



Analysis of construct validity of the instrument: “Managerial approach in the management for the results in the knowledge society”

Análisis de validez de constructo del instrumento: Enfoque Directivo en la Gestión para Resultados en la Sociedad del Conocimiento”

Mtro. José Isaías Martínez-Corona is a full time professor at Tecnológico Nacional de México (Mexico) (joseisaías.martinezcorona@gmail.com) (<https://orcid.org/0000-0003-3465-5606>)

Mtra. Gloria Edith Palacios-Almón is a full time professor at Tecnológico Nacional de México (Mexico) (gloriaedith.palaciosalmón@gmail.com) (<https://orcid.org/0000-0002-2411-5553>)

Dr. Luis Gibran Juárez-Hernández is a professor and researcher at Centro Universitario CIFE (Mexico) (luisgibran@cife.edu.mx) (<https://orcid.org/0000-0003-0658-6818>)

Abstract

This article presents the results of an instrumental study that deals with the analysis of construct validity and reliability of the instrument: managerial approach in the management for the results in the knowledge society, with the objective to obtain an optimum quality to provide valid and reliable evidence. The construction of the instrument was based on the four fundamental axes of the management cycle and what was expressed in the first principle of the Marrakech Declaration. To meet the objective, the instrument was applied to 505 executives of the public administration. The construct validity analysis was performed using the exploratory factor analysis (EFA) technique, verifying the pertinence of the data for this technique and analyzing the reliability of the instrument using Cronbach's Alpha. The results of the EFA reveal that the items are represented in the factorial model, manifesting only one factor, which corresponds to the proposed theoretical model. Regarding the reliability analysis, an optimal value was obtained (Cronbach's Alpha: 0.868). Given these results, it is concluded that the instrument and the elements that integrate it accurately represent and measure the construct that is intended to be evaluated.

Resumen

En el presente trabajo se exponen los resultados de un estudio instrumental que aborda el análisis de la validez de constructo y confiabilidad del instrumento: enfoque directivo en la gestión para resultados en la sociedad del conocimiento, con el objeto de que obtenga una calidad óptima para que brinde evidencias válidas y confiables. La construcción del instrumento se basó en los cuatro ejes fundamentales del ciclo de gestión y en lo expresado en el primer principio de la Declaración de Marrakech. Para cumplir con el objetivo, el instrumento fue aplicado a 505 directivos de la administración pública. El análisis de validez de constructo se realizó con la técnica del análisis factorial exploratorio (AFE), verificándose la pertinencia de los datos para esta técnica y se analizó la confiabilidad del instrumento mediante el Alfa de Cronbach. Los resultados del AFE revelan que los ítems están representados en el modelo factorial, manifestándose un solo factor, lo cual corresponde con el modelo teórico propuesto. En cuanto al análisis de confiabilidad, se obtuvo un valor óptimo (Alfa de Cronbach: 0.868). Ante estos resultados, se concluye que el instrumento y los elementos que lo integran representan y miden con precisión el constructo que se pretende evaluar.

Keywords | palabras clave

Management for results, management approach, knowledge society, analytical rubric, reliability, reliability, validity, construct validity. Gestión para resultados, enfoque directivo, sociedad del conocimiento, rúbrica analítica, confiabilidad, fiabilidad, validez, validez de constructo.

Suggested citation: Martínez-Corona, J. I., Palacios-Almón, G. E., & Juárez-Hernández, L. G. (2020). Analysis of construct validity of the instrument: “Managerial approach in the management for the results in the knowledge society”. *Retos Revista de Ciencias de la Administración y Economía*, 10(19), 143-154. <https://doi.org/10.17163/ret.n19.2020.09>

1. Introduction

One of the great demands that public workers have is to carry out their activities more effectively and efficiently; i.e. to meet the objectives of their responsibility, but with less resources. In this sense, there is an approach known as New Public Management (NPM), which promotes the incorporation of management models in the public administration (Ministerio de Economía y Finanzas, 2015). In the context of developed countries, it is used to maintain the level of development achieved and to overcome issues related to fiscal or financial crises; however, in developing countries, the fundamental objective of their use is to find a higher level of development, i.e. to find better results in the implementation of public policies.

In this way, the idea is to look for a more efficient state and much closer to society (Pliscoff-Varas, 2017), and in Latin America, the aim is to achieve a higher level of development, reason for which it is referred to results-based management (RBM) (Ministerio de Economía y Finanzas, 2015). This term has been conceived as a managerial discipline (Secretaría de Hacienda y Crédito Público, 2017) that applies to the public sector and that involves elements of the management cycle (Shack & Rivera, 2017).

In this regard, Martínez-Corona and Palacios-Almón (2019) express that the RBM comprises an approach to organizational culture that relies on practical tools. Therefore, it assumes that public servants must focus in terms of professionalism and a managerial approach that concentrates on the results that bring value to society. In addition, the RBM should be seen as a compromise and not a challenge, as it involves a transformation in the institutional culture.

One of the important challenges for public workers is that the impacts of public policy implementation cannot be assessed *ex ante*, the effects can be observed with the results obtained in the implementation in an *ex post* measurement (Secretaría de Hacienda y Crédito Público, 2017). Therefore, the manager must have an approach to the use of methodologies, techniques and technologies for this purpose. Hence, it is important to consider the principles of the Knowledge Society, which among its main elements is the creation of knowledge, collaborative work, the management of change and the use of Information Technologies and Communications. The combination of these elements helps organizations to solve problems and achieve shared goals (Tobón, Guzmán, Hernández & Cardona, 2015).

Although it is a high priority topic, instrumental inputs for its evaluation are scarce. In this regard, Martínez-Corona, Palacios-Almón and Juárez-Hernández (2020) proposed the instrument called "Directive Approach in the Management of the Results in the Knowledge Society" (DAMfRNS). The instrument integrates the four fundamental axes of the management cycle as a reference: planning, budgeting, implementation of programs and projects, and evaluation (Kauffman, Sangines, & García-Moreno, 2015), considering the basis of what was expressed in the first Marrakesh Declaration (Chica, 2015), which structures the management approach for the results in three dimensions: *ex ante*, during the execution and *ex post*. A cross-cutting dimension of this topic is incorporated to make it affordable with the Knowledge Society.

It is important to note that, once the construction phase is completed, Martínez-Corona *et al.* (2020) indicate how the instrument was validated in terms of

facie and content. In addition, it is noted that the instrument was applied to a pilot group of 12 officials at the management level of the public administration, where the degree of satisfaction of the items and instructions was also assessed, and the degree of satisfaction with the instrument. The latter process is important because it is affordable to use the instrument in the context in which it is intended to be applied; i.e. the characteristic or quality of feasibility is fulfilled (Carvajal, Centeno, Watson, Martínez & Sanz-Rubiales, 2011).

Hence, evaluating the psychometric properties of the instrument is essential for determining the quality of what it is intended to measure (Carvajal *et al.*, 2011). Therefore, having the validity of content is relevant; but, for the instrument to obtain optimal quality, the analysis of construct validity is required. In this regard, Hernández-Sampieri, Fernández-Collado, and Baptista-Lucio (2010) define the construct as the measured variable that takes place within a theoretical hypothesis, theory or scheme. The authors express that, from a scientific point of view, the validity of the construct is likely to be the most important of the concepts.

Hernandez-Sampieri *et al.* (2010) indicate that the validity of the construct refers to “how successfully an instrument represents and measures a theoretical concept” (p. 51). For their part, Prieto and Delgado (2010) express that it can be used to contrast scientific theories with the use of the hypothetical-deductive method; as well as it represents “a comprehensive framework for obtaining evidence of validity” (p. 71), which is inclusive for the validity of content and criteria. The authors refer that validation is concrete by being based on the theories on which the evaluated construct is defined and its relationship “with other constructs, their manifestations and their potential applications and interpretations” (p. 71). Another relevant psychometric property is reliability, which is defined as the accuracy of the results when the instrument is applied on different occasions (Carvajal *et al.*, 2011).

Carvajal *et al.* (2011) mention that the validation process of an instrument is continuous and dynamic, and evaluating its psychometric properties is an essential criterion to determine the quality of its measurement (Gómez-Benito & Hidalgo, 2015). For this reason, the analysis of the validity of construct and reliability of the DAMfRNS instrument is addressed in the development of this work, with the aim of obtaining optimal quality with valid and reliable evidence.

2. Materials and method

2.1. Type of Study

An instrumental study was carried out, which consists on the development / adaptation of tests or devices, as well as the study of their psychometric properties to develop new procedures, instruments or tests (Montero & León, 2002). The validity of construct and reliability of the above-mentioned instrument were analyzed: a management approach to the management for the results in the knowledge society. With the above, the idea is to provide the instrument accuracy and consistency to be able to make generalizations in the findings (Hidalgo, 2005).

2.2. Procedure

The study of the validity of the construct and reliability of the instrument was carried out through the following phases:

2.2.1. Instrument

The DAMfRNS instrument consists of an analytical rubric that aims to evaluate the approach of public sector managers in a management-based management for the results and with a perspective from the knowledge society (Martínez-Corona *et al.*, 2020), which groups together four aspects (*ex ante*, implementation, *ex post* and transversal axis: knowledge society) and is integrated into seven items. The aforementioned aspects are constituted in a dimension, which represents the theoretical construct Management for the Results in the Knowledge Society; this is because the theoretical model, as already mentioned, is based on the fundamental axes of the management cycle and the first principle of the Marrakesh Declaration. Each of the items has a descriptor, which was formulated considering some of the socio-formative taxonomy elements, and the established levels were receptive, resolute, autonomous and strategic (Tobón, 2017). Table 1 presents the aspects, components and indicators that make up the instrument.

Table 1. Aspects, components and indicators of the instrument

Aspect	Component	Indicator
<i>Ex ante</i> phase	Expected Results	Views the expected results when designing an institutional program or project (Program)
	Probable Costs	Foresees the likely costs of implementing a program
	Expected Impacts	Anticipates the expected impacts of the Program
	Design of Strategic Indicators	Sets indicators to measure program effectiveness for program evaluation and monitoring
Implementation phase	Design of Performance Indicators or Management	
	Follow and Evaluation	
	Corrections	
<i>Ex post</i> phase	Program Evaluation	Accountable to society for program results
	Accountable	
Cross-axis (Knowledge Society)	ICT in decision-making	Uses Information and Communication Technologies for strategic and tactical processes
	Data management	Conducts data analysis and decision-making to drive results
	Decisions and data analysis	

Source: Martínez-Corona *et al.*, 2020.

After its design, the instrument was validated in facie and content (Martínez-Corona *et al.*, 2020). The first phase is called facie validation, presentation validity or apparent validity and its objectives are to verify whether the items belong to a pheno-

menon or construct, their relevance, wording and if they are understandable (Buela-Casal & Sierra, 1997; Reina Gamba & Vargas Rosero, 2008; Salas-Razo & Juárez-Hernández, 2019). Regarding the content validity analysis, an expert judgement was conducted with a qualitative-quantitative approach where all items were validated, revealing “the degree to which the instrument reflects a specific content domain of what is being measured” (Hernández-Sampieri *et al.*, 2010, p. 201). It is important to note that the instrument was applied to a pilot group of civil workers at the management level of the public administration with the aim of assessing the affordability of the instrument and conducting an initial reliability analysis by Cronbach’s Alpha coefficient (Cronbach, 1951). The results of this phase were favorable, revealing assessments of good and excellent, in terms of the degree of understanding and an optimal value of reliability (Cronbach Alpha: 0.822).

2.2.2. Selection of the population sample for the implementation of the instrument

The instrument was applied to 505 managers (public workers); who, in the period established for the collection of the data, responded to the invitation. To be considered as research individuals, they had to meet the criterion of carrying out a management responsibility in the public sector. It is important to note that the implementation of the instrument was carried out online by an invitation to participate in the study, for which they were given a description of the instrument, its purpose and the instructions to follow. Sociodemographic data of participants are shown in Table 2.

Table 2. Sociodemographic data of the participants (n=505)

Sociodemographic Data of Pilot Group Participants	
Sex	Men 59.2%
	Women 40.8%
Average Age (years)	44.6 years
Position	Administrative 2.6%
	IC or Inner Comptroller 1.8%
	Coordinator 1.6%
	Special Delegate 0.2%
	Director 38.2%
	Area Director 0.8%
	General Director 0.8%
	Teacher 1.2%
	Chief Department 28.5%
	Chief of Office 3.4%
	Doctor 0.4%
	Rector 0.6%
	Secretary 0.8%

	Subdirector 17.6%
	Sub-secretary office 0.2%
	Specialized Technician 1.0%
Academic degree	Bachelor 40.6%
	Master 52.7%
	Doctorate 6.7%
Area of experience	Organizational Processes 26%
	Teaching 57.7%
	Management 16.3%

Source: Own Elaboration.

2.2.3. Analysis of construct validity and reliability

The analysis of construct validity was carried out using the exploratory factor analysis technique (EFA), with the aim of verifying whether the instrument items represent the different dimensions of the same construct (Mavrou, 2015). For the development of the EFA, the above was consulted by Costello and Osborne (2005), Hair, Black and Anderson (2010), Pérez and Medrano (2010), Frías-Navarro and Pascual-Soler (2012), Mavrou (2015) and López-Aguado and Gutiérrez-Provencho (2019) regarding the minimum sample to verify the relevance of the data for this analysis.

The latter was made through the observation of the correlation matrix, the determinant value, the Kaiser-Meyer-Olkin and Bartlett test (Pérez & Medrano, 2010; Hair *et al.*, 2010; Mavrou, 2015). According to these authors, the correlation coefficients must be higher than 0.50 and significant, the determinant value was close to zero, the KMO index was higher than 0.70 and finally Bartlett's sphericity test was statistically significant ($p < 0.05$) (Costello & Osborne, 2005; Pérez & Medrano, 2010; Juárez-Hernández, 2018).

As these assumptions were fulfilled, the factor extraction method of main axes was chosen (Gorsuch, 1983; Hair *et al.*, 2010; De Winter & Dodou, 2012; Juárez-Hernández, 2018; López-Aguado & Gutiérrez-Provecho, 2019). It is important to note that the number of factors to be retained was based on Gutman-Kaiser rule (Ruiz & San Martín, 1992; Pérez & Medrano, 2010). For its part, the determination of significance in the factorial loads was carried out as stipulated by Rositas-Martínez (2014), who states that according to the sample size, the factorial load must be higher than 0.30. If factorial loads have significant loads to more than one factor in the factorial matrix, the rotation of the matrix was performed using the algorithm with higher convenience and the Reliability analysis using the Cronbach Alpha coefficient (Cronbach, 1951) and finally the quality of feasibility was analyzed through the satisfaction survey instrument (CIFE, 2018).

3. Results

3.1. Analysis of the validity of the instrument

Table 3 shows the correlation matrix between the items; in which, it can be observed that all items are significantly correlated ($p < 0.05$) and with a determinant of 0.058. Secondly, Kaiser Meyer Olkin test (KMO: 0.901) and Bartlett's esfericity test ($X^2: 1429.358$ gl: 21; $p < 0.001$) showed that the data are susceptible to analysis using the EFA.

Table 3. Correlation matrix between items (Note *= $p < 0.05$)

Item	1	2	3	4	5	6	7
1	1.000						
2	0.464*	1.000					
3	0.474*	0.516*	1.000				
4	0.518*	0.532*	0.545*	1.000			
5	0.314*	0.365*	0.458*	0.457*	1.000		
6	0.390*	0.464*	0.470*	0.522*	0.568*	1.000	
7	0.451*	0.501*	0.553*	0.574*	0.538*	0.579*	1.000

Source: Own elaboration.

The EFA in its first matrix (communalities), showed the representation of all the items within the factorial model (Table 4), and a single factor presented an eigenvalue higher than 1, and this explained more than 56% of the variance. The analysis of the factorial matrix denoted the representation of the items with a significant loading on the factor found (Table 4).

Table 4. Communalities and Factorial loading

Item	Communalities	Factorial loading
1. It views the expected results when designing an institutional program or project (Program).	.373	.611
2. It foresees the likely costs of implementing a Program.	.453	.673
3. It anticipates the expected impacts of the Program.	.520	.721
4. It establishes indicators to measure the effectiveness of the program for the evaluation and monitoring of programs.	.576	.759
5. It is accountable to the company with respect to the results of the program.	.408	.638
6. It uses Information and Communication Technologies for strategic and tactical processes.	.512	.715
7. It performs data analysis and decision-making to drive results.	.602	.776

Source: Own elaboration.

In the application of the instrument to the participating sample, an optimal reliability value was obtained (Cronbach Alpha: 0.868). Finally, it was found that the participants showed good to excellent degree of understanding with the instrument's instructions, understanding of the items, satisfaction with the instrument and relevance of the questions (Table 5).

Table 5. Instrument Satisfaction Survey Results

	Low	Acceptable	Good	Excellent
What was the understanding degree of the instrument's instructions?	0.990	14.455	58.614	25.941
What was the understanding degree of the questions or items?	0.990	15.842	58.020	25.149
What was the satisfaction degree with the instrument?	1.386	16.436	59.802	22.376
What is the relevance degree of the questions?	0.594	15.446	54.455	29.505

Source: Own elaboration.

4. Discussion

From an organization point of view, the different tools that support management move their attention to results rather than procedures. This feature mentions the criteria or reference framework for the certification of management systems, or for the purpose of accrediting higher education curricula in the case of evaluation. In the public administration, management results have taken on major relevance, particularly in Latin America, where there is little background (García-López & García-Moreno, 2010). From the point of view of evaluating the approach of the managers, in this construct, it was found that the contributions are null and void. Thus, the RBM is a managerial discipline that seeks to overcome problems in the public administration, with the use of public policy information to improve the decision-making (Martínez-Corona & Palacios-Almón, 2019).

This represents a necessity since the evaluation has two functions: one psychosocial and one administrative. The first related to personal development and adaptation to the environment; the second, to identify the right people for a position and identify training proposals (Gil-Flores, 2007). In particular, there is a premise that the managerial approach as any competition must be demonstrated and must have performance criteria (Vargas-Leyva, 2008).

In this sense, the design and development of an instrument to support the evaluation of the management approach to the management results is considered desirable and relevant; in particular, suitable for a knowledge society in order to contribute to the granting of services in the public administration with value to society. Consequently, the importance of having a management-oriented approach to the management results is to highlight that it must be seen as a system; therefore, it is

based on the results-oriented management cycle, which involves everything from a diagnosis to accountability. It emphasizes that each of the stages must be properly articulated, with the aim of facilitating the subsequent stages (Kauffman *et al.*, 2015), stating that even though it is important to know how the actions are carried out, the main emphasis is: what is done, what is achieved and what is its impact (UAEM, 2015).

To fulfill this task, the analytical heading was proposed: “management approach in the management for the results in the knowledge society” (Martínez-Corona *et al.*, 2020); which is considered a contribution to the area, as it denotes elements to identify characteristics in public workers towards a guidance for the results in the implementation of public policy; as well as making decisions for the training of public managers, based on an institutional diagnosis and taking as reference the axes of the management cycle and is structured under the management approach for the results.

While the instrument is considered to include aspects that characterize the RBM, validation is necessary to verify that it measures what it needs to measure; i.e., the reason for its design (Carvajal *et al.*, 2011). In this regard, there are a number of psychometric properties of relevance in the evaluation of instruments. These point out the so-called validity of *facie*, which is the verification of the relevance of the instrument items and the assessment of their understanding in their wording (Reina Gamba & Vargas Rosero, 2008); and the second called content validity which “refers to the degree to which an instrument reflects a specific content domain of what is being measured” (Hernández-Sampieri *et al.*, 2010, p. 201).

With regard to the latter, Juárez-Hernández and Tobón (2018) refer to the validity of the content such as the quality and accuracy of the research instrument, for which they perform an analysis of the historical development of the term, in which stand out definitions such as the one of Kerlinger (1986) that expresses that it is the representativeness of the content, also Koller, Levenson and Glück (2017) who add elements such as representativeness of items and their grammatical aspects, as well as the clarity of the instructions. Additionally, Carvajal *et al.* (2011) express that the validity of the content is a qualitative assessment to know whether the questionnaire covers all the dimensions of the phenomenon to be measured. According to the above, the instrument was subjected to these processes; therefore, it can be indicated that the instrument for evaluating the DAMfRNS has content validity and the appropriate features for its application.

However, both properties have been mentioned as important, and the validity of the construct is considered to be the one of greatest relevance and importance, since it corresponds to the meaning of the instrument and concerns, verifying that an instrument represents and measures the theoretical concept it aims to measure (Hernández-Sampieri *et al.*, 2010, p. 203). Other authors indicate that it is the main in terms of the types of validity, and that it is a unifying concept, since it integrates into a common framework to test the theoretically relevant relationships, the considerations of content validity and criterion (Messick, 1980).

In order to comply with the validation scheme, the analysis of this property was carried out, applying the instrument to 505 managers of the public administration, which optimally meets the fundamental standard of the sample size for the implementation of exploratory factor analysis (Hair *et al.*, 2010; Mavrou, 2015). The results

were satisfactory, as the correspondence of what was theoretically proposed was first observed. In this sense, even if the instrument considers various aspects, its basis is the axes of the management cycle and the first principle of the Marrakesh declaration, since they represent a process where all aspects are related and are part of the same construct. Thus, it could be verified that they respond to the same dimension derived from the matrix of the total variance explained, and only one factor obtained an eigenvalue higher than 1 and which explained more than 56% of the variance.

Secondly, all the proposed items are represented within the factorial model and the factor found, revealing that the instrument items represent and measure the theoretical construct or concept that is proposed (Mavrou, 2015). This aspect is relevant as it shows the value of content validation, since as noted, the latter represents a fundamental part of the construct's validity (Messick, 1980). Another important aspect to note is the fulfillment of all assumptions, since the method large samples, correlation between variables and adequacy data were favorable. Compliance with these assumptions brings robustness and relevance to the results found.

Another property analyzed was reliability, which according to Virla, González-Pineda and Gutiérrez (2013) is related to the accuracy used by an instrument to measure what must be measured. Hernandez-Sampieri *et al.* (2010) express the extent to which the repeated application of an instrument to the same individual produces equal results. Specifically, an optimal value (Cronbach Alpha of 0.868) was obtained according to the criteria indicated (Cervantes, 2005; Juárez-Hernández, 2018; Taber, 2018), revealing the reliability of the instrument, which means that the results are reliable when applied in several moments (Carvajal *et al.*, 2011). Likewise, it is important to note that the instrument showed optimal reliability values in its first analysis (Cronbach Alpha 0.822) in the pilot group, and according to Charter (2003) the coefficient tends to be unstable with small samples. The above highlights the value obtained in this work, since the sample is considered optimal to perform this analysis and be certain about the obtained value.

Another aspect to mention is the characteristic or quality of feasibility; i.e., its affordability for the targeted population (Carvajal *et al.*, 2011). In this work, good weights were obtained regarding the understanding of instructions and items, as well as the satisfaction of the instrument, which is similar to the pilot group (Martínez-Corona *et al.*, 2020). This aspect is of the utmost importance, since as Corral (2009) and Carvajal *et al.* (2011) mention, inadequate understanding of instructions or questions may affect psychometric properties, as well as the results of the instrument.

5. Conclusions

The instrument "management approach to the management for the results in the knowledge society" and the elements that are part of it, accurately represent and measure the construct to be evaluated. In addition to these results, the relevance of the previous phases of review and validation of the instrument's content stands out, being significant in the results obtained in this work. It is worth noting the evaluation by the target population, since it stated that the instructions and items of the instrument are understandable with a high degree of satisfaction. This evidence denotes the

quality in the instrument and its measurement, which represents a contribution to the area of study and provides the opportunity to apply the instrument for obtaining a diagnosis to identify lines of training for the managers in the public sector, which can improve public policy decisions and outcomes.

References

- Buela-Casal, G., & Sierra, J. C. (1997). *Manual de evaluación psicológica: fundamentos, técnicas y aplicaciones*. España: Siglo XXI.
- Carvajal, A., Centeno, C., Watson, R., Martínez, M., & Sanz-Rubiales, Á. (2011). ¿Cómo validar un instrumento de medida de la salud? *Anales Sis San Navarra*, 34(12), 63-72.
- Cervantes, V. H. (2005). Interpretaciones del coeficiente alpha de Cronbach. *Avances en medición*, 3(1), 9-28.
- Charter, R. A. (2003). A Breakdown of Reliability Coefficients by Test Type and Reliability Method, and the Clinical Implications of Low Reliability. *The Journal of General Psychology*, 130(3), 290-304. <https://doi.org/10.1080/00221300309601160>.
- Chica, S. A. (2015). Gestión para Resultados en el Desarrollo: Hacia la Construcción de una Buena Gobernanza. *Administración & Desarrollo*, 45(1), 71-93.
- CIFE (2018). *Planeación del diseño y validación de un instrumento de investigación*. Cuernavaca, Morelos, México: Centro Universitario CIFE.
- Corral, Y. (2009). Validez y confiabilidad de los instrumentos de investigación para la recolección de datos. *Revista Ciencias de la Educación*, 19 (33), 228-247.
- Costello, A. B., & Osborne, J. W. (2005). Best Practices in Exploratory Factor Analysis: Four Recommendations for Getting the Most From Your Analysis. *Practical Assessment, Research & Evaluation*, 10(7). <https://dx.doi.org/10.4135/9781412995627.d8>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3), 297-334. <https://doi.org/10.1007/BF02310555>
- De Winter, J. C., & Dodou, D. (2012). Factor recovery by principal axis factoring and maximum likelihood factor analysis as a function of factor pattern and sample size. *Journal of Applied Statistics*, 39, 695-710. <https://doi.org/10.1080/02664763.2011.610445>.
- Frías Navarro, D., & Pascual Soler, M. (2012). Prácticas del Análisis Factorial Exploratorio (AFE) en la investigación sobre conducta del consumidor y marketing. *Suma Psicológica*, 47-58.
- García-López, R., & García-Moreno, M. (2010). *La gestión para resultados en el desarrollo: Avances y desafíos en América Latina y el Caribe*. Banco Interamericano de Desarrollo.
- Gil-Flores, J. (2007). La evaluación de competencias laborales. *Educación XX1*(10), 83-106.
- Gómez-Benito, J., & Hidalgo, M. D. (2015). La validez en los tests, escalas y cuestionarios. *La sociología en los escenarios*, 8 (revista electrónica), 1-14.
- Gorsuch, R. L. (1983). *Factor Analysis* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Hair, J. F., Black, W. C., & Anderson, R. E. (2010). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice Hall.
- Hernández-Sampieri, R., Fernández-Collado, C., & Baptista-Lucio, P. (2010). *Metodología de la Investigación*. México: McGraw-Hill Educación.
- Hidalgo, L. (2005). Confiabilidad y validez en el contexto de la investigación y evaluación cuantitativas. *Revista Venezolana de Investigación*, 225-243.
- Juárez-Hernández, L. G. (2018). *Manual práctico de estadística básica para la investigación*. Florida: Kresearch.
- Juárez-Hernández, L. G., & Tobón, S. (2018). Análisis de los elementos implícitos en la validación de contenido de un instrumento de investigación. *Revista Espacios*, 39(53), 23.
- Kauffman, J., Sangines, M., & García-Moreno, M. (2015). *Construyendo gobiernos efectivos: Logros y retos de la gestión pública para resultados en América Latina y el Caribe*. (B. I. Desarrollo, Ed.) Washington, D.C., USA.

- López-Aguado, M., & Gutiérrez-Provecho, L. (2019). Cómo realizar e interpretar un análisis factorial exploratorio utilizando SPSS. *REIRE Revista d'Innovació i Recerca en Educació*, 12(2), 1-14. <http://doi.org/10.1344/reire2019.12.227057>.
- Martínez-Corona, J. I., & Palacios-Almón, G. E. (2019). Análisis de la Gestión para Resultados en el Marco de la Sociedad. *Revista Atenas*, 3(47), 180-197.
- Martínez-Corona, J. I., Palacios-Almón, G. E., & Juárez-Hernández, L. G. (2020). Diseño y validación del instrumento —enfoque directivo en la gestión para resultados en la sociedad del conocimiento—. *Revista Espacios*, artículo en prensa.
- Mavrou, I. (2015). Análisis factorial exploratorio: cuestiones conceptuales y metodológicas. *Revista Nebrija de Lingüística Aplicada a la Enseñanza de las Lenguas*, 19.
- Messick, S. (1980). Test validity and ethics of assessment. *American Psychologist*, 35, 1012-1027. <http://dx.doi.org/10.1037/0003-066X.35.11.1012>
- Ministerio de Economía y Finanzas (2015). *Presupuesto por resultados y la articulación territorial*. Recuperado de: <http://bit.ly/2oYlt36> (2019-05-29)
- Montero, I., & León, O. G. (2002). Clasificación y descripción de las metodologías de investigación en psicología. *Revista Internacional de Psicología Clínica y de la Salud*, 2(3), 503-508.
- Plissock -Varas, C. (2017). Implementando la nueva gestión pública: problemas y desafíos a la ética pública. El caso chileno. *Convergencia Revista de Ciencias Sociales*, 24(73), 141-164.
- Pérez, E. R., & Medrano, L. (2010). Análisis Factorial Exploratorio: Bases Conceptuales y Metodológicas. *Revista Argentina de Ciencias del Comportamiento*, RAAC, 2(1), 58-66.
- Prieto, G., & Delgado, A. R. (2010). Fiabilidad y validez. *Papeles del Psicólogo*, 31(1), 238-253.
- Reina Gamba, N. C., & Vargas Rosero, E. (2008). Validez de contenido y validez facial del instrumento "Percepción de comportamientos de cuidado humanizado". *Avances en enfermería*, 26(2), 71-79.
- Rositas-Martínez, J. (2014). Los tamaños de las muestras en encuestas de las ciencias sociales y su repercusión en la generación del conocimiento. *Innovaciones de negocios. Innovaciones de Negocios*, 11(22), 235-268.
- Ruiz, M. A., & San Martín, R. (1992). El comportamiento de la regla k1 en la estimación del número de factores. *Psicothema*, 4(2), 543-550.
- Salas-Razo, G., & Juárez-Hernández, L. G. (2019). Rúbrica analítica para el diagnóstico integral del nivel de desarrollo de una comunidad rural. *Ager: Revista de Estudios sobre Despoblación y Desarrollo Rural*, 26(1), 161-188.
- Secretaría de Hacienda y Crédito Público (2017). *Módulo 2. Planeación y Presupuesto Orientado a Resultados del Diplomado de Presupuesto Basado en Resultados*. Ciudad de México: SHCP.
- Shack, N., & Rivera, R. (2017). *Seis años de la gestión para resultados en el Perú (2007-2013)*. Huancayo: Universidad Continental, Fondo Editorial.
- Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273-1296.
- Tobón, S. (2017). *Evaluación socioformativa: estrategias e instrumentos*. Mount Dora, USA: Kresearch.
- Tobón, S., Guzmán, C. E., Hernández, J. S., & Cardona, S. (2015). Sociedad del conocimiento: Estudio documental desde una perspectiva humanista y compleja. *Paradigma*, 36(2), 7-36.
- UAEM (2015). *Gestión para resultados en la UAEM*. Recuperado de: bit.ly/34lPnxk
- Vargas-Leyva, M. R. (2008). *Diseño curricular por competencias*. Ciudad de México: ANFEI.
- Virla, M. Q., González-Pineda, M., & Gutiérrez, D. J. (2013). Pertinencia de los términos validez y fiabilidad en investigaciones de la complejidad social. *Opción*, 29(71), 45-56.