

360-degree and leadership assessment in a service company in northern Mexico applying multivariate techniques

Evaluación de 360 grados y de liderazgo en una empresa de servicios en el norte de México aplicando técnicas multivariadas

ESPINOZA-PRIETO, José Roberto†, ORTEGA-MONTES, Fabiola Iveth*, RUBIO-ARIAS, Héctor Osbaldo and DIAZ-PLASCENCIA, Daniel

Universidad Autónoma de Chihuahua, Facultad de Ciencias Agrícolas y Forestales

ID 1st Author: *José Roberto, Espinoza-Prieto* / ORC ID: 0000-0003-0697-0852, CVU CONACYT ID: 426794

ID 1st Co-author: *Fabiola Iveth, Ortega-Montes* / ORC ID: 0000-0002-2071-7901, CVU CONACYT ID: 343986

ID 2nd Co-author: *Héctor Osbaldo, Rubio-Arias* / ORC ID: 0000-0002-0363-3407, CVU CONACYT ID: 120252

ID 3rd Co-author: *Daniel, Díaz-Plascencia* / ORC ID: 0000-0002-8309-8597, CVU CONACYT ID: 164545

DOI: 10.35429/EJRC.2022.15.8.1.6

Received September 20, 2022; Accepted December 30, 2022

Abstract

The aim was to formulate a 360-degree and leadership evaluation of a service company in northern Mexico to determine its strengths and areas of opportunity. Technical, professional and personal skills were evaluated through an instrument of 44 questions operating interviews with the main collaborators. The instrument was properly validated with the Cronbach's alpha parameter. The information was analyzed with a principal component analysis (PCA) and, in addition, conceptual maps were made using multidimensional scaling. The PCA results showed that six components explain 85% of the information and the scores of communalities with a range of 0.750 to 0.943. Visualized strengths highlight paying attention to customer needs, such as conversations and communication skills. As areas of opportunity were noted the definition of objectives, the measurement of performance in the short term and long-term, such as the need to motivate the work team (discriminant values: 0.715 to 0.739). It is concluded that the implementations of multivariate techniques allow visualizing the way in which the collaborators are perceived in their performance in the company and values can be assigned to variables that allow improving the work environment and productivity.

360-degree, Evaluation, Leadership

Resumen

El objetivo fue elaborar una evaluación de 360 grados y de liderazgo de una empresa de servicio en el norte de México para determinar sus fortalezas y áreas de oportunidad. Se evaluaron competencias técnicas, profesionales y personales mediante un instrumento de 44 preguntas mediante entrevista a los principales colaboradores. El instrumento se validó con el parámetro de alfa de Cronbach. La información se analizó con un análisis de componentes principales (ACP) y se realizaron mapas conceptuales mediante escalamiento multidimensional. Los resultados del ACP mostraron que seis componentes explican el 85% de la información y las puntuaciones de las communalidades con un rango de 0.750 a 0.943. Las fortalezas visualizadas destacan prestar atención a las necesidades de los clientes, como a las conversaciones y habilidades de comunicación. Como áreas de oportunidad se observaron la definición de objetivos, la medición del desempeño en el corto y largo plazo, como la necesidad de motivar al equipo de trabajo (valores discriminantes: 0.715 a 0.739). Se concluye que las implementaciones de técnicas multivariadas permiten visualizar la manera en que los colaboradores son percibidos en su actuación en la empresa y se puede asignar valores a variables que permitan mejorar el clima laboral y la productividad.

Multivaridas, Evaluación, Liderazgo

Citation: ESPINOZA-PRIETO, José Roberto, ORTEGA-MONTES, Fabiola Iveth, RUBIO-ARIAS, Héctor Osbaldo and DIAZ-PLASCENCIA, Daniel. 360-degree and leadership assessment in a service company in northern Mexico applying multivariate techniques. ECORFAN Journal- Republic of Cameroon. 2022, 8-15: 1-6

* Correspondence to Author (e-mail: fortega@uach.mx)

† Researcher contributing first author.

Introduction

A 360-degree appraisal is a tool or process to obtain confidential and anonymous information about workers in a given company. This type of assessment is implemented to improve the functioning of the company or even to motivate work and activities in order to increase workers' performance and productivity (SafetyCulture, 2022). The German military participating in the Second World War were the first to implement this evaluation tool in order to evaluate the participation of their officers (Appraisal 360, 2022). Peiperl (2001) conducted 360-degree appraisals in 17 companies of different sizes in the number of employees and came up with four interesting paradoxes: the role paradox, which states that you cannot be judge and jury; the group performance paradox, which states that by focusing on one person you can lose coherence in the group; the size paradox, which explains that there are things that are easy to obtain but difficult to apply; and the reward paradox, which states that a person's reward is beneficial but helps very little.

Typically a 360-degree assessment weights personal competencies on the one hand and technical competencies on the other (Madge, 2019). Among the main personal competencies that are assessed are: leadership, emotional intelligence, teamwork, communication, creativity, organisation and organisational values. Among the technical competencies that are assessed are: technical knowledge, product or service mastery, customer support and sales skills. The objective of this case study was to determine through a 360-degree assessment the strengths and areas of opportunity of managers and executives to improve the working environment of the company. It is hoped that these results will lead to better customer service and serve as a basis for other similar companies in Mexico and other areas.

Methodology

This case study was based on a 360-degree and leadership assessment in a company located in the city of Chihuahua, Chihuahua State in Mexico. The company serves an average of more than 250 clients per day. Six of the company's main employees were selected, considering their position of authority and responsibility.

Eleven technical and personal competencies were assessed with a total of 44 questions as ordinal variables with the following five possible answers: poor (1), fair (2), good (3), very good (4) and excellent (5). In addition, a total of four open-ended questions were considered. The evaluation instrument was carried out by means of a formal, personalised interview with all participants. Anonymously, each participant evaluated his or her peers.

The five stages that were implemented for the 360-degree and leadership assessment were as follows: Stage 1. Clear and specific definition of the objective of the process. Stage 2. Selection of participants. Stage 3. Selection of competency areas. Step 4. Define criteria, methodologies and networks to evaluate the project. Step 5. Defining the confidentiality of the evaluations. The main competencies for evaluation were selected jointly with the company and represent: 1) Communication, 2) Leadership, 3) Motivation, 4) Teamwork, 5) Problem solving, 6) Continuous improvement, 7) Organisation and time management, 8) Customer focus, 9) Strategic thinking, 10) Focus on results, and 11) Personal capacity.

Previously, the instrument was validated with Cronbach's alpha parameter, making a statistical and explorative analysis of the data. A principal component analysis (PCA) was used as well as a multidimensional scaling analysis (ALSCAL) and tests of statistical independence. The SPSS version 20 statistical software was used for data analysis.

Results

250 data on technical, professional and vocational competencies were obtained, assessed and visualised using descriptive statistics. The Cronbach's alpha parameter of 0.702 was considered good and consistent. Table 1 shows the means of the technical, professional and personal competences.

Descriptive statistics	Media	Deviation	N	of analysis
Attentive in conversations.	3.78	0.91	32	
Understands the customer's needs and seeks to exceed their expectations.	3.78	0.91	32	
Is perceived by the customer as a reliable person who represents the company.	3.66	0.90	32	
You express your ideas with clarity and respect for the other person.	3.63	1.04	32	
Acts as an active member of the team.	3.56	1.01	32	
Looks for ways to provide added value to customers.	3.56	0.91	32	
Efficiently uses assigned resources to carry out his/her activities.	3.53	0.98	32	
Establishes and maintains long-term relationships with customers by gaining their trust.	3.53	0.84	32	
Recognises and seizes opportunities.	3.53	0.92	32	
Demonstrates interest in the achievement of individual and organisational goals with commitment.	3.53	1.08	32	
Seeks to strengthen skills and work on areas of opportunity.	3.50	1.16	32	
Demonstrates technical knowledge to carry out their work.	3.50	1.02	32	
How to rate their performance towards the achievement of organisational goals.	3.50	1.08	32	
Maintains high levels of performance standards.	3.50	1.11	32	
Shares information effectively and assertively.	3.47	1.08	32	

Table 1 Competences with the highest averages in case
Source: Own Elaboration

Higher means can be considered as strengths. When implementing PCA, it is noticeable that the first principal components describe most of the variance of the data. The lower order components sometimes contain the most important factor in the database and the others may be relegated.

There are different techniques for estimating the number of principal components that are relevant; the most appropriate technique will depend on the structure of correlations in the original data. In other words, the communality is the proportion of variability of each variable that is explained by the factors. The closer the communality is to 1, the better the factors of a given variable are explained as can be seen in Table 2.

Communalities	Inicial	Extraction
Shares information effectively and assertively.	1	0.811
Listens actively and is receptive to the opinions of others.	1	0.854
Listens attentively in conversations.	1	0.868
Communicates clearly in writing.	1	0.819
Expresses ideas clearly and with respect for the other person.	1	0.841
Encourages open and direct dialogue.	1	0.849
Acts as an active member of the team.	1	0.862
Inspires, motivates and guides the team to achieve goals.	1	0.943
Shares knowledge, skills and experience.	1	0.766
Shares recognition of achievements with the rest of the team.	1	0.750
Gathers information from different sources to make a decision.	1	0.830
Focuses on key issues to solve problems.	1	0.816
Has flexibility and willingness to deal with situations.	1	0.785
Considers implications before taking action.	1	0.865
Remains calm in difficult situations.	1	0.886
Adapts to working with new processes and tasks.	1	0.912
Does not show resistance to other people's ideas.	1	0.915
Actively seeks new ways of doing things.	1	0.908
Strives to innovate and contribute ideas.	1	0.855
Seeks to strengthen their skills and work on their areas of opportunity.	1	0.804
Is able to prioritise work tasks.	1	0.858
Effectively completes assigned projects in a timely manner.	1	0.850
Efficiently uses assigned resources to carry out his/her activities.	1	0.892
Establishes and maintains long-term relationships with clients by gaining their trust.	1	0.908
Determines objectives and sets priorities to achieve them.	1	0.895
Seeks ways to provide added value to clients.	1	0.889
Understands customer needs and seeks to exceed customer expectations.	1	0.860
Is perceived by the customer as a reliable person who represents the company.	1	0.912
Has demonstrated outstanding and exceptional knowledge, skills and experience.	1	0.823
Demonstrates technical knowledge to carry out their work.	1	0.756
Demonstrates exceptional attitude and results in reducing costs and increasing productivity.	1	0.781
Has the knowledge to train and coach employees.	1	0.812
Has the responsibility and authority to lead the company.	1	0.885
Is able to motivate the whole team.	1	0.924
How to rate their performance in order to achieve the organisation's objectives.	1	0.898
Understands the short and long term implications of their decisions for the business.	1	0.836
Determines objectives and sets priorities to achieve them.	1	0.896
Has a long-term vision and looks for opportunities to lead the organisation to growth.	1	0.901
Bases strategic decisions and actions on the organisation's vision, mission and values.	1	0.865
Recognises and seizes opportunities.	1	0.852
Maintains high levels of performance standards.	1	0.887
Demonstrates interest in the achievement of individual and organisational goals with commitment.	1	0.828
Cluster case number.	1	0.782
Distance of the case from the cluster centre of its ranking.	1	0.865
Extraction method: Principal component analysis.		

Table 2 Results of the communalities by the Principal Components method
Source: Own Elaboration

From the implemented analysis it can be observed that the following four variables presented the values closest to 1.0: 1) Ability to motivate the entire work team; 2) does not show resistance to the ideas of other people; 3) adapts to working with new processes and tasks and; 4) is perceived by the client as a reliable person who represents the company.

The variables that could be considered as areas of opportunity since they presented values between 0.70 and 0.80 of communality are: 1) shares recognition of achievements to the rest of the team; 2) denotes technical knowledge to carry out his work; 3) shares his knowledge, skills and experience and 4) demonstrates exceptional attitude and results in reducing costs and increasing productivity.

It is important to mention that values of communalities below 0.50 are considered moderate to low; however, in the six evaluated collaborators, they did not show values below 0.70.

It is important to note that the variables used in this study were perfectly adapted to the PCA, as the dimensions were reduced by more than 70%. In other words, only six components are explaining 85.44% of the total of the 44 variables used. This result can be seen in Table 3 and its graphical representation in Figure 1.

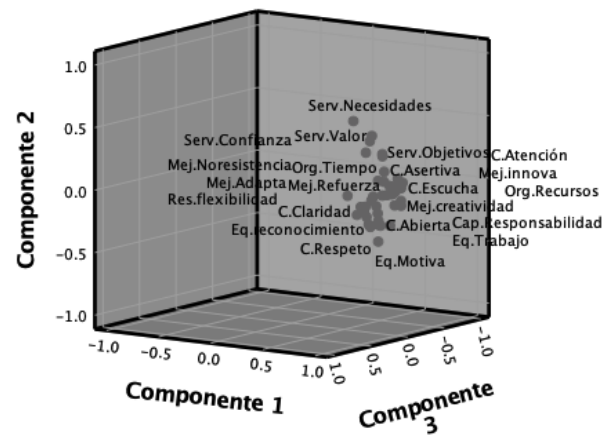


Figure 1 Main components of the model

To validate the effectiveness of the PCA method, the Kaise, Meyer-Olkin parameter is used. This analysis contrasts whether the correlations between the variables studied are minimal and a Kmo value of 0.730 was determined, which is considered moderate (P=0.012).

It is well known that the ALSICAL statistical tool starts from a matrix of distances (similarities) and results in a representation on an ordinary Euclidean scale. In other words, the distances on this scale should be as close as possible to the starting distances. In other words, it is a matter of constructing a few variables (two is the most common, as they are representable on paper) and giving scores to individuals, so that the distances between scores represent the distances given in the problem statement.

In the literature, these scores are often referred to as principal coordinates, and for this reason, multidimensional scaling is also known as principal coordinate analysis. Sometimes the information available is a measure of distance or a measure of discrepancy or difference between individuals, while at other times a measure of similarity between individuals is available.

A common solution will be provided whether the starting data are distances or similarities, as it will in fact be possible to transform a measure of similarity into a measure of distance. This implies that maps or diagrams can be produced to illustrate the stimuli perceived by the individuals under study. Using this criterion, personal, technical and professional competences were plotted and are exemplified in Figure 2.

Component	Total variance explained					
	Initial eigenvalues	Sum of the squared saturations of the extraction				
Total	% of variance	% accumulated	Total	% of the variance	% accumulated	Total
1	30.457	69.220	69.220	30.457	69.220	69.220
2	2.221	5.047	74.267	2.221	5.047	74.267
3	1.560	3.545	77.812	1.560	3.545	77.812
4	1.253	2.847	80.59	1.253	2.847	80.659
5	1.097	2.494	83.153	1.097	2.494	83.153
6	1.009	2.293	85.446	1.009	2.293	85.446
7	.0873	1.984	87.430			
8	0.725	1648	89.079			
9	0.653	1.484	90.563			
10	0.532	1.210	91.773			
11	0.471	1.070	92.842			
12	0.414	0.941	93.783			
13	0.375	0.852	94.635			
14	0.350	0.797	95.431			

Table 3 Explained variance of principal components
Source: Own Elaboration

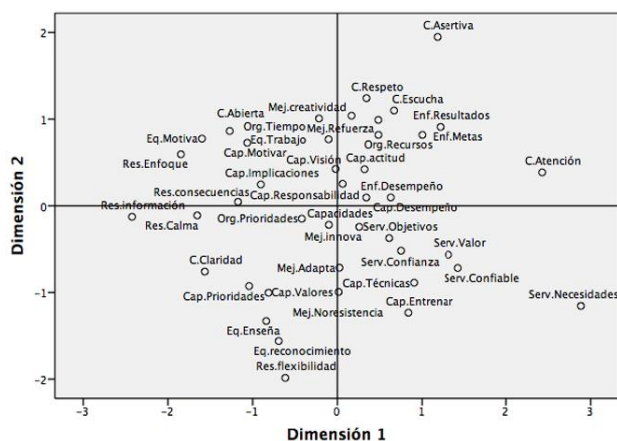


Figure 2 Perception of competencies by all employees

For this methodology the parameters used are the Stress level, which the closer to 0 the better, and the RSQ value, which is a coefficient of determination, being in this case a value closer to 1.0. The values obtained in the present study were a stress value of 0.27962 and an RSQ of 0.62205, which indicates that this map elaborated by multidimensional scaling can be considered as moderate.

This multivariate technique allows concept maps to be produced for each of the variables considered in this case study. For example, Figure 3 shows the employee in the sales management position.

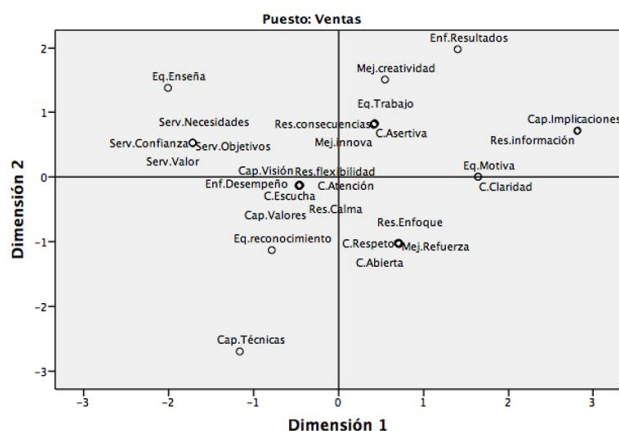


Figure 3 Sales Manager's Perception by Multidimensional Scaling

Another example is the concept map of a customer service employee (Figure 4).

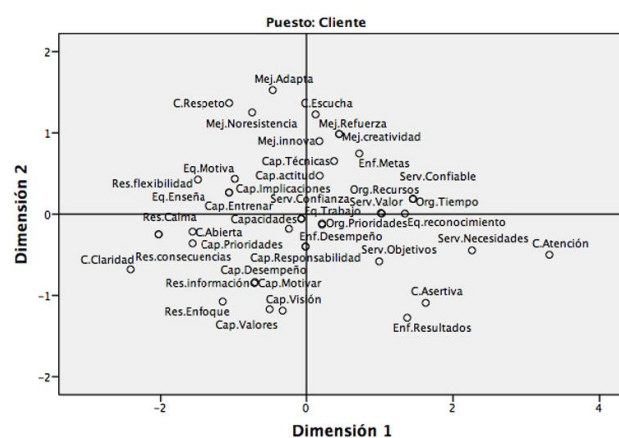


Figure 4 Customer Service Manager Perception by Multidimensional Scaling

The difference between the employee in the managerial position and the customer service position can be analysed. For these cases, a Stress value of 0.08329 and an RSQ of 0.98394 were obtained. It can be seen that the competencies of focusing on results, paying attention to conversations, sharing information effectively and assertively, among others, are more highly perceived by the other five employees in the case of the customer service manager.

Finally, a discriminant analysis and statistical independence tests were carried out in this study. The objective of the discriminant analysis is to maximise the variance between groups and minimise the inter-group variance through linear combinations. In this way, cases can be grouped with a certain probability that their value can be known and the competencies of the most observed employees or, failing that, discriminated against by the other employees can be determined.

In this case, the variable with the highest score comprises the implications of their decisions for the business in the short and long term (0.739), followed by having the responsibility and authority to manage the company (0.733), being able to motivate their entire work team (0.723) and so on, as can be seen in Figure 5.

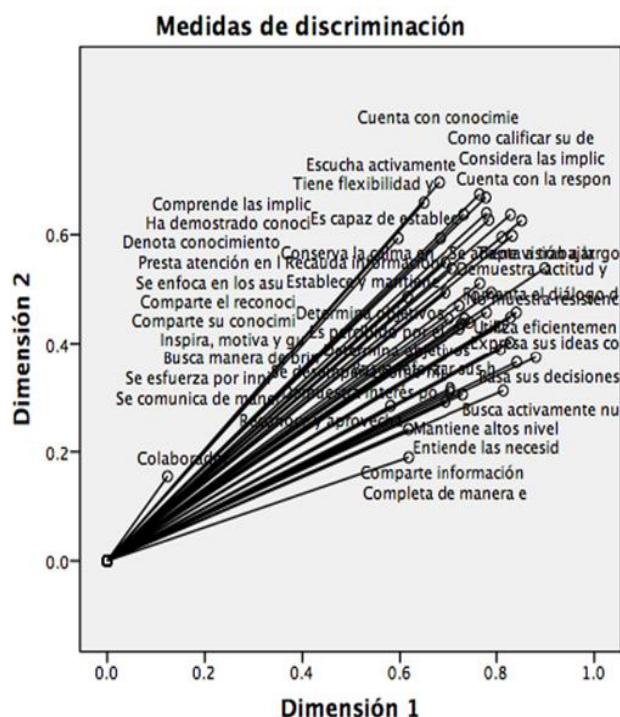


Figure 5 Main discriminated variables of the 360-degree evaluation

With respect to the statistical independence tests, between each of the items or variables with respect to each of the employees, values were obtained that present a P value of less than 0.05, which means that there is statistical dependence or a relationship between the variable in question and the employee. At this point, none of the technical, professional and personal competencies were statistically significant or were associated in particular with a single employee.

Acknowledgements

This research was made possible thanks to the Faculty of Agricultural and Forestry Sciences, the Faculty of Zootechnics and Ecology, the Faculty of Accounting and Administration of the Autonomous University of Chihuahua and the businessman Alejandro Mendoza for allowing us to carry out the case study in his service companies.

Funding

This work has been funded by the Universidad Autónoma de Chihuahua, and by the research professors of this article.

Conclusions

It can be concluded that the competences assessed include the ability to evaluate the performance of the organisation's objectives, the ability to motivate their work teams and the ability to have the authority and responsibility to manage the company. In addition, the ability to pay attention to conversations between employees and customers, the ability to understand the needs of customers and the perceived trust of employees are strengths. The best evaluated was the person who is in charge of management and customer service within the company. As an important recommendation, the results of this case study were presented to the company in question, and on the basis of collaborative work, a training programme, staff empowerment and improvement of the working environment are being developed.

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