917</td>
<td>7.500</td>
<td>7.500</td>
<td>7.500</td>
<td>7.500</td>
<td>7.188</td>
<td>7.083</td>
<td>7.500</td>
<td>7.500</td>
</tr>
<tr>
<td>90.000%</td>
<td>8.333</td>
<td>7.625</td>
<td>8.750</td>
<td>7.500</td>
<td>8.750</td>
<td>7.813</td>
<td>7.917</td>
<td>8.333</td>
<td>8.125</td>
</tr>
</tbody>
</table>

### Table 2: Correlation Matrix.

**Pearson Correlation Matrix**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Org perception</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td>0.097</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>0.388</td>
<td>-0.124</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics</td>
<td>0.281</td>
<td>0.174</td>
<td>0.153</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relation</td>
<td>0.261</td>
<td>0.127</td>
<td>0.370</td>
<td>0.291</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrk_stress</td>
<td>0.354</td>
<td>0.216</td>
<td>0.344</td>
<td>0.548</td>
<td>0.490</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provisions</td>
<td>0.317</td>
<td>0.043</td>
<td>0.155</td>
<td>0.298</td>
<td>0.118</td>
<td>0.223</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunity</td>
<td>0.204</td>
<td>-0.027</td>
<td>0.112</td>
<td>0.266</td>
<td>0.158</td>
<td>0.207</td>
<td>0.329</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>QWL</td>
<td>0.532</td>
<td>-0.080</td>
<td>0.402</td>
<td>0.318</td>
<td>0.276</td>
<td>0.302</td>
<td>0.423</td>
<td>0.336</td>
<td>1.000</td>
</tr>
</tbody>
</table>

**Predictors of QWL**

Regression analysis was conducted to find out the factors influencing QWL. The analysis showed that four predictor variables were found to be of significance in explaining QWL. The four-predictor variables are Organization Perception, Health, Provisions and Opportunity.
As depicted in the coefficients table (Table 3), the estimates of the model coefficients for $\beta_0$ is -0.689, $\beta_1$ is 0.440, $\beta_2$ is 0.241, $\beta_3$ is 0.296, and $\beta_4$ is 0.100. Therefore, the estimated model is as below:

$$Y (\text{QWL}) = -0.689 + 0.440 (X_1) + 0.241 (X_2) + 0.296 (X_3) + 0.100(X_4) + E$$

Where:

$X_1$ = Organization Perception,
$X_2$ = Health,
$X_3$ = Provisions and
$X_4$ = Opportunity.

### Table 3: Estimates of Coefficients.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>QWL</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>364</td>
</tr>
<tr>
<td>Multiple R</td>
<td>0.648</td>
</tr>
<tr>
<td>Squared Multiple R</td>
<td>0.420</td>
</tr>
<tr>
<td>Adjusted Squared Multiple R</td>
<td>0.414</td>
</tr>
<tr>
<td>Standard Error of Estimate</td>
<td>1.143</td>
</tr>
</tbody>
</table>

Regression Coefficients $B = (X'X)^{-1}X'Y$

<table>
<thead>
<tr>
<th>Effect</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Std. Coefficient</th>
<th>Tolerance</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONSTANT</td>
<td>-0.689</td>
<td>0.471</td>
<td>0.000</td>
<td>-1.462</td>
<td>0.145</td>
<td></td>
</tr>
<tr>
<td>ORG PERCEPTION</td>
<td>0.440</td>
<td>0.059</td>
<td>0.343</td>
<td>7.505</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>HEALTH</td>
<td>0.241</td>
<td>0.049</td>
<td>0.216</td>
<td>4.940</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>PROVISIONS</td>
<td>0.296</td>
<td>0.058</td>
<td>0.226</td>
<td>5.106</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>OPPORTUNITY</td>
<td>0.100</td>
<td>0.026</td>
<td>0.167</td>
<td>3.911</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

The R-squared of 0.420 implies that the four predictor variables explain about 42.0% of the variance in the QWL. This is quite a respectable result. The ANOVA table revealed that the F-statistics (65.121) is very large and the corresponding p-value is highly significant (0.0001) or lower than the alpha value of 0.05. This indicates that the slope of the estimated linear regression model line is not equal to zero confirming that there is linear relationship between QWL and the predictor variables.

As depicted in Table 3, the Beta value for Organization Perception is the highest (0.343), followed by Provisions (0.226), Health (0.216). The Beta value for Opportunity is the smallest (0.167) indicating that it made least contribution.

Based on the collinearity diagnostic table obtained, none of the tolerance value is smaller than 0.10. This indicates that there is no serious multi-collinearity problem among the predictor variables of the model. The normal P-P plot of regression standardized residuals revealed all observed values fall roughly along the straight line.
indicating that the residuals are normally distributed. The scatter-plot indicates the relationship between the dependent variables and the predictors is linear and the residual’s variances are equal or constant. Since there is no multi-collinearity problem between the predictors included in the model and the assumptions of normality, equality of variance and linearity are all met, hence, it is wise to conclude that the estimated regression model is valid and respectable. Finally, a conceptual model depicting the level of influence of various parameters on quality of work life is arrived at.

**Figure 1**: Conceptual model of the factors influencing QWL.

![Conceptual model of factors influencing QWL](image)

**Optimization Model for Maximizing QWL**

Based on the information collected through survey, weightages were awarded to various parameters influencing the QWL. Finally, Linear programming problem was
developed with the objective function as Maximization of the Quality of work life. The model involves seventeen variables and four constraints. All the variables are positive. The lower and Upper bound values range from Zero to Ten. The model was analyzed using the STORM package. The input data into the package in equation style is as follows:

PROBLEM DATA IN EQUATION STYLE

Maximize

\[+ 0.35 \text{VAR} 1 + 0.35 \text{VAR} 2 + 0.35 \text{VAR} 3 + 0.35 \text{VAR} 4
+ 0.35 \text{VAR} 5 + 0.35 \text{VAR} 6 + 0.25 \text{VAR} 7
+ 0.25 \text{VAR} 8 + 0.25 \text{VAR} 9 + 0.25 \text{VAR} 10
+ 0.25 \text{VAR} 11 + 0.25 \text{VAR} 12 + 0.25 \text{VAR} 13
+ 0.25 \text{VAR} 14 + 0.15 \text{VAR} 15 + 0.15 \text{VAR} 16
+ 0.15 \text{VAR} 17\]

Subject to

CONSTR 1
\[+ 0.1 \text{VAR} 1 + 0.15 \text{VAR} 2 + 0.05 \text{VAR} 3 + 0.15 \text{VAR} 4
+ 0.25 \text{VAR} 5 + 0.3 \text{VAR} 6 >= 7.5\]

CONSTR 2
\[+ 0.5 \text{VAR} 7 + 0.5 \text{VAR} 8 >= 6.5\]

CONSTR 3
\[+ 0.05 \text{VAR} 9 + 0.1 \text{VAR} 10 + 0.3 \text{VAR} 11 + 0.25 \text{VAR} 12
+ 0.15 \text{VAR} 13 + 0.15 \text{VAR} 14 >= 7\]

CONSTR 4
\[+ 0.5 \text{VAR} 15 + 0.35 \text{VAR} 16 + 0.15 \text{VAR} 17 >= 6.5\]

0 <= VAR 1 <= 10
0 <= VAR 2 <= 10
0 <= VAR 3 <= 10
0 <= VAR 4 <= 10
0 <= VAR 5 <= 10
0 <= VAR 6 <= 10
0 <= VAR 7 <= 10
0 <= VAR 8 <= 10
0 <= VAR 9 <= 10
0 <= VAR 10 <= 10
0 <= VAR 11 <= 10
0 <= VAR 12 <= 10
0 <= VAR 13 <= 10
0 <= VAR 14 <= 10
0 <= VAR 15 <= 10
0 <= VAR 16 <= 10
0 <= VAR 17 <= 10
The reports generated upon analysis give the following results indicating the fact that the problem designed provides a feasible optimal solution for maximizing the quality of work life in call centres.

QWL-Voice

**OPTIMAL SOLUTION - SUMMARY REPORT (NONZERO VARIABLES)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VAR 1</td>
<td>10.0000</td>
</tr>
<tr>
<td>2</td>
<td>VAR 2</td>
<td>10.0000</td>
</tr>
<tr>
<td>3</td>
<td>VAR 3</td>
<td>10.0000</td>
</tr>
<tr>
<td>4</td>
<td>VAR 4</td>
<td>10.0000</td>
</tr>
</tbody>
</table>

Continued ....
5  VAR   5        10.0000         0.3500
6  VAR   6        10.0000         0.3500
7  VAR   7        10.0000         0.2500
8  VAR   8        10.0000         0.2500
9  VAR   9        10.0000         0.2500
10 VAR  10        10.0000         0.2500
11 VAR  11        10.0000         0.2500
12 VAR  12        10.0000         0.2500
13 VAR  13        10.0000         0.2500
14 VAR  14        10.0000         0.2500
15 VAR  15        10.0000         0.1500
16 VAR  16        10.0000         0.1500
17 VAR  17        10.0000         0.1500
Slack Variables
18 CONSTR   1         2.5000         0.0000
19 CONSTR   2         3.5000         0.0000
20 CONSTR   3         3.0000         0.0000
21 CONSTR   4         3.5000         0.0000

Objective Function Value = 45.5

Conclusion
From the analysis conducted in call centers, it is observed that Quality of Work life is influenced by Organizational Perception, Provisions, Health and Opportunity. It is a known fact that the work in call centre is highly monotonous and the environment is absolutely live. This puts lot of pressure on the employee which in turn leads to increase in stress levels of the employee. The employees can enjoy their job by means of job enrichment. This can happen by understanding the science behind doing the work. Many of the call centres do have in place certain human resource practices to enhance the QWL. However, there is a need to look into the following thoughts. The employees should have an attitude of involving in lateral jobs From the organization side the management has to create an environment which can foster good relationships within the organization across the departments. The professional interactions need to be encouraged amongst the employees within and outside the organization. Career advancement schemes have to be put in place and the organization has to create a feeling of being required by the company amongst the employees. The strategic management has to strive to create a brand name for their
organization in the sector. This will enable the call centre executives to definitely have a kind of positive perception about the organization and this could lead to a situation where the executives could think of having a long term association with the organization. If the predictions of the industry growth by various agencies have to be realized, there is a need for the call centre managements to look into this matter seriously.

Bibliography