International Business Management 10 (1): 1-8, 2016
ISSN: 1993-5250

Evaluation Skills with Support of Multicriteria Modeling

Maria do Ceu Sena de Moura and Marcos Felipe Falcao Sobral
Departamento de Administracao, Federal Rural University of Pernambuco,
AvenidaDom Manoel de Medeiros, s/n-Dois Irmaos, Recife, PE, Brazil

Abstract: The performance evaluation of competencies is one of the most promising tools for assessing human capital in organizations. However, the analysis of multiple axes at the same time is complex and prone to error. The aim of this study is to propose the use of multicriteria support to aid the decision maker in evaluating competencies. To this end, the multicriteria method called ELECTRE TRI was used to analyze the competencies and accomplish classification of the employees. The competencies axes, Skills, Knowledge and Attitude (SKA) are used in the method as criteria while the evaluated employees were the "alternatives". A field study involving 91 employees working in Call Center Company of Pernambuco State (Brazil) was conducted. The results showed that it is possible to perform specific modeling for each type of function. In the groups of attendants, approximately 15% of workers demonstrated poor performance. Analogously, similar results were observed in 10% of managers. The model arises as a support in the processes of firing, hiring and training.

Key words: Multicriteria decision aid, ELECTRE TRI, competency management, call center, training

INTRODUCTION

Human competencies manifest in combinations of SKA (Skills, Knowledge and Attitude) in which knowledge, technical skills and attitude impact behavior. These three factors are interrelated and interdependent. In this context, skills should add economic value to the organization and social value to the individual. Therefore, competency is the result of crossing three axes: the formation of the person, the educational background and professional experience.

The objective of this research was to analyze and classify the employees of a call center based on competency management in operational and management levels. The multicriteria decision support model was used by the ELECTRE TRI Method. Initially, the model was a brief review of competency assessment, a call center, multicriteria decision support and ELECTRE TRI.

Data were obtained through field research with exploratory questionnaires given to 91 workers from the Call Center of Pernambuco. The group was comprised of 84 attendants and seven participants classified as company managers. Groups of attendants were segmented according to the level of autonomy and complexity of the financial transactions performed. The teams were named A, B and C. Each team had two levels of coverage and different treatment, depending on the allocation of transactions identified as L_1 and L_2 (Level 1 and 2). The study was conducted in a call center company specializing in debt recovery and collections with Active Call Center, Inbound and Blended operations.

Use of the ELECTRE TRI methodology had the following results. In the L_{1A} group, approximately 30% of the attendants were classified as having low performance skills. In contrast, 100% of the attendants in the L_{2A} group were classified as having high performance. In the group of company managers, 10% had low performance in skills. This result indicates that this team needs monitoring because the management team must be strategic and capable of leading teams.

Data analysis was performed using various procedures, however, there was practically no change in classification. It can be stated that when the results are equal, the classification occurred consistently (Mousseau and Slowinski, 1998). This modeling emerges as an important assessment tool providing support to the decision maker in the processes of firing, hiring, recruitment and selection as well as training.

Objectives:

- We conducted a field study involving 91 employees of a Brazilian Call Center
- We collected informationto evaluate the basis of competencies
- Was considered the competencies axes as criteria and the employees as alternatives and we used the Multicriteria Method ELECTRE TRI to promote a sort into four classes (excellent, good, deficient and poor)

Corresponding Author: Marcos Felipe Falcao Sobral, Departamento de Administracao, Federal Rural University of Pernambuco, AvenidaDom Manoel de Medeiros, s/n-Dois Irmaos, Recife, PE, Brazil

- The use of Multicriteria Modeling can be used to reduce the complex analysis of competencies

Literature review

Competency based management: Competency management is an important research subject within the more general area of knowledge management and has an important contribution at the organizational and personal levels (Draganidis and Mentzas, 2006).

Competencies with in companies began to be studied in 1973 by McClelland. At that time, psychologists and managers in the United States initiated a debate and study of assessing competency (McClelland, 1973). At the time, the research distinguished competencies from aptitude, stating that aptitude is the natural talent of the people while competency is learned by a person who may be assigned a performance task or may be characteristic of a particular situation (McClelland, 1973).

A number of authors believe that competencies encompass more than just knowledge and skill and propose a more inclusive definition such as "a specific, identifiable and measurable knowledge, skill, ability and/or other characteristic which a human resource may possess and which is necessary for an activity in a specific business context (Sicilia, 2007).

Competency is the result of crossing three axes: the formation of the person, the educational background and their professional experience. Therefore, competency is a set of social and communicative learning, fed by upstream and downstream and by the learning evaluation system.

According to Durand, there are three dimensions of competencies: knowledge, skill and ability. Knowledge is related to savvy while skill is related to technique and abilityto behavioral aspects. These three dimensions are interrelated and interdependent and a professional can be considered competent when he or she has developed these three dimensions.

It is most important to identify which particular set of key skills is required for the business to achieve its strategic goals (Homer, 2001). The competencies must provide economic value to the organization and social value to the individual. Figure 1 shows the relation between competencies and economic value.

The competency called "Management" can be described as a set of processess that aim to identify, classify and oversee competencies that employees need to perform specific tasks (Loia *et al*., 2010). Thus, the concept of competency can be defined as a knowledge, act or responsibility that when recognized, implies, mobilizes, integrates, transfers knowledge, resources or skills that add economic value to the organization and social value to the individual.

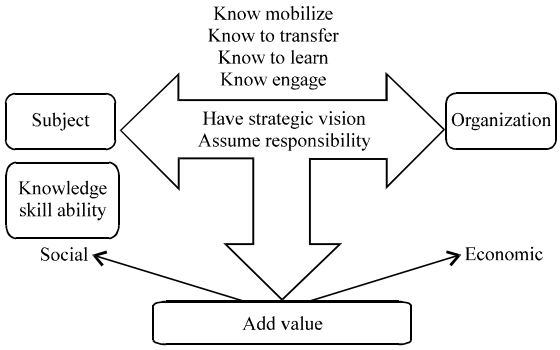

Fig. 1: Competencies as a value source to organizations and individuals

The network of knowledge starts to assert the individual as key to generate competencies and thus begins the discussion regarding organizational skills. In the 1980s, the "core competency" concept was proposed that presents competency as the ability to combine, mix and integrate resources and services (Prahalad and Hamel, 1990).

The challenge for organizations is to relate the use of instruments associated with the practices of collective learning, team development and knowledge management to provide multiple opportunities for professional growth and to encourage people not only to develop their individual skills collectively but also share them.

Thus, the organization has several organizational skills which are subdivided into the following levels: essential or strategic skills and distinctive. This generates organizational competitive advantage and links the individual skills of each person in the company to the skills and attitudes that generate economic value to the social organization and the individual (Mills *et al*., 2002). Sant'Anna state that it is possible to conclude that organizations have demanded a broad range of skills but to a high degree, a modernity of policies and management practices can be observed.

It is possible to correlate mutations at work with skills development based on three concepts: event, communication and service. The notion of "event" befalls unplanned, partially unpredictably but of importance to the productive activity; "communication" derives from the observation that the quality of interactions is critical to improving the performance of organizations and the "service" is considered the product or service in line with the expectations of customers and users.

The Teleservice and its evolution in Brazil: The Teleservice definition encompasses geographical distance use of information technology and industrial service (Kussel *et al*., 2000). The call center focuses on the

relationship with customers, via phone, e-mail or other technology. Furthermore, the Short Message Service (SMS) is considered a promising tool for operating teleservices (Acker, 2014).

In the last decade, call center operations became an inevitable part of many global businesses (Aktekin, 2014) and the expansion of Teleservice companies in Brazil was promoted by economic, social, cultural and political factors that propitiated the distant interactions. Violence rates and traffic congestion in large urban centers also influenced the expansion of this sector.

In Brazil, certain events intensified the growth of the teleservice business. In the 1980's, due to the oil crisis, door to door sales became more expensive. With this, telemarketing and direct mail began to be used more frequently in business. In the 1990's, operations multiplied after the enactment of the Consumer Protection Code and in the 2000's, privatization of the telecommunications and energy sectors made use of the call center more prevalent in organizations.

Despite the phone being used predominantly in call centers, new technologies extended the communication channels, automated processes and hadthe capability to support a large number of simultaneous connections.

There is a broad range of studies about call centers. These studies were concentrated initially in queue modeling (Aktekin, 2014; Liu and Liu, 2012; Qi *et al*., 2006; Sherstneva, 2012). However, new research is focused on other themes such as analysis of trade union responses to the reorganization of the work of a call center in Germany (Holtgrewe and Doellgast, 2012) and how the Irish call centers respond to offshore competition (Jobs and Butler, 2006).

These studies corroborate the evolution of the industry and address existing problems because the activity of a call center can be considered new if compared with other existing activities in the labor market. Several studies propose the opening of self-help portals through web sites, thereby reducing the flow of calls and the cost to the call center. The results showed that there are processes by which the client can resolve their own problems without having to actually make a call (Garg *et al*., 2008).

Multicriteria decision aid and the ELECTRE TRI: Decision-making and problem resolution are of significant concern to executives. In the course of daily business, a number of decisions must be made with or without the use of formal methods to support the decision. The concern however is associated with the consequences of such decisions because the performance of these actions impacts both the competitiveness and survival of organizations.

The decision support aids obtain information to answer the questions posed by a decision maker (stakeholder) in the decision-making process. These elements classify the decision and lead to a recommendation (Roy, 1996). A decision model justifies the efforts made to solve a given problem or decisions of major impact.

The purpose of adopting multiple criteria is to help make better decisions, thus the Multicriteria Decision Aid (MCDA) Method allows an increasing degree of conformity and coherence between the evolution of the decision making process and the systems of values and goals of those involved in the decision process (Roy, 1990). The decision process can be summarized as (Roy, 1996):

- (P.α): Select the "best" alternative (s)
- (P.β): Perform classification of the alternatives, i.e., abide by the alternatives that seem to be "good" and discard the ones that seem "bad"
- (P.γ): Make a ranking of alternatives
- (P.δ): Describe the alternatives

The ELECTRE Methods (Elimination etChoixTraduisant la Realite) are subdivided in various versions as ELECTRE I, II, III, IV and TRI (Roy, 1996). The ELECTRE TRI was proposed by Yu and is intended to solve the P.β. This method is an evaluation of alternatives for each criterion $\{g_1, ..., g_j, ..., g_m\}$ and a set of profile indices $\{b_1, ..., b_i, ..., b_m\}$ which is defined as (p+1) categories in which b_h, represents the upper limits for c_h category and c_{h+1} the lower limit.

The ELECTRE TRI addresses problems that are modeled by a family of pseudocriteria with preference $p_j(b_h)$ and indifference $q_j(b_h)$ thresholds. Thus, $q_j(b_h)$ specifies the largest difference $g_j(a)$-$g_j(b_h)$ which preserves the indifference between a and the profile b_h in g_j criteria and $p_j(b_h)$ represents the smallest difference $g_j(a)$-$g_j(b_h)$. Mousseau and Slowinski (1998) suggest that the outranking relation can be constructed from the following steps:

- Compute the partial concordance index $c_j(a, b_h)$ and $c_j(b_h, a)$
- Compute the total concordance index $C_j(a, b_h)$
- Compute the partial concordance index $d_j(a, b_h)$ e $d_j(b_h, a)$
- Compute the credibility index $\sigma(a, b_h)$

The $c(a, b)$, $c_j(a, b)$ and $d_j(a, b_h)$ are calculated by the following equations:

$$c(a, b) = \frac{\sum_{j\in F} k_j c_j (a, b_h)}{\sum_{j\in F} k_j} \quad (1)$$

$$c_j(a, b) = \begin{cases} 0 \text{ if } g_j(b_h)-g_j(a) \geq p_j(b_h) \\ 1 \text{ if } g_j(b_h)-g_j(a) \leq q_j(b_h) \\ \dfrac{p_j(b_h)+g_j(a)-g_j(b_h)}{p_j(b_h)-q_j(b_h)} \text{ n.c.} \end{cases} \quad (2)$$

$$d_j(a, b_h) = \begin{cases} 0 \text{ if } g_j(b_h)-g_j(a) \leq p_j(b_h) \\ 1 \text{ if } g_j(b_h)-g_j(a) \geq v_j(b_h) \\ \dfrac{p_j(b_h)+g_j(a)-p_j(b_h)}{v_j(b_h)-p_j(b_h)} \text{ n.c.} \end{cases} \quad (3)$$

The credibility index $\sigma(a, b_h)$ evaluates whether alternative b_h outranks alternative a. The assertions $\sigma(a, b_h)\hat{I}[0, 1]$ and aSb_h are considered valid if $\sigma(a, b_h)\geq 1$ where the λ-cut lies within the range between 0.5 and 1. The credibility index can be calculated by Eq. 4:

$$\sigma(a, b_h) = C(a, b_h) \prod_{j\in F} \frac{1-d(a, b_h)}{1-C(a, b_h)} \text{ where} \quad (4)$$
$$F = \{j\in F: d_j(a, b_h) > C(a, b_h)\}$$

It is very important to define the λ-value correctly. Higher values of λ characterize decisions that minimize the uncertainties. On the other hand, low values of λ can increase the frequency of relations of indifference. The allocation of alternatives to predefined classes can be performed by two types of procedures: optimistic and pessimistic ones. The boundaries of the classes for each criterion are flexible, thus, enabling the decision maker to model the problem such that it is more similar to reality (Zopounidis and Doumpos, 2002).

MATERIALS AND METHODS

The methodology consisted of field research of an exploratory nature. The collected data were subjected to qualitative and quantitative analysis. The qualitative method was designed to analyze and interpret deeper aspects such as the complexity of human behavior and reduces the quantitative samplesby summarizing data numerically and tabulating it (Marconi and Lakatos, 2011).

Questionnaires were administered to 91 employees working in a call center company in Pernambuco State (Brazil) with 84 attendants and 7 managers correlating to 100% of the operational framework of the company. The company operates in the credit recovery and recovery for banks and notaries. It performs active, receptive and blended (receive and make calls) Call Center activities.

The questionnaire consisted of two parts: the first part was made upof five questions that were designed to map the profile of the respondent. In the second part, the questions were structured and based on the three dimensions of the evaluation model for skills Skill, Knowledge and Attitude (SKA).

Each item in the survey contained multiple choice questions and a degree of field extension using a Likert scale of 1-4 defined as follows: poor, deficient, good and excellent. The groups were segmented according to the existing levels of coverage in the call center and the degree of complexity of financial transactions performed. Group attendants were segregated and analyzed by levels of scope and autonomy within the call center operation, so the teams were named A, B and C. Each team has two levels of coverage and different treatment depending on the allocation of transactions identified as L1 and L2 (Level 1 and 2). Additional data requirements and parameters of the ELECTRE were determined by the CEO.

RESULTS AND DISCUSSION

The ELECTRE TRI classifies the degree of competency of employees of the call center. Because assessing competency by creating multiple criteria has been established in this way, it was possible to identify and classify which skills are most relevant in operational work groups and management. To use the ELECTRE TRI for the classification of professionals required the processing of the following activities:

- Specify the criteria. Define what criteria should be considered based on the evaluation model for competency. The criteria and sub-criteria were defined by the axes of skills: knowledge, skills and attitude
- Specify a range of judgment for the weights. Assign weights to each of the criterion in relation to the degree of importance of the competency to perform the activities of professionals in the call center by the decision maker
- The study includes rankings of professionals in the operational and management levels. The weights of each criterion should be assigned based on the skills needed for each assigned role
- Identify the equivalence classes. Establish preference (p), indifference (q) the veto (v) and thresholds for each criterion

Table 1: Description of criteria and weights of operational employees

Axes	Covers	Weights
Knowledge	1.1: Receives regular training on operational and behavioral procedures	0.02
	1.2: Achieves success in negotiations with customers	0.02
	1.3: Knows the procedures of the company	0.02
	1.4: Gets feedback from the chief	0.02
Skills	2.1: Knows how to work as a team	0.03
	2.2: Dominates the information system	0.04
	2.3: Has autonomy to solve problems that arise	0.04
	2.4: Has emotional control in difficult situations at work	0.04
Atitude	3.1: Acts ethically in professional relationships	0.05
	3.2: Is proud of the job	0.05
	3.3: Managers are more focused on process management	0.05
	3.4: Managers are more focused on people management	0.05
	3.5: Feels supported by the managers of the company	0.06

The synthesis of criteria and weights defined are shown in Table 1. In modeling for classification of call center attendants, the weight of 0.02 for criteria whose responsibilities are related to the knowledge was established considering that this activity is generally governed by standardized procedures. Although, knowledge about the competency is important, regular training on operational and behavioral procedures (criterion 1.1) usually takes place and the clerk typically receives technical and behavioral training. Success in negotiations with customers (criterion 1.2) is presented as an element of relevance in the classification given that the study is based on a professional call center.

For the skills competency, the weights between 0.03 and 0.04 were determined based upon the teamwork (criterion 2.1), the information systems (criterion 2.2), autonomy in the resolution of problems (criterion 2.3) and emotional control in difficult situations (criterion 2.4). The last three criteria were given greater weight because they are more relevant to the activity that these professionals perform.

The weights reflect the significance of attitude by assigning weightsof 0.05 and 0.06 because theseare the most relevant skills. The most important criteria are related to the work ethic (criterion 3.1), the focus of managers in the management of processes (criterion 3.3) and the focus of managers in people management (criteria 3.4). They seek to identify the perception of management by observing how the manager participates in daily activities and whether they are more involved with processes or people. Support from company managers (criterion 3.5) sought to identify whether the attendants can see the support that their leaders demonstrate in everyday life. Such criteria have a correlation in how the employee behaves in the workplace.

For the manager's, criteria was created and weighted considering the degree of importance of each competency for the manager (Table 2). Regarding ability, the ability to adapt to change (criterion 2.1), emotional control in difficult situations (criterion 2.2) and the level of influence and leadership over work teams (criterion 2.3) form the most important criteria required in the performance of functional managers. The weight 0.03 was determined for all criteria concerning the skills competency.

Table 2: Description of criteria and weights of managers

Axes	Covers	Weights
Knowledge	1.1: Receives regular training	0.02
	1.2: Feels prepared to explore new opportunities	0.02
	1.3: Receives feedback	0.02
	1.4: Know the goals that are imposed on the team	0.02
Skills	2.1: Can adapt to changes	0.03
	2.2: Has emotional control to address difficult situations	0.03
	2.3: Has influence over the team	0.03
Atitude	3.1: Acts ethically in professional relationships	0.04
	3.2: The organizational climate is favorable	0.05
	3.3: Usually finishes the job on time	0.05
	3.4: Managers are more focused on process management	0.05
	3.5: Managers are more focused on people management	0.05

Table 3: Scale trial for the evaluation criteria for competency

Degree of dominance	Labels
1	Poor
2	Deficient
3	Good
4	Excellent

Table 4: Threshold and lambda cut

Parameters	Values
Indifference threshold	0.00
Preference threshold	3.00
Veto threshold	0.00
Cut	0.65

Actions are highlighted in the distribution of weights for the manager on the grounds that they have greater relevance in the daily lives of managers. The leader must be an example and motivate employees to "want to" is basic when you're leading a group. Leadership is the process of directing the actions or influencing the behaviors and mentality of people. Thus, the favorable organizational climate (criterion 3.2), the manager's ability to complete activities (criterion 3.3), the focus on process management (criterion 3.4) and the focus on people management (criteria 3.5) are evaluated during the interviews with managers. Increased focus on processes or people or both were the criteria that had the greatest impact on the performance of the functions of a manager.

Through the ELECTRE TRI, each criterion of the research was rated as ascending or descending. In all modeling, criteria were treated as growing, respondents attributed a degree of mastery according to their experiences in scale trial work as listed in Table 3.

Each respondent was considered as an alternative to the criteria and sub-criteria developed from the competency evaluation. The ELECTRE TRI parameters were set by the decision maker. Table 4 shows the threshold and lambda.

Table 5: Profiles

Profiles	Limits
b_1	0.50
b_2	1.50
b_3	2.50

Table 6: Nomenclature of work teams

Labels	Levels	Coverage
L_{1A}	Level 1 team A	Active and receptive attendants low complexity
L_{2A}	Level 2 team A	Active attendants and blended high complexity
L_{1B}	Level 1 team B	Active and receptive attendants low complexity
L_{2B}	Level 2 team B	Active attendants and blended high complexity
L_{1C}	Level 1 team C	Active and receptive attendants low complexity
L_{2C}	Level 2 team C	Active attendants and blended high complexity

Table 7: Final allocation of L_{1A}

Excellent	Good	Deficient	Poor
A_1			A_7
A_2			A_{10}
A_3			A_{13}
A_4			A_{18}
A_5			A_{19}
A_6			A_{20}
A_8			A_{23}
A_9			
A_{11}			
A_{12}			
A_{14}			
A_{15}			
A_{16}			
A_{17}			
A_{21}			
A_{22}			
A_{24}			

Table 8: Final allocation of L_{2A}

Excellent	Good	Deficient	Poor
A_1			
A_2			

Limits have been established for each competency and/or criteria. The limits established within each category make modeling the classification of alternatives more or less rigid (Sobral and Costa, 2012). The ELECTRE TRI is based on building relationships outranking "S" rank alternatives within predefined categories (P.β) in which the allocation of an alternative "A" results from the comparison of "A" with profiles within defined boundaries of categories (Mousseau and Slowinski, 1998). The category limits were set uniformly for all criteria and for all respondents both employee and manager groups as shown in Table 5.

Groups of attendants were segregated and the levels of coverage were analyzed based on the range and complexity of the financial transactions performed within the Call Center. The teams were called the A_n, B_n and C_n teams. Each team had two levels of coverage and different treatment depending on their allocation of transactions identified as L_1 and L_2 as shown in Table 6. The final allocation for each level and team is shown in Table 7-13.

Table 9: Final allocation of L_{1B}

Excellent	Good	Deficient	Poor
B_1			
B_2			
B_3			
B_4			
B_5			
B_6			
B_7			
B_8			
B_9			
B_{10}			
B_{11}			
B_{12}			
B_{13}			
B_{14}			
B_{15}			
B_{16}			
B_{17}			
B_{18}			
B_{19}			
B_{20}			
B_{21}			
B_{22}			
B_{23}			
B_{24}			
B_{25}			
B_{26}			
B_{27}			

Table 10: Final allocation of L_{2B}

Excellent	Good	Deficient	Poor
B_1			B_4
B_2			B_5
B_3			
B_6			
B_7			
B_8			
B_9			

Table 11: Final allocation of L_{1C}

Excellent	Good	Deficient	Poor
C_1		C_8	
C_2			
C_3			
C_4			
C_5			
C_6			
C_7			
C_9			
C_{10}			
C_{11}			
C_{12}			
C_{13}			
C_{14}			

Table 12: Final allocation of L_{2C}

Excellent	Good	Deficient	Poor
C_1			C_2
C_3			C_8
C_4			
C_5			
C_6			
C_7			

Evaluating the final classification of the working groups L1A demonstrated that alternatives were assigned

Table 13: Final allocation of managers

Excellent	Good	Deficient	Poor
G_1			G_5
G_2			
G_3			
G_4			
G_6			
G_7			

to classes 1 through 4. A_7, A_{10}, A_{13}, A_{18}, A_{19}, A_{20} and A_{23} alternatives are classified as below the level of competency expected (Table 7). This result demonstrates that there is a paradox where in some professionals that are revealing a high level of competency were allocated in the last scale as under performing. In the working group L2A, all professionals were allocated to class 1 showing a high degree of competency (Table 7 and 8).

The results of final classification of all alternatives of L_{1B} group were placed in class 1. This result shows a high degree of competency (Table 9) while for the L_{2B} submitted B_4 and B_5 alternatives in class 4 with low performance skills (Table 9). In contrast, the sensitivity analysis in the group L_{1B} the alternatives B_{15} and B_{25} were assigned in class 4 reflecting low performance (Table 9 and 10).

The alternatives of L_{1C} group were allocated in class 1 with a high level of competency except for the C_8 alternative that was classified with a reasonable level of competency (Table 11). In contrast, the L_{2C} group presented two alternative C_2 and C_8 in class 4 with competency level below that expected (Table 11 and 12).

This result can be explained by the way that the operation is scaled with the career path of the attendants at this company and the gateway of the working groups in level 1. The low complexity of operationsis characteristic of these groups as opposed to attendants categorized at level 2 who are dealing with more complex processes and financial transactions. They also already have over 1 year of service time. The complexity or the natural wear of the activity of these factors possibly justify the performance of the L_{2C} group level compared with L_{1C} group. There was no difference in rank generated by optimistic or pessimistic versions of the test.

In the final allocation of managers, G_1, G_2, G_3, G_4, G_6 and G_7 alternatives were sorted with high competency in class 1. G_5 alternative was allocated in class 4 showing a low level of competency (Table 13). Taking into account that managers occupy strategic positions in the organization, this result may represent a sign for the company that this group needs monitoring, possibly because the deficiencies have affected the team.

CONCLUSION

The present study aimed to classify a professional call center based on an assessment of KSA's (Knowledge, Skill and Attitude) where knowledge is related to learned information, technical skills and the attitude of "wanting to do". The choice of the call center industry for the study was due to high rates of growth in this sector in recent decades.

The profile of the interviewed group of attendants, professionals and managers of the Call Center of Pernambuco had the following characteristics. In the group of attendants, 84% were female, 41% were between 22 and 25 years of age and 31% were between 26 and 31 years of age. The 36% of the attendants reported Call Center experience of between 2 and 3 years and 22% reported between 1 and 6 months of operating activity. The 36% have incomplete higher education and 34% have secondary education. In the group of managers, 71% were female. The 42% were between 26 and 31 years of age and 42% were over 31 years old. The 57% have acted as managers for over 4 years. The 42% have completed higher education training and 26% have incomplete higher education.

The multicriteria decision support through ELECTRE TRI offered appropriate methodology, therefore a condensed criteria set based on the assessment of the competency and judgment of each employee in the light of knowledge, skills and attitude. Thus, ELECTRE TRI enabled the classification of professionals from simultaneous measurements while considering multiple criteria.

To use the ELECTRE TRI in the classification of professionals, it was necessary to specify criteria (skills), specify a range of trial and identify the equivalent classes for the thresholds of preference (p), indifference (q) and the veto (v) for each criterion. For each group of criteria, weights were assigned according to the need of developing skills for each role.

The ELECTRE TRI results showed adherence to building on the excellent G7 alternatives that responded to all skills and was allocated to class 1 thereby showing a high level of competency. The modeling condensed all criteria in judgment of each employee and from the final classification allowed the decision maker to assess and analyze the skills of working groups covering multiple criteria for each respondent group, thus, leading the decision maker to a recommendation in the process.

The robustness of the method could be tested from the sensitivity analysis because changes in weights were conducted using the pessimistic and optimistic versions, yet the final rankings did not change significantly. Among

the seven groups studied, only two alternatives, B15 and B25 belonging to the group suffered L1B changes in class.

The innovation of this consists of the use of multi-criteria decision support for classifying and assessing professionals. For humans to evaluate people and processes from the perspective of multiple criteria seems impossible without this method. Thus, ELECTRE TRI presented a structured procedure that can classify people based on competency assessment considering all the criteria relevant to the decision maker.

More complex modeling suggested for future research. The need to apply the model over time to test the criteria of competency and therefore correlate with indicators of turnover, absenteeism, new hires, planning training and recruitment and selection has been acknowledged.

REFERENCES

Acker, A., 2014. The Short Message Service: Standards, infrastructure and innovation. Telematics Inform., 31: 559-568.

Aktekin, T., 2014. Call center service process analysis: Bayesian parametric and semi-parametric mixture modeling. Eur. J. Opera. Res., 234: 709-719.

Draganidis, F. and G. Mentzas, 2006. Competency based management: A review of systems and approaches. Inform. Manage. Comput. Security, 14: 51-64.

Garg, D., N. Kambhatla, M. Vukovic and G. Pingali, 2008. Mining top issues from contact center logs for self help portals. Proceedings of the IEEE International Conference on Services Computing, Volume 2, July 7-11, 2008, Honolulu, HI., pp: 171-178.

Holtgrewe, U. and V. Doellgast, 2012. A service union's innovation dilemma: Limitations on creative action in German industrial relations. Work Employment Soc., 26: 314-330.

Homer, M., 2001. Skills and competency management. Ind. Commer. Train., 33: 59-62.

Jobs, C. and D. Butler, 2006. A case study in the globalization of jobs in Ireland. Int. J. Soc. Econ., 33: 666-676.

Kussel, R., V. Liestmann, M. Spiess and V. Stich, 2000. TeleService a customer-oriented and efficient service? J. Mater. Process. Technol., 107: 363-371.

Liu, T. and L. Liu, 2012. Research on forecasting call center traffic through PCA and BP Artificial neural network. Proceedings of the 2012 5th International Symposium on Computational Intelligence and Design, Volume 1, October 28-29, 2012, Hangzhou, pp: 444-447.

Loia, V., C. Maio, G. Fenza, F. Orciuoli and S. Senatore, 2010. An enhanced approach to improve enterprise competency management. Proceedings of the IEEE International Conference on Fuzzy Systems (Fuzz), July 18-23, 2010, Barcelona, pp: 1-8.

Marconi, M.D. and E.M. Lakatos, 2011. Metodologia Cientifica. 6th Edn., Vol. 1, Atlas Publishing Co. Inc., Sao Paulo.

McClelland, D.C., 1973. Testing for competence rather than for intelligence. Am. Psychol., 28: 1-14.

Mills, J., K. Platts, M. Bourne and H. Richards, 2002. Strategy and Performance: Competing through Competences. Cambridge University Press, Cambridge, UK., ISBN-13: 978-0521890236, Pages: 192.

Mousseau, V. and R. Slowinski, 1998. Inferring an electre TRI model from assignment examples. J. Global Optim., 12: 157-174.

Prahalad, C.K. and G. Hamel, 1990. The core competence of the corporation. Harvard Bus. Rev., 90: 79-91.

Qi, L., S. Ma and K. Liu, 2006. Research on predictive dialing system based on distributed call center. Proceedings of the 4th International Conference on Software Engineering Research, Management and Applications, August 9-11, 2006, Seattle, WA., pp: 195-201.

Roy, B., 1990. Decision-Aid and Decision-Making. In: Readings in Multiple Criteria Decision Aid, Costa, C.A.B. (Ed.). Springer, New York, USA., ISBN-13: 9783642759352, pp: 324-331.

Roy, B., 1996. Multicriteria Methodology for Decision Aiding. Springer, New York, USA., ISBN-13: 9780792341666, Pages: 292.

Sherstneva, A., 2012. The call-center. Development of algorithm routings of calls. Proceedings of the 2012 11th International Conference on Actual Problems of Electronics Instrument Engineering, October 2-4, 2012, Novosibirsk, pp: 211-213.

Sicilia, M.A., 2007. Competencies in Organizational E-learning: Concepts and Tools. Idea Group Inc., Canada, ISBN-13: 9781599043432, Pages: 374.

Sobral, M.F.F. and A.P.C.S. Costa, 2012. Negotiation model for group decision with electre TRI-the electre TRI-NG. J. Decis. Syst., 21: 121-136.

Zopounidis, C. and M. Doumpos, 2002. Multicriteria classification and sorting methods: A literature review. Eur. J. Oper. Res., 138: 229-246.