

Integral evaluation instrument of development in rural communities: construct validation and reliability

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Abstract

This article studies the construct validity and reliability of the instrument “analytical rubric for the comprehensive diagnosis of development levels in rural communities”. The instrument was applied to 351 inhabitants of rural communities, using exploratory factorial analysis. Findings show that the factorial model consisted of four dimensions: i) organizational, economic-environmental, and educational access conditions; ii) infrastructure; iii) governance; and iv) social and cultural conditions, which account for over 58% of the differences. Regarding reliability, an optimal value was obtained globally (Cronbach’s alpha: 0.800) and was also significant across all dimensions. The article concludes that the instrument accurately measures the objective construct, demonstrating its usefulness in using local populations’ perceptions to provide valid and reliable assessments of development levels in rural communities.

Keywords: standard of living; rural environment; socioeconomic development; Latin America; regional analysis.

1. INTRODUCTION

Based on the connotation given to rural development, referred to as an improvement to economic and environmental conditions as well as quality of life for inhabitants of rural areas, Salas-Razo and Juárez Hernández (2018) studied whether it was pertinent to move to a sustainable integrated rural development model, based on a knowledge society. In past decades, Latin America’s rural areas have undergone profound changes, because of major demographic, social, and manufacturing changes that have exacerbated poverty and the degradation of natural resources. An instrument that can describe reality through its inhabitants’ eyes is needed, as they live with the scarcity and needs grounded in their reality.

The authors believe that sustainable rural development is multifactorial, which establishes it as a complex and dynamic phenomenon, that aims to surpass economic proposals and look systemically at the various dimensions that determine the development level of a rural community. Accordingly, they consider that the factors are *i*) economic, social and cultural *ii*) environmental *iii*) basic services and infrastructure and *iv*) organizational and governmental.

There are different proposed instruments to evaluate rural community development (Galván-Corral *et al.*, 2014; De Alcántara-Bousi *et al.*, 2017; Milano, 2017; Fuentes *et al.*, 2018) that assess biodiversity loss, deforestation, socioeconomic inequality, malnutrition, access to education, health, security, infrastructure, housing, services, democracy, and social stability. They also evaluate the adoption of new technology, the use of renewable energy, the manufacture of consumer and wellbeing goods, and the suitability of the region. These are seen as key factors for sustainable development, quality of life, territorial security, education, technology, and employment, based on factors relating to resource availability, social reliability, social justice, opportunities for choice, the ability to choose and the perception of satisfaction and sustainable economic development. However, Salas-Razo and Juárez-Hernández (2018) highlight that the different factors for development levels in a rural community remain disperse.

In that regard, Rodríguez-Casavielles *et al.* (2011), Galván-Corral *et al.* (2014), Estrada *et al.* (2015), De Alcántara-Bousi *et al.* (2017), Milano (2017), and Fuentes *et al.* (2018), note that the dimensions that comprise the concept are child development, quality of life, territorial security, education, technology and employment, all according to factors relating to resource availability, social reliability, social justice, opportunities for choice, the ability to choose and the perception of satisfaction and sustainable economic development. However, these proposals do not include the fundamental dimensions (economic, sociocultural, environmental conditions; basic services and infrastructure; and organization and governance), which were considered essential to evaluating development levels in rural areas (Salas-Razo and Juárez-Hernandez, 2018).

Consequently, it became clear that there was a need for an instrument that filled the existing gaps in diagnostic materials of the development levels of a rural community. An instrument that included the pertinent dimensions and that objectively described the context, shortages, and the opportunities according to a rural community as perceived by its own inhabitants. (Larres and López, 2004; Barrera-Ortiz *et al.*, 2015; Ibáñez and Castillo, 2015; Rizo- Mustelie *et al.*, 2017).

Faced with this need, Salas-Razo and Juárez-Hernández (2019) developed the instrument called an “Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community” that incorporates economic conditions, social and cultural conditions, the community’s environmental condition, basic services and infrastructure, and organization and governance.

When using the term instrument, it is important to note its definition: a group of items that allow for the identification of theoretical variable levels that are not directly observable (Mendoza-Mendoza and Garza, 2009). Therefore, if the measurement or evaluation is undertaken in an indirect manner, robust evidence of the relationship between what is really being measured and the attribute that one thinks one is measuring is needed (Kerlinger and Lee, 2002).

Thus, the instrument, "Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community" underwent a *de facie* and content process of validation, as well as an adaptability analysis of the target population (Salas-Razo and Juárez-Hernández, 2019) which showed that the instrument is valid *de facie*. Therefore, the dimensions and items of the construct were shown to be present (Buena-Casal and Sierra, 1997). The content was also shown to be valid, indicating that the items chosen as measurement instruments were both representative and relevant (Sireci, 2003). Moreover, the rural population was able to understand the elements that comprise the instruments.

The instrument was shown to be valid in *de facie* terms and content. However, construct validity, considered the main type of validity, must also be determined, (Pérez-Gil *et al.*, 2000) as it verifies that the instrument does, in fact, reproduce the definition of the construct considered (Lagunes, 2017). Construct validity can be defined as an integrated evaluative judgement of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on survey results (Messick, 1986)

Thus, the article's objective is to analyze the construct validity and reliability of "Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community". Verifying these psychometric properties ensures that the quality of the instrument is optimal, and that valid and reliable evidence can be obtained. (Messick, 1989; Pérez-Gil *et al.*, 2000; Kerlinger and Lee, 2002).

The article is divided into five sections: following the introduction, the second section, defines the methodology applied in the study, the instrument used, the sample population selection, and the definition of statistical methods and procedures used. The third presents results obtained from the analysis carried out. The fourth section contains a discussion of the results, and the fifth presents conclusions, highlighting the main results.

2. METHODOLOGY

Type of Case Study

An instrumental case study, which included designing instruments and tools, and an analysis of psychometric properties, was used (Monterrey and León, 2007).

Procedure

The instrumental case study was conducted in the following manner:

Instrument

"Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community" Salas-Razo and Juárez-Hernández (2019) is comprised of five dimensions *i)* economic, social, and cultural condition; *ii)* environmental; *iii)* infrastructure and services; *iv)* organizational; *v)* governance in the rural communities. Each of these is divided into three categories that describe the development level of each dimension. Five levels of development were established for each item, (very low, low, medium, high and very high), and descriptions of each added (see table 1).

Table 1. Dimensions and Items that Comprise “Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community”

<i>Dimensions</i>	<i>Items</i>
The Community's Economic Condition	1. What is the income level in the community?
	2. What level of industrial development is present in the community?
	3. What is the level of manufacturing in the community?
The Community's Social and Cultural Condition	4. What is the safety level in the community?
	5. What level of social inclusivity is present in the community?
	6. What level of cultural identity is present in the community?
The Community's Environmental Condition	7. To what level are natural resources used and preserved?
	8. To what level have renewable energy and sustainable alternatives been adopted and used in the community?
	9. What level of environmental management is present in the community?
Level of the Community's Basic Services and Infrastructure	10. What is the level of health and nutrition in the community?
	11. What is the education level in the community?
	12. What is the level of infrastructure present in the community?
Level of Organization and Governance	13. What level of organization is present in the community?
	14. What is the level of adherence to the law, and how well is justice imparted in the community?
	15. What level of democracy is present in the community?

Source: taken from Salas-Razo and Juárez-Hernández, 2019.

Once it had been designed, the instrument underwent an adaptability analysis of the target population (Salas-Razo and Juárez-Hernández, 2019), organized in stages. Each stage was then reviewed by experts and the relevance and pertinence of each of the dimensions and items to the construct was established. Then, an expert panel with a quality and quantitative focus, determined the validity of all the items' content.

The instrument was applied to two pilot groups, comprised of inhabitants of a rural community. The adaptability of the instrument to the target population was ascertained, given that the target population's level of understanding of both instructions and items was high. Finally, the pilot demonstrated that the study showed optimal levels of reliability for both groups (Cronbach's Alfa: 0,875; Cronbach's Alfa: 0,898).

Selecting the Sample Population for the Implementation of the Instrument

Under a collaboration agreement with “The Michoacán Association of Irrigation Users A.C.” (AMUR) and the National Farmworkers Organization “New Rural Alliance for the Future Hope of Mexico” (NACE), the instrument was given to 351 inhabitants of rural communities. All the communities selected had ties to the organizations (see table 2). The regional presidents of AMUR and NACE, DEFINED the areas for the instrument's application, after taking a training workshop. At the end of the evaluation, participants were asked if the instrument included all aspects of their community.

Table 2. Sociodemographic Data of the Participants.

<i>Participants (n= 351)</i>			
<i>Gender</i>	<i>Age</i>	<i>Education</i>	<i>Occupation</i>
Men 60.7%	< 18 years old 29.6%	No education 8.0%	Farmer 25.9%
Women 39.3%	>18 years old 70.4%	Primary school 27.4%	Trade 4.8%
		Middle School 19.4%	Day laborer 4.0%
		High School 36.2%	Employee
		University 9.1%	Student 31.9%
			Professional Activity 4.0%
			Homemaker 11.1%
		Other 3.4%	

Source: compiled by authors.

Construct Validity and Reliability Analysis

The construct validity analysis was implemented using exploratory factor analysis (EFA) to identify the items' underlying structure (Tabachnick and Fidell, 2006; Thompson, 2004; Lloret-Segura *et al.*, 2014). The sample size was verified to apply this statistical technique (Costello and Osborne, 2005; Mavrou, 2015). The pertinence of the data was also verified by observing the correlation matrix, the determinant value, the Kaiser Meyer Olkin test (KMO) and Bartlett's test of sphericity, (Costello and Osborne, 2005; Pérez and Medrano, 2010; Juárez-Hernández, 2018).

Once these hypotheses had been proven, the EFA was carried out and the extraction method was chosen, based on the use of the Mardia coefficient (Mardia, 1970), for the evaluation a multivariate normality under the Bollen criteria (1989). If they did not comply with these hypotheses, the principal axis method of extraction was selected, as the method is robust in the case of an assumption violation of normality (Gorusch, 1983; De Winter and Dodou, 2012; Juárez-Hernández, 2018).

The number of factors retained was based on the Kaiser- Gutman rule (Gorsuch, 1983) and the variance threshold (Loret-Segura *et al.*, 2014). The representativeness of the factorial loads was verified according to the sample size (0.350) (Rositas-Martínez, 2014). If an item had a factorial load above one factor (*i.e.*, factorial complexity) the matrix was rotated using the most suitable method. Finally, the reliability analysis was carried out using the Cronbach Alfa coefficient (Cronbach, 1951), indicating that the criteria established by Taber (2018) would be taken into account for the value obtained.

3. RESULTS

Construct viability and reliability analysis

The data was confirmed to be factorial, as significant general correlations were observed ($p < 0.05$) (see table 3) with a determinant close to zero ($d: 0.012$). The KMO (KMO 0.813) and Bartlett's test of sphericity ($X^2: 1346.882$; $p < 0.001$) showed that the data were appropriate to be analyzed using the EFA.

Table 3. The Correlation Matrix Between Items

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.000														
2	.447	1.000													
3	.372	.482	1.000												
4	.031	-.075	.015	1.000											
5	.334	.090	.234	.075	1.000										
6	.016	.048	.055	.297	.074	1.000									
7	.333	.289	.229	-.023	.279	.124	1.000								
8	.061	.069	.098	.053	.132	-.026	.160	1.000							
9	.417	.262	.247	.018	.257	-.003	.306	.101	1.000						
10	.381	.248	.240	.119	.260	.093	.362	.223	.448	1.000					
11	.383	.427	.341	.099	.198	.055	.364	.264	.301	.434	1.000				
12	.301	.136	.261	-.029	.409	-.182	.314	.401	.279	.436	.373	1.000			
13	.532	.428	.497	-.004	.296	-.027	.328	.039	.335	.273	.446	.179	1.000		
14	.347	.219	.386	.194	.326	-.075	.246	.102	.316	.234	.281	.208	.513	1.000	
15	.163	-.019	.199	.098	.452	-.107	.194	.259	.144	.220	.106	.407	.201	.442	1.000

Note: bold text shows significant correlations $p < 0.05$

Source: Compiled by Authors.

In keeping with the Mardia test, the absence of multivariate normality was observed (Kurtosis $p < 0.05$ and Asymmetry $p < 0.05$) and accordingly, the method of principal facto extraction was used. Four factors had an eigenvalue above one, explaining more than 58% of the variance, and factor one explained more than 30% of the variance. The factorial matrix analysis showed the representation of the items with a significant loading. However, items 12 and 15 had factorial complexity, as they were represented in two factors. Therefore, the matrix was rotated, and a clarification of factorial loadings was observed, which indicated that no item showed factorial complexity (see table 4)

Table 4. Factorial Matrix. Items, factorial loading and % of variance of different dimensions in the instrument "Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community" are indicated.

<i>Factor % variance</i>	<i>Community</i>	<i>Factorial Loading</i>	<i>Item</i>	<i>Dimension*</i>	<i>Reliability</i>
F1 (30.19%)	0.729	0.739	13 Organizational level	Organization and governance condition	0.804 (0.770 + 0.833)
	0.627	0.694	2 Industrial development	Community's economic condition	
	0.549	0.639	1 financial income	Community's economic condition	
	0.414	0.577	3 Manufacture	Community's economic condition	
	0.534	0.557	11 Education	Basic Services and Infrastructure Condition	
	0.358	0.44	9 Environmental management	Community's environmental Condition	
	0.348	0.408	7 Use and conservation of natural resources	Community's environmental Condition	
F2 (10.88%)	0.741	0.778	12 infrastructure	Basic Services and Infrastructure Condition	0.721 (0.666 + 0.767)
	0.482	0.52	10 Level of health and nutrition	Basic Services and Infrastructure Condition	
	0.339	0.448	8 Use and adoption of renewable energy and clean alternatives	Community's environmental Condition	
F3 (9.18%)	0.576	0.703	15 Democracy	Organization and governance condition	0.704 (0.646 + 0.754)
	0.641	0.62	14 Level of adherence to the law and quality of justice imparted	Organization and governance condition	
	0.417	0.441	5 Social inclusion	Community's social and cultural condition	
F4 (8.34%)	0.660	0.654	6 Cultural identity	Community's social and cultural condition	0.645 (0.542 + 0.712)
	0.214	0.487	4 Security	Community's social and cultural condition	

Note: the dimension corresponds to the initial proposal by Salas-Razo and Juárez-Hernández (2019)

Source: Compiled by Authors.

Nesting items by factor differs from the theoretical model proposed (see table 1). According to the inhabitants' perception, the factor demonstrating levels of development present in a rural community, (F1) (see table 4) is determined by dimensions such as organizational conditions, economic-environmental conditions, and access to education. This is because it is comprised of items from the economic condition (level of income, industrial development, manufacture), the status of organization and governance (organizational level), the status of basic services and infrastructure (education) and finally the dimension relating to the community's environment (use and conservation of natural resources, environmental management). The second factor (F2), which shows levels of development present in a rural community, is subject to an infrastructure dimension, because it is composed of dimension items pertaining to the status of basic services and infrastructure (level of health and nutrition; level of infrastructure) and the dimension pertaining to the environment (level of use of and adoption of renewable and clean energy). The third factor is determined by status of organization and governance, (the level of adherence to the law and the quality of justice imparted; the level of democracy in the community) and an item of the social and cultural condition dimension (the level of social inclusion). Finally, the fourth factor (F4) belongs to the community's social and cultural condition dimension which only includes items belonging to the dimensions pertaining to level of security and cultural identity.

With regards to reliability, the instrument demonstrated excellent values (Cronbach Alpha: 0.80; IC 95%: 0.766 + 831), whilst by factor, the three had appropriate values for trust. Finally, more than 58% of participants said that the instrument took every aspect of their community into account. In response to the same question, 28% answered maybe, and the remaining 14% found to be insufficient.

4. DISCUSSION

Improving living conditions for the rural population requires a development model that is sustainable and does not negatively impact on productivity. It must also be environmentally friendly, and balance the fulfilment of needs for services, without prioritizing the accumulation of wealth as the goal of the development model. Therefore, sustainable rural development should be seen as having multifactorial traits that establish it as being a complex and dynamic phenomenon (Salas-Razo and Juárez-Hernández, 2018). The profound changes in the rural landscape, a consequence of huge changes in demographic, social conditions and manufacturing have increased poverty and the degradation of natural resources. An instrument that can describe the reality of the rural environment, from the inhabitants' point of view is needed. It should include how the community functions, how it is organized and an evaluation of territorial aptitude as a key factor in determining sustainability (Salas-Razo and Juárez-Hernández, 2019).

However, as previously noted, the instruments available for evaluating the levels of development of a rural community are scarce, and the attempts at evaluating them are unclear. Thus, the "Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community" (Salas-Razo and Juárez-Hernández, 2019) fills the voids that exist in the matter of diagnostics of development levels of a rural community and includes the essential and pertinent dimensions (economic condition, sociocultural condition, environmental condition, level of basic services and infrastructure and organization and governance). These describe the context, the scarcity and opportunities present in a rural community, from the perspective of its inhabitants (Salas-Razo and Juárez-Hernández, 2018).

Moreover, it is important to emphasize that the instrument was subject to an initial methodological process, to show that it measures what it intends to measure (Carvajal *et al.*, 2011). It was also shown to provide evidence relating to the pertinence, relevance and representativeness of the dimensions and items of the construct (Haynes *et al.*, 1995; Buéla-Casal and Sierra, 1997; Koller *et al.*, 2017), the instrument's precision and representation of the concept analyzed (reliability) (Haynes *et al.*, 1995; Welch and Comer, 1988; Tavakol and Dennick, 2011); as well as the clarity and intelligibility of items and instructions (Haynes *et al.*, 1995; Meliá, 2001; Koller *et al.*, 2017).

These phases, which took place prior the instrument's analysis, are important as they show the same definition as in the analysis carried out here. The validity of the construct is the unifying concept that integrates the considerations of content validity and criteria in a common framework for testing hypotheses about theoretically relevant relationships (Messick, 1980).

In this respect, it is important to mention that the method used (*i.e.*, EFA) to analyze construct validity requires that the guidelines for its application be verified, one of these being sample size (Mavrou, 2015). The validity of the study is further established, as the number of participants was 351, which is considered to be optimal. In addition, the correlation between items and the susceptibility of the data (kMO and Bartlett test) to be analyzed by this multivariate method, was observed. Analyzing these assumptions gives validity to the results obtained.

The results revealed the representation of the proposed items, showing that these reproduce the construct (Mavrou, 2015; Lagunes, 2017). As mentioned previously, this aspect shows the importance of the previous confirmation phases, both *de facie* and instrument content (Salas-Razo and Juárez Hernández, 2019). As Haynes *et al.* (1995) stated, content validity is an important component of construct validity because it provides evidence regarding the degree to which the elements of an assessment instrument are relevant and pertinent to the target construct.

The EFA revealed that the organization of the items and dimensions (see table 4) is different from the theoretical proposal (see table 1), which is determined by the perception of the participants. This is consistent with the functional objectives of EFA, which allows for the reinterpretation of variables, grouping items and excluding those requiring substantial modifications or that are outside the estimated dimensions (Figueroa *et al.*, 2018; Olivares-Faúndez *et al.*, 2018).

Thus, the resulting factorial model is shown to be composed of four factors that explain over 58% of the variance, reaffirming that rural development is multifactorial (Salas-Razo and Juárez Hernández, 2018). According to the model obtained, the resulting factors were named "organizational, economic-environmental, and access to education condition dimensions" (F1), "infrastructure dimensions" (F2), "governance dimension" (F3) and finally "community's social and cultural condition dimension" (F4).

As shown, the differentiation between the theoretical model and findings in the analysis are highly justifiable due to the target population's point of view, attributable to the diverse socio-economic and cultural situations that exist, for each of them involves a psychological evaluation, in a constant and dialectical relationship with the context in which they are immersed. That is to say, a point of view can change due to gender, biopsychosocial model, "emics" or "etics", age, education, and the person's sociocultural level. To aim to evaluate a universal construct (Etic) with the idiosyncratic characteristics of each person (Emic), requires identifying indicators that are relevant to the construct (Romero, 2011; Palacios *et al.*, 2017). The precision with an individual is situated in relation to the characteristic to be measured, defines the instrument's exactitude, and has a close relationship to its validity and reliability (Cadena-Iñiguez *et al.*, 2017).

Looking specifically at data for F1, it is not surprising that organizational level ranks as most relevant, (organizational, economic-environmental status and access to education). As stated by Rodríguez-Hernández and Quintero-Novoa (2018), social capital is an important factor in fostering the development of societies and their organizations, and they are the main protagonists in achieving development. Their importance is based in the fact that they are in direct contact with community issues and function as interlocutors by liaising with government institutions. Investment for industrial development has consequently been managed and brought in, in turn promoting economic growth and employment, by boosting manufacturing and productivity in communities (Martínez-Domínguez *et al.*, 2018).

Environmental management, as well as the use and conservation of natural resources, are currently structured on organizational guidelines, conceived from a philosophical and not epistemological perspective, moving to a new awareness from a local to a global level. Examples can be seen in a town's contaminated stream to global warming and soil desertification, water shortages, and of course the loss of indigenous cultural heritage (López and Bastida, 2018). This could constitute a dimension of economic-environmental status in an organized community, capable of synthesizing the development level of a rural community. Thereon, it is important to note that education is a factor in development, given that its impact shown in different jobs is of greater efficiency, increased salaries, and a lesser degree of inequity (Yunez-Naude and Taylor, 2001; Jonasson and Helfland, 2010; Martínez - Domínguez *et al.*, 2018).

In F2 (the dimension relating to infrastructure) the infrastructure level dominated, showing the relevance it has to development levels in rural communities. Calero (2008) states that infrastructure is the return on development and the quality, coverage and efficiency obtained from it. He goes on to say that to a greater degree, it defines the level of wellbeing or stagnation experienced by a community and its inhabitants. Development without an existing basic physical infrastructure is unthinkable, especially when considering housing, the use and protection of water resources, road development, water and sanitation infrastructure, and telecommunications.

Both the levels of health and nutrition, as well as the use and adoption of renewable energy and clean alternatives, were highlighted in factor 2. These have moved from the technical to the political sphere and involve economic, social, and cultural aspects that impact the population. When looked at in a general or local situational analysis, these are increasingly permeated by globalization and sustainable development objectives (Yepes and Marin,

2018). All these factors are fundamental in determining the development level present in a rural community. However, not all rural communities benefit from them, due to geographical, economic, or political reasons, with a clear association between higher levels of social marginalization and places that have the least access to and coverage of services (Alvarado *et al.*, 2016). As rural areas have potential based on their natural, environmental, and cultural assets, producing renewable energies can be used to advance the local population and contribute to sustainability goals (Jiménez, 2014; Perusset, 2018).

F3 (the dimension relating to governance) highlights that democracy, the level of law adherence and the quality of justice imparted are closely connected. The unreal exercise of democracy predominant in Latin America provides us with an example. It is a form of plebiscite oligarchy with consequences such as political favoritism, opportunism, and corruption; a scenario in which politicians' interests come before those of their constituents, and where legality is always sanctioned by whomsoever is in power and can coerce individuals, leaving justice to one side and bowing to power and irresistible financial interests (Guariglia, 2012).

F4 (the dimension relating to the community's social and cultural condition) can be seen as determinant in the development level, cultural identity, and safety present in a rural community. Rural development based on valuing each community's cultural identity (language, music, literature, art, tradition and folklore, gastronomy and arts and crafts) is increasingly frequent and well-known. However, poverty and marginalization call for a reassessment of economic development priorities as inhabitants' needs are greater than the value given to their cultural identity (Fonte and Ranaboldo, 2007).

In Mexico, the increase in lack of public safety and delinquency has worsened in recent years, resulting in the Federal government and states taking measures such as changes in legislation. Examples of these have been structures for obtaining, imparting, and administering justice, creating legal defense and human right institutions, among others. The situation has worsened, and estimates of probable benefits are unclear, which demands that alternative policies be found and implemented. These could be policies that direct spending to containing violence from a virtuous peace circle by bolstering a culture revindicating the local identity of each community. The impact on economic growth would then be felt, with job creation and, in turn, create greater social equity and opportunities (Soria, 2018).

The internal consistency analysis (globally, as well as for most factors) showed acceptable values, underlining the degree of correlation between items and the representation of the concept addressed (Haynes *et al.*, 1995; Welch and Comer, 1998; Tavakol and Dennik, 2011). With regards to this, even if F4 (the community's social and cultural status) had a lower value than the others, according to Katz (2006), it can be deemed acceptable.

A valuable aspect analyzed in this report was the sample's perception of how complete the instrument was, which is fundamental as it shows how functional the instrument was in considering the target population in accordance with nature of the research (Cadena-Iñiguez *et al.*, 2017).

Research into psychometric properties allowed the meaning of each factor to be evaluated. This highlights the fact that the findings obtained from this instrument, applied to a rural context, contribute substantially given that they provide accurate data for development levels present in rural communities (Salvador-Ginez *et al.*, 2017).

Finally, it must be recognized that the instrument must be applied to a larger sample to confirm the factorial structure obtained.

5. CONCLUSIONS

From the construct validity analysis, "Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community", showed an adequate representation of the target construct. The representation of all the items initially proposed was observed, and a reorganization of the items and theoretically proposed dimensions obtained. In that regard, the arrangement of the items into four revealed factors allowed the dimensions to be defined by the following terms: organizational status; economic-environmental and access to education; condition of infrastructure; condition of governance and social and cultural condition.

An excellent result was obtained for reliability, both globally as well as for each factor, showing the instrument's precision, the correlation between items and construct representation. It is important to note that the instrument "Analytical Rubric for a Comprehensive Diagnosis of The Development Level of a Rural Community" will provide valid and reliable assessments, according to the analysis of the psychometric properties studied. This addition to the data will allow social scientists, decision makers, environmental risk managers, authorities and those responsible for public policy to design development planning criteria and will generate new knowledge societies in rural areas.

Another notable aspect is that as the instrument is grounded in the inhabitants' point of view, aspects of sustainable rural development can be identified. These deserve greater attention, as do areas that need to be revalued such as cultural identity, which should undergo a process of economic reevaluation. If adopted as a means for development, these offer a path to solving or relieving poverty in rural areas.

BIBLIOGRAPHY

- Alvarado, E. A., Medina, O. R. and Mota, O. I. (2016). Niveles de cobertura y accesibilidad de la infraestructura de los servicios de agua potable y de salud en Nuevo León, México. *Contexto*, 10(12). <https://contexto.uanl.mx/index.php/contexto/article/view/52>.
- Barrera-Ortiz, L., Carrillo-González, G. M., Chaparro-Díaz, L., Sánchez-Herrera, B., Vargas-Rosero, E. and Patricia-Carreño, S. (2015). Validez de constructo y con fiabilidad del instrumento calidad de vida versión familiar en español. *Enfermería Global*, 14(37). <https://doi.org/10.6018/eglo-bal.14.1.185111>
- Bollen, K. A. (1989). *Structural equations with latent variables*. John Wiley and Sons.

- Buela-Casal, G. and Sierra, J. C. (1997). *Manual de evaluación psicológica: fundamentos, técnicas y aplicaciones*. Siglo XXI de España Editores.
- Cadena-Iñiguez, P., Rendón-Medel, R., Aguilar-Ávila, J., Salinas-Cruz, E., De la Cruz-Morales, F. and Sangerman-Jarquín, D. (2017). Métodos cuantitativos, métodos cualitativos o su combinación en la investigación: un acercamiento en las ciencias sociales. *Revista Mexicana de Ciencias Agrícolas*, 8(7). <https://doi.org/10.29312/remexca.v8i7.515>
- Calero, I. (2008). Infraestructura para el desarrollo. *Universitas. Revista de Ciencias Sociales y Humanas*, 10. <https://www.redalyc.org/articulo.oa?id=476150829009>
- Carvajal, A., Centeno, C., Watson, R., Martínez, M. and Sanz Rubiales, A. (2011). ¿Cómo validar un instrumento de medida de la salud? *Anales del Sistema Sanitario de Navarra*, 34(1). <https://recyt.fecyt.es/index.php/ASSN/article/view/10317>
- Costello, A. B. and Osborne, J. W. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation*, 10(7). <https://doi.org/10.7275/jyj1-4868>
- Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3). <https://doi.org/10.1007/BF02310555>
- De Alcântara-Buosi, M., De Oliveira-Lima, S. and Leocádio-da Silva, Á. (2017). Relación entre la percepción del desarrollo sustentable y la imagen del lugar según los residentes de un destino de turismo internacional. *Estudios y Perspectivas en Turismo*, 26(1). <https://www.redalyc.org/articulo.oa?id=180749182007>
- De Winter, J. C. and 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(4). <https://doi.org/10.1080/02664763.2011.610445>
- Figueroa, J. T., Martín, D., Asencio, E. N., Montilla, S. P. and Mendoza, V. I. (2018). Validación de constructo de un instrumento para medir la competencia digital docente de los profesores (CDD). *Revista Española de Pedagogía*, 76(269). <https://doi.org/10.22550/REP76-1-2018-02>
- Fonte, M. and Ranaboldo, C. (2007). Desarrollo rural, territorios e identidades culturales. Perspectivas desde América Latina y la Unión Europea. *Revista Opera*, 7. <https://revistas.uexternado.edu.co/index.php/opera/article/view/1179>
- Fuentes, C. M., Peña, S. and Hernández, V. (2018). La medición multidimensional de la pobreza a nivel intraurbano en Ciudad Juárez, Chihuahua. *Estudios Fronterizos*, 19(e001). <https://doi.org/10.21670/ref.1801001>
- Galván-Corral, A., Miranda-Esquer, J. B., Baez-Portillo, M. M., Acosta-Mellado, E. I. and Murillo-Félix, C. A. (2014). Análisis de fiabilidad de un instrumento para medir la percepción del nivel de desarrollo sustentable de Navojoa, Sonora. *Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, 12. <http://1-11.ride.org.mx/index.php/RIDese-CUNDARIO/article/viewFile/706/690>
- García Estrada, E., García Lirios, C., Rosas Ferrusca, J. F. and Castillo Escamilla, M. B., Carreón Guillén, J., Hernández Valdés, J. and Rivera Varela, B. L. (2015). Prueba empírica de un modelo de calidad de vida. *Civilizar: Ciencias Sociales y Humanas*, 15(28). <https://doi.org/10.22518/16578953.286>
- Gorsuch, R. L. (1983). *Factor analysis*. Lawrence Erlbaum Associates.
- Guariglia, O. (2012). Democracia y justicia global: obstáculos y perspectivas. *Eidos: Revista de Filosofía de la Universidad del Norte*, 17. <https://rciencias.uninorte.edu.co/index.php/eidos/article/view/4411>
- Haynes, S., Richard, D. and Kubany, E. (1995). Content validity in psychological assessment: A functional approach to concepts and methods. *Psychological Assessment*, 7(3). <https://doi.org/10.1037/1040-3590.7.3.238>
- Ibáñez, N. and Castillo, R. (2015). Hacia la cuantificación del desarrollo humano sustentable. *Negotium*, 10(30). <https://www.redalyc.org/articulo.oa?id=78238677010>
- Jiménez, T. (2014). Energías renovables y turismo comunitario: una apuesta conjunta para el desarrollo humano sostenible de las comunidades rurales. *Energética*, 44. <https://revistas.unal.edu.co/index.php/energetica/article/view/45487>
- Jonasson, E. and Helfand, S. (2010). How important are locational characteristics for rural non-agricultural employment? Lessons from Brazil. *World Development*, 38(5). <https://doi.org/10.1016/j.worlddev.2009.11.020>
- Juárez-Hernández, L. G. (2018). *Manual práctico de estadística básica para la investigación*. Kresearch.
- Katz, M. H. (2006). *A practical guide for clinician*. Cambridge University Press.
- Kerlinger, F. N. and Lee, H. B. (2002). *Investigación del comportamiento: métodos de investigación en Ciencias Sociales*. McGraw-Hill Interamericana Editores.
- Koller, I., Levenson, M. R. and Glück, J. (2017). What do you think you are measuring? A mixed-methods procedure for assessing the content validity of test items and theory-based scaling. *Frontiers in Psychology*, 8. <https://doi.org/10.3389/fpsyg.2017.00126>
- Lagunes, R. (2017). Recomendaciones sobre los procedimientos de construcción y validación de instrumentos y escalas de medición en la psicología *Instrumento de evaluación integral del nivel de desarrollo de comunidades rurales de la salud. Psicología y Salud*, 27(1). <https://psicologiaysalud.uv.mx/index.php/psicysalud/article/view/2431>
- Lares, O. and López, M. (2004). Metodología de diagnóstico para el desarrollo sustentable. *Revista del Centro de Investigación. Universidad La Salle*, 6(22). <https://www.redalyc.org/articulo.oa?id=34202203>

- Lloret-Segura, S., Ferreres-Traver, A., Hernández-Baeza, A. and Tomás-Marco, I. (2014). El análisis factorial exploratorio de los ítems: una guía práctica, revisada y actualizada. *Anales de Psicología*, 30(3). <https://dx.doi.org/10.6018/analesps.30.3.199361>
- López, R. and Bastida, D. (2018). La importancia de la educación ambiental no formal en el medio rural: el caso de Palo Alto, Jalisco. *Diálogos sobre educación. Temas actuales en investigación educativa*, 9(16). http://www.scielo.org.mx/scielo.php?script=sci_arttext&pid=S2007-21712018000100004
- Mardia, K. V. (1970). Measures of multivariate skewness and kurtosis with applications. *Biometrika*, 57(3). <https://doi.org/10.1093/biomet/57.3.519>
- Martínez-Domínguez, M., De Souza, M. and Mora-Rivera, J. (2018). Cambios en el empleo e ingreso de los hogares rurales de México, 2002-2007. *Región y Sociedad*, 30(71). <https://doi.org/10.22198/rys.2018.71.a772>
- Mavrou, I. (2015). Análisis factorial exploratorio. *Revista Nebrija de Lingüística Aplicada a la Enseñanza de Lenguas*, 19. <https://doi.org/10.26378/rmlael019283>
- Meliá, J. L. (2001). *Teoría de la fiabilidad y la validez*. Ed. Cristobal Serrano.
- Mendoza-Mendoza, J. and Garza, J. B. (2009). La medición en el proceso de investigación científica: evaluación de validez de contenido y con fiabilidad. *Innovaciones de Negocios*, 6(11). <https://core.ac.uk/reader/84812900>
- Messick, S. (1980). Test validity and ethics of assessment. *American Psychologist*, 35(11). <https://doi.org/10.1002/j.2333-8504.1979.tb01178.x>
- _____ (1986). The once and future issues of validity: Assessing the meaning and consequences of measurement. In H. Wainer and H. I. Braun (eds.). *Test validity* (pp. 33-48). Lawrence Erlbaum Associates.
- _____ (1998). Test validity: A matter of consequence. *Social Indicators Research*, 45(1-3). <https://link.springer.com/article/10.1023/A:1006964925094>
- Milano, F. (2017). Instrumentos para la conservación ecosistémica como promotores de la transición agroecológica y del desarrollo rural sostenible. *Documentos y Aportes en Administración Pública y Gestión Estatal*, 17(29). <https://doi.org/10.14409/da.v17i29.7098>
- Montero, I. and León, O. (2007). A guide for naming research studies in Psychology. *International Journal of Clinical and Health Psychology*, 7(3). <https://www.redalyc.org/articulo.oa?id=33770318>
- Olivares-Faúndez, V., Gil-Monte, P., Montaña-Espinoza, R., Barrera-Capot, R., Fredes-Collarte, D. and Figueiredo-Ferraz, H. (2018). Validez factorial del cuestionario para la evaluación del síndrome de quemarse por el trabajo (cesqt) en profesionales de servicios. *Interciencia*, 43(6). <https://www.redalyc.org/articulo.oa?id=33957447004>
- Palacios, J., Ramírez, V., Anaya, M., Hernández, H. and Martínez, R. (2017). Evaluación psicométrica de una escala de autoeficacia de la conducta alimentaria. *Revista Chilena de Nutrición*, 44(1). <http://dx.doi.org/10.4067/S0717-75182017000100013>
- Pérez, E. R. and Medrano, L. (2010). Análisis factorial exploratorio: bases conceptuales y metodológicas. *Revista Argentina de Ciencias del Comportamiento*, 2(1). <https://doi.org/10.32348/1852.4206.v2.n1.15924>
- Pérez-Gil, J. A., Chacón-Moscoso, S. C. and Rodríguez, R. M. (2000). Validez de constructo: el uso de análisis factorial exploratorio-confirmatorio para obtener evidencias de validez. *Psicothema*, 12(2). <http://www.psicothema.com/psicothema.asp?id=601>
- Perusset, M. (2018). Saberes locales y tecnologías actuales: energía y producción familiar. *InterSedes: Revista de las Sedes Regionales*, 19(39). <http://dx.doi.org/10.15517/isucr.v19i39.34068>
- Rizo-Mustelier, M., Vuelta-Lorenzo, D. and Lorenzo-García, A. (2017). Agricultura, desarrollo sostenible, medioambiente, saber campesino y universidad. *Ciencia en su PC*, 2.
- Rodríguez-Casavielles, R. N., Bellido-Aguilera, O. L., González-Calzadilla, C., Solares-Sierra, E., Rojas-Verdecia, I. and Lorenzo-Martín, R. (2011). Mejoramiento sostenible de la calidad de vida de la población mediante el trabajo comunitario. *Revista Cubana de Salud Pública*, 37(3).
- Rodríguez-Hernández, R. and Quintero-Novoa, R. (2018). Estrategias de los líderes de organizaciones sociales en la construcción de capital social. *RICSH. Revista Iberoamericana de las Ciencias Sociales y Humanísticas*, 7(13). <http://cathi.uacj.mx/20.500.11961/5409>
- Romero, E. (2011). Confiabilidad y validez de los instrumentos de evaluación neuropsicológica. *Subjetividad y Procesos Cognitivos*, 15(2). <http://dspace.uces.edu.ar:8180/xmlui/handle/123456789/1388>
- 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*, 11(22). <http://revistainnovaciones.uanl.mx/index.php/revin/article/view/59>
- Salas-Razo, G. and Juárez-Hernández, L. G. (2018). Hacia un modelo de desarrollo rural integral sustentable basado en la sociedad del conocimiento. *Espacios*, 39(45). <https://www.revistaespacios.com/cited2017/cited2017-09.html>
- _____ and 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*, 27. <https://doi.org/10.4422/ager.2019.01>
- Salvador-Ginez, O., Ortega Andeane, P., Rivera Aragón, S. and García-Mira, R. (2017). Validez y con fiabilidad de la escala de percepción de riesgo de deslave en la Ciudad de México. *Acta de Investigación Psicológica-Psychological Research Records*, 7(1). <https://doi.org/10.1016/j.aiprpp.2016.11.006>
- Sireci, S. G. (2003). Validity content. En R. F. Ballesteros (ed.). *Encyclopedia of psychological assessment* (pp. 1075-1078). Sage.
- Soria, R. (2018). Una estimación del costo de la inseguridad y la delincuencia en México: análisis comparativo a nivel de las entidades federativas. *Gestión y Política Pública*, 27(1). <http://www.gestionypoliticapublica.cide.edu/ojsaide/index.php/gyp/article/view/372>

- Tabachnick, B. G. and Fidell, L. S. (2006). *Using multivariate statistics*. Allyn & Bacon/Pearson Education.
- 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). <https://doi.org/10.1007/s11165-016-9602-2>
- Tavakol, M. and Dennick, R. (2011). Making sense of Cronbach's Alpha. *International Journal of Medical Education*, 2. <http://dx.doi.org/10.5116/ijme.4dfb.8dfd>
- Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications*. American Psychological Association.
- Welch, S. and Comer, J. (1988). *Quantitative methods for public administration: techniques and applications*. Dorsey Press.
- Yepes, C. and Marín, Y. (2018). Desafíos del análisis de la situación de salud en Colombia. *Biomédica*, 38(2). <https://doi.org/10.7705/biomedica.v38.i0.3594>
- Yunez-Naude, A. and Taylor, E. J. (2001). The determinants of nonfarm activities and incomes of rural households in Mexico, with emphasis on education. *World Development*, 29(3). [https://doi.org/10.1016/S0305-750X\(00\)00108-X](https://doi.org/10.1016/S0305-750X(00)00108-X)