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Effects Obtained Within Call Centers at Different Employee Occupancy Rates

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Abstract:
The occupancy rate is one of the most important indicators for call centers, this percentage relates the hours worked by available employees and the hours spent by them in productive activities. This percentage is one of the major elements that generates errors of the operators and leads to burnout effect. The research questions if there is a universal occupational factor which at the same time minimizes errors, maximizes service, optimizes productivity and increases the call centers sales. A questionnaire was applied to top call centers managers. The results were processed at a significance level using an inference procedure to analyze the difference between two population means. It was found that the occupational rate (i) optimize productivity vs minimize procedure errors and (ii) optimize productivity vs maximize kind service are incompatible results, thus the top managers at the call centers ought to target their employee's occupation and decide if they want to maximize kind service, minimize the number of errors or optimize productivity.

Keywords: Call center management, behavioral operations, operations strategy, planning and scheduling, service operations.

1. Introduction

The call centers Industry is growing exponentially worldwide. They are strategic areas for companies as they are one of the gateways for customer communication, to expose their service experiences, problems, complaints, inquiries, offers, transactions, sales and services. Today, all Fortune 500 companies have at least one call center, which on average employs 4,500 employees each (Rehmat et al.,2015).

The profitability of call centers is very sensitive to the occupancy rate of its employees in customer related activities. The cost of human resources usually represents, on average, 70% of their total call center cost (TanandNetessine, 2014). Usually, conflict exists when the amount of work is contrasted against its quality, for this reason, top managers should consider occupancy rate in the design of their organization, staff selection, training, job design, empowerment in the supervisory systems online, performance measurement and incentive pay, promotions and security plans (Choi et al., 2012; Martí-Audí et al., 2013). Consequently, the study of overuse or underwork of employees at call centers is justified.

Most errors that occur in business are caused by human factors (Amendola, 2006; Chapman,2005; Givi et al., 2015). Particularly it is shown that overloading human resources is one of the major factors leading to executive errors (Báez et al., 2013; Wickens et al.,2015). The analysis of human factors is part of the complex systems theory, which proposes that a large number of correlated variables: personal, organizational, situational and environmental factors make difficult to determine the causes of reliable executive work (Pons et al., 2014).

1.1 TheEmployee'sOccupancy Rate

The occupancy rate of staff is one of the most important indicators for call centers, this percentage relates the hours worked by the available employees and the hours spent by them in productive activities (Gans, 2003). Some features of this indicator are consistent in the literature, such as its relation with significant costs of health and safety, where there is a clear relation between the percentage of occupation and physical conditions and the safety of employees (Burchell et al., 2009; Eurofound, 2012), even if the definition of the occupancy rate differs depending on the studies cited. For the purpose of this research we use Jouini et al. (2013) definition of occupancy rate as the percentage of occupation of time that employees are engaged in activities of customers, compared to all the time they are connected at their workstation. The information about the occupancy of employees is accessible from the client company's local automatic call distributor (ACD) (Gans and Zhou, 2007). From the corporate profitability perspective, the ideal situation is obtained when all call centers employees have an occupancy rate of 100% of their time engaged either in talking or other customer related activities (Koole,2013). However, this is utopian as it has been demonstrated that the occupancy rate of the executive cannot come to 100% even at peak hours of operation. Sze (1984, p. 229) said: "Typically, 90-95% of the operators are occupied during busy periods, but because of the large number of servers, only about half of the customers are delayed".

In the literature, the term overload is used when there is overwork of employees to serve customers, and the term understaffing is used if the same employees are underemployed (RodandAshill, 2013). The staff cannot be permanently in overload due to operational and labor causes. An operational cause occurs when no outbound calls have been programmed or no incoming calls have been received from customers requesting for attention. A labor cause occurs when employees are ill, on paid vacation, away for training, receiving coaching or, especially, gone on paid breaks. The fraction of time in which employees are unoccupied is known as idle time, and the fraction of time that employees cannot work because of labor issues is called shrinkage. In the industry of call centers, it is not uncommon to see cases with 40% occupancy rate (Koole, 2013). If the occupancy rate is permanently close to 100%, the call center will have a difficult situation since, eventually, the customers queue can spiral out of control or explode. If this situation raises top managers at call centers have basically three options to return to normal operation and lower occupancy rate: (a) increase the number of service employees, (b) increase the number of customers served by each employee, or (c) reduce the number of customers arriving (Ostrom et al., 2015). In this regard, the telecom company AT & T recommends in its Universal Card Services one standard behavior: maintain a standard rate of 70% of the total time of employees devoted to customer interaction (Singh, 2000).

There is a perceived difference between real worked time and perceived worked time. Support for this was found at perceived occupation research. Posing questions such as Does your activity requires working at very high speed? Activity requires working with tight deadlines? Or Do you have enough time to accomplish required activities? The authors concluded that this difference is due to intrinsic job related factors such as equipment, cooperation, support administration and training and external factors such as weather or added experience (Burchell et al., 2009; Hernandez et al., 2015). Particularly, it has been empirically shown that employees in a call center experience emotional exhaustion when a conflict between the workload and the quality required of it exists. This depletion worsens due to three causes: (a) the constant contact with customers with problems, many times with aggressive attitudes, (b) reduced time breaks between calls, and (c) the constant monitoring to which they are subject, generating a feeling of overload (Becker, 2013; Jenkins andDelbridge, 2013; Rafaeli et al., 2012; Sliter et al., 2011; Taylor et al., 2014).

1.2.Executive Errors in their Work

Bauer and Harteis (2012) define error as those actions or decisions that divert the company from its original plans, established to achieve the desired objectives. When processes require that people interact with machines, the variables that affect the probability of making a procedure error are related to human factors (Báez et al.,2013; García-Herrero et al., 2012;Stave andTörner, 2007).It is shown that companies overexploitation lead to staff work stress, and stress is highly correlated with accidents at work (Bardera et al., 2002; Gillen et al.,2002; Glasscock et al.,2006; HiltonandWhiteford, 2010). In this regard, the International Labor Organization (ILO) has recognized that overtime without rest periods, increases the likelihood of accidents; mainly because workers diminish their level of alert as their experience sleep disturbance and chronic general fatigue (Soglo, 2012).

1.3. TheLack of Kind Service with Customers

Peskin et al. (1997) define kind service as an attribute of people. It reflects the internal ability to maintain close relations; Neumann et al. (2011) added some consequences to this definition. It causes pleasant feelings of joy, friendship, tenderness and kindness. Call centers develop within a constant time pressure (Deery et al., 2010). In this environment, employees are required to permanently adapt to unpredictable interactions with customers, avoid relaxing in their efforts and maintain concentration in each contact (Hampson et al., 2009). In addition, employees are constantly observed by a monitoring system to measure their performance (Ball andMargulis, 2011; Deery et al., 2010). It is shown that the time pressure, and constant evaluation; are elements of the work environment that impact the ability of employees to provide a friendly and kind service (Aksin et al., 2009; Littleand Dean, 2006).

In particular, the staff monitoring systems in call centers includes procedures for observation and evaluation of executive behavior and telephone responses. In this matter, it is shown that people come into conflict when they are observed, and this conflict creates situations of discord in human relations (Meier et al., 2013). Work developed in a conflict environment, combined with mental workload, have a negative effect on mood changes that affect subjects in the short, medium and long term. Consequently, these changes generate a poor performance of employees, who are in direct contact with customers (Briggs et al., 2014; Meier and Gross, 2015; Zhou et al., 2015).

1.4.The Productivity of Employees

Studies on productivity in call centers rely on four basic management tools: (a) standardization and specialization process, (b) division of processes between external and internal suppliers, (c) separation and optimization tasks and (d) management of access channels customers with a business (Bititci et al.,2012;Koole, 2013;SteinkuhlerandKoole, 2014), these tools agree that productivity at call centers is defined by the number of customers served per unit time (Singh, 2000). Workload and serial production are two essential characteristics of call centers, this is why they focus on optimizing productivity within a defined quality standard and within a budget cost, which Seddon (2008) defines their central management paradigm. This paradigm is derived from the following variables: How much work load do you have? How many employees are available? How many tasks can be performed every hour per executive? In this regard, the negative consequences of mental and physical exhaustion are significant to the employees at call centers and for the organization as they involve substantial costs due to low job performance (Das, 2012; Deery et al., 2010).

Employees at call centers are under constant pressure to meet their goals of productivity and quality in customer service at the same time (Deery et al., 2002; Kjellberg et al., 2010). This pressure results in executive physical and mental exhaustion, which substantially reduces their productivity (Choi et al., 2012; Rod andAshill, 2011). This situation exacerbates if top managers overload employees with extra assignments (HakanenandSchaufeli, 2012; Wegge et al., 2014).

1.5.The Volume of Sales Executive

The most frequent indicator used to measure the effectiveness of telephone sales employees in call centers is the amount of sales made by an employee in a given period of time (López and Vanessa, 2014; Montarcé, 2009). Problems with sales at call centers arise when there are few calls from customers, because few sales will be made, but also when many calls from customers are presented, as high accuracy and attention are needed in conversations in order to close sales (Fu et al., 2009).

One of the solutions suggested to reduce the exhaustion of executives is to have the correct volume of workers required for the operation of a call center, not to over staff and not lack staff. Driving a percentage of optimum occupancy of employees avoids administrative problems in implementation. For future research, it is required to explore the relationship between operational planning, control and performance of human resources to be modeled effectively (Aksinand Rod, 2007).

The *research question*, based on the variables defined in the theoretical framework is: there an occupation rate which at the same time minimizes errors, maximizes the kind service, optimizes productivity, increases call centers sales and maximizes customer satisfaction?

2. Methodology

Based on the literature review the following conceptual definition for the independent variable will be used: *Occupancyrate* is the percentage of the employees' timethatthey are engaged in customer activities compared to the percentage of employees´ time that they are connected toa workstation (Jouini et al., 2013).*Errors* are the volume of actions and decisions that deviate from their original plan to achieve the desired company objectives (BauerandHarteis, 2012).*Kind service* is the ability to establish and maintain a close relationship, hosting, which is established through verbal and nonverbal behaviors; so that for the customer means a pleasant experience (Lagos-Sánchez, 2015;Neumann et al., 2011;Peskin et al., 1997).*Productivity* is the number of clients served by employee, for a period of time (Singh, 2000).*Sales* is the amount of sales achieved per employee for a defined period of time (Lópezand Vanessa, 2014).The notation used in the remainder of the paper is summarized below: *OR_errors$_i$* occupancy rate that minimizes errors; *OR_kind$_i$* occupancy rate that maximizes kind service; *OR_productivity$_i$*occupancy rate that optimizes productivity; *OR_sales$_i$* occupancy rate that maximizes sales; *OR_satisfaction$_i$* occupancy rate that maximizes customer satisfaction.

The variables were measured on the basis of a questionnaire that was applied to call centers top managers. Questions and doubts about the definitions were resolved previous to gathering the information. The tool used to collect data was a questionnaire of 5 questions, plus some other descriptive data.

It was delivered in person and was filled by the top managers, at the same time the researcher resolved the doubts about the definitions included in the questions. It was clear that participation was completely voluntary and in no way implied an official opinion from their company. It was stated explicitly that the information expressed on the survey is confidential. The questionnaire was made in a Likert scale 11 points, and the responses were within a range 50% to 100%, with increases of 5%. The procedure of Cronbach (1951) Alfa coefficient was used to analyze the reliability of the instrument. To answer the research, question the following hypothesis are integrated:

- Hypothesis 1: E[*OR_errors*] =E[*OR_kind*] = E[*OR_productivity*] =E[*OR_sales*] = E[*OR_satisfaction*]

The t distribution inference procedure was used to analyze the difference between two population means from unawareness of the population standard deviations for hypothesis testing with the method of correcting Welch (Ortizand Moreno, 2011):

$$X_1 - X_2 \pm t_{\frac{\alpha}{2}} \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

Where 1-α is the confidence coefficient and the degrees of freedom of the distribution with two independent random samples is given by:

$$gl = \frac{\left(\dfrac{S_1^2}{n_1} + \dfrac{S_2^2}{n_2}\right)^2}{\dfrac{1}{n_1-1}\left(\dfrac{S_1^2}{n_1}\right)^2 + \dfrac{1}{n_2-1}\left(\dfrac{S_2^2}{n_2}\right)^2}$$

Unadjusted comparisons were performed between all the possible combinations of the five variables, utilizing tests 2-Sample t Test for the Mean of two variables. All the analysis was performed using Minitab 17.*p-values*<0.05 were considered statistically significant.

3. Results and Hypothesis Testing

90 questionnaires were distributed to different call centers, 7 were discarded due to incomplete or duplicated information. 83 viable questionnaires were obtained (92% response rate).

The call center companies sample was composed by: 20% service oriented, such as education, hospitality or tourism; 18% outsourcing or business process operations services oriented; 14% aimed at financial sector; 11% commercial sector; 11% aimed at insurance business and road assistance, and the rest divided into several sectors.52 call centers were dedicated to sales,35 were dedicated to inbound calls, 12 to outbound calls, 34 have mixed processes, and 2 did not testify. In terms of sizes, the total number of workstations of the sample was27,542 (*N*=83; *M*=349; *S*=682). Due to the high standard deviation of the number of workstations obtained in the sample, we controlled the test for the whole sample by running two additional test for two groups split up by the median (*Mdn*=70): small (*n*=39; *M*=31, *S*=20) and large (*n*=39; *M*=660, *S*=854). Table 1 shows the items of the questionnaire.

Variable	Request
OR_errors	What is the occupancy rate of your call center employees that minimizes the number of errors?
OR_kind	What is the occupancy rate of your call center employees that maximizes kind service with customers?
OR_productivity	What is the occupancy rate of your call center employees that optimizes productivity?
OR_sales	What is the occupancy rate of your call center employees that maximizes sales?
OR_satisfaction	What is the occupancy rate of your call center employees that maximizes customer satisfaction?

Table 1: Survey items

The Cronbach's *alpha* coefficient of the 5 items of the received questionnaires was 0.91, which is acceptable under the general criteria of George and Mallery (2003), whose recommendations suggest that an*alpha*> 0.90coefficient is excellent. We ran a test to identify possible item reduction and the results were negative (Campo-Arias, 2006).

The Sample mean, standard deviation (*S*), Standard Error for the mean (*SEM*) and the confidence interval (*CI*) obtained by the five items, shown by call center size are in Table 2.

Size Call Center	Variables	Sample[a]	Mean (%)	S (%)	SEM (%)	95%CI
Total sample	*OR_errors*	83	78.6	9.2	1.0	(76.6, 80.6)
	OR_kind	82	77.1	10.6	1.2	(74.8, 79.5)
	OR_productivity	83	81.5	10.0	1.1	(79.3, 83.7)
	OR_sales	52	79.6	11.0	1.5	(76.6, 82.7)
	OR_satisfaction	81	78.7	11.0	1.2	(76.3, 81.1)
Small Call centers	*OR_errors*	39	79.5	9.6	1.5	(76.4, 82.6)
	OR_kind	39	79.0	11.0	1.8	(75.4, 82.5)
	OR_productivity	39	83.1	9.1	1.5	(80.1, 86.0)
	OR_sales	24	79.4	10.9	2.2	(74.8, 84.0)
	OR_satisfaction	39	81.4	11.4	1.8	(77.7, 85.1)
Large Call centers	*OR_errors*	40	77.1	9.0	1.4	(74.3, 80.0)
	OR_kind	39	74.5	9.7	1.6	(71.3, 77.6)
	OR_productivity	40	80.1	10.7	1.7	(76.7, 83.6)
	OR_sales	26	79.8	11.8	2.3	(75.1, 84.6)
	OR_satisfaction	38	75.9	9.1	1.5	(72.9, 78.9)

Table 2: Sample t to compute a confidence interval. Note[a]Differences between the number of questionnaires received and the size of the total sample is due to missing data.

As shown in the Table 2: (a) the lowest standard deviation of the five items is that of the occupancy rate that minimizes errors (*S*= 9.6),this means that the community sampled in this item is the most homogenous,(b) the lowest average of the five items is that of

occupancy rate that maximizes kind services (*M*=77.1), (c) The highest average of the five items is that of occupancy rate that optimizes productivity (*M*=81.5), (d) The highest standard deviation of the five items is that of the occupancy rate that maximizes sales (*S*=1.5), this means that the community sampled in this item is the most heterogeneous.

The first test result was: There are not unusual data points. The normality is not an issue. Welch´s method was used, which does not assume or require that the two samples have equal variances; the test performs well with unequal o equal variances.

The results of the hypothesis testing for differences between two population means, applied to the total sample were: (a) the pairs of variables *OR_errors*vs. *OR_productivity* have sufficient statistical evidence to reject the hypothesis of equality of means with an estimated difference of: -2.95; 95% *CI* for difference: (-5.89, -0.014); t-Test of difference = 0 (vs ≠): *t-Value*=-1.98; *p-Value*=0.049, with *df* = 162,(b) The pairs of variables *OR_kind* vs. *OR_productivity*have sufficient statistical evidence to reject the hypothesis of equality of means with an estimated difference of: -4.37; 95% *CI* for difference: (-7.54, -1.21); t-Test of difference = 0 (vs ≠): *t-Value* = -2.73; *p-Value* = 0.007, with*df*= 162.The results of this study show that the means of the latter are different: (a) the call center employees´ occupancy rate that minimizes the number of errors ought to be different from the occupancy rate that optimizes productivity; and (b) the call center employees´ occupancy rate that maximizes kind service ought to be different from the occupancy rate that optimizes productivity. It can be concluded at the 0.05 level of significance.

The results of the hypothesis testing for differences between two population means applied to the total sample were: (a)*OR_errors* vs *OR_kind*, (*P*=0.360);(b)*OR_kind* vs *OR_sales*, (*P*=0.200); (c)*OR_kind* vs *OR_satisfaction* (*P*=0.356); (d)*OR_productivity* vs *OR_sales* (*P*=0.317); (e)*OR_productivity* vs *OR_satisfaction* (*P*=0.090); (f)*OR_sales* vs *OR_satisfaction* (*P*=0.643); (g)*OR_errors* vs *OR_sales* (*P*=0.564); (h)*OR_errors* vs *OR_satisfaction* (*P*=0.925), reveals that there is insufficient statistical evidence to reject the hypothesis of equality of means, with a significance level of 5%.

The same test was applied to the split-up samples: small and large call centers. The results of the latter confirm that the pair: *OR_kind*vs*OR_productivity*(*P*=0.17) have different means. In all other cases, there is insufficient statistical evidence to conclude significant results.

4. Conclusions and New Directions

Based on the call centers´ top manager experience and the results of the statistical data analysis performed, the probability of the existence of a single occupation rate for all management purposes is inexistent, especially in the case of large call centers. The confidence intervals analysis shows that the occupancy rate that maximizeskindservice and the occupancy rate that minimizes errors are incompatible with an occupancy rate that optimizes employee productivity. The occupation rate that optimizes employee productivity, should be less than 84%(*CI*: 79.3% - 83.7%), and no employee should be working more than 90% of their time, as suggested by other authors. Surpassing this percentage leads to burnout effect and its consequences.

Decision makers within the call centers operation, should asses and consider what their main purpose is, since there is not a single effectiveoccupancy rate that solves all company *objective functions*. If they want to maximize the kind service given to customers, then they should pursuea77%average employee occupancy rate; but if they want to minimize the number of errors, then they should pursue a79% average employee occupancy rate. Finally, if they want to optimize productivity, then the percentage should be around 82%.

I suggest refer Chan et al. (2014) to review how they defined objective functions that account for the service levels, the abandonment ratios, and the fairness of occupancy across agent groups.

The tests do not yield to a conclusive finding on the topics of customer satisfaction and sales. For future research, the use of different methodologies is suggested.

The present study provides important knowledge about the call centers´ occupational rate. Even if the sample size was representative, the results obtained based on some top managers´ experience are debatable. As the result are perceptions based, subsequent investigation is needed for the five categories of analysis studied, relying on hard data obtained from call center operation, to compare the results.

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