Development, validation, and reliability of a measurement scale for investigating the principle of intercooperation

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Abstract
The present study aimed to develop and validate a measurement scale for investigating the principle of intercooperation, in order to provide researchers in the field of cooperativism with a valid and reliable measure. To this end, four main steps were followed: conceptual mastery, theoretical validation, semantic validation, and statistical validation. First, a preliminary scale was developed based on a literature review and interviews with twenty representatives of cooperatives and representative organizations. Later, the evaluation was carried out by eight academic judges and analyzed using the Content Validity Coefficient. A pre-test was then carried out with subjects from the population, and subsequently the scale was applied to a sample of 213 cooperatives. Finally, factor analysis was performed with the aim of evaluating convergent and factorial validity as well as individual and construct reliability. Thus, it is proposed that the principle of intercooperation be measured by two different scales. The first, called "Horizontal Intercooperation", presented a Composite Reliability equal to 0.81 and Average Variance Extracted equal to 0.68. The second, called "Vertical Intercooperation", presented a Composite Reliability equal to 0.96 and Average Variance Extracted equal to 0.69. After the analyses, the proposed intercooperation scales showed signs of validity and reliability.

1. Introduction

After the congress that marked the centenary of the International Cooperative Alliance (ICA), the trends and structural changes of the cooperative movement were analyzed and, consequently, the general principles of cooperativism were reviewed.

Among the seven principles established, that of "cooperation between cooperatives" – also called "intercooperation" – encourages integration and interorganizational relationships in cooperativism (Konzen & Oliveira, 2015; Mendina et al., 2019). According to the ICA (1995), this allows cooperatives to serve their members more effectively, as well as fostering the development of cooperativism through cooperative relationships. This principle, which was initially announced at the 23rd ICA Congress in 1966, specifies the relevance of inter-organizational relationships in the cooperative context.

It should be noted that the scope of markets and the increasingly specific characteristics of resources have led cooperatives to demand external assets and to invest more significantly in cooperative relationships (Mendina et al., 2019; Simão et al., 2018). According to Ong et al. (2022) and Balestrin and Verschoore (2016), this can enable complex competitive gains to be obtained in isolation.

In this regard, studies involving the principle of intercooperation were carried out (Konzen & Oliveira, 2015; Mendina et al., 2019; Boccatonda et al., 2019; Božić et al., 2019), and authors also sought to review the concept and dimensions intrinsic to such a construct (Fauquet, 1949; Desroche, 1969; Leite, 1982; Meliá & Igual, 2008; Lago & Silva, 2012; Bialoskorski, 2012; Pachón, 2015).

In addition, several studies have identified and analyzed specific intercooperation actions, such as purchase and sales relationships between cooperatives (Božić et al., 2019; Mendina et al., 2019; Pachón, 2015), work carried out jointly (Alves et al., 2019; Luo et al., 2017; Ruano, 2018; Sergaki, 2010), shared brands (Boccatonda et al., 2019; Sergaki, 2010), and the sharing of resources and knowledge (Bialoskorski, 2012; Cechin, 2014; Konzen et al., 2015; Oczkowski et al., 2013).

In such research, a variety of intercooperation concepts supporting the operationalization of the studies were observed. Most of them used qualitative approaches or the measures that were presented lacked information about their validity and reliability.

Therefore, the present study aimed to develop and validate a measurement scale that can be used to investigate the principle of intercooperation, with the intention of providing researchers in the field of cooperativism with a valid and reliable measure.

It is worth noting that the validity of the measurement scale, as explained by Sampieri et al. (2013), is the degree to which it actually measures the variable it purports to measure. Reliability, on the other hand, refers to the level at which the scale produces coherent and consistent results, that is to say, how accurate and precise it is.

Therefore, the development of the measurement scale involved specifying the theory for measuring the principle of intercooperation, covering a set of directly observed variables that operationalize the factor. The purpose of the analysis of the measurement scale was thus to measure latent concepts in a valid and accurate way.

After this introduction, a theoretical review of the principle of intercooperation will be presented. Furthermore, in the subsequent section, the methodological procedures for the operationalization of the development and validation of the measurement scale are presented. The statistical validation results are then offered in section 4.

2. Principle of intercooperation

Simão et al. (2018) and Saes and Silveira (2014) highlighted that intercooperative networks are seen as one of the most expressive strategic trends in cooperativism and,

according to Mendina et al. (2019), intercooperation makes it possible for the cooperatives involved to achieve competitive advantages.

In this regard, studies on interorganizational relationships have recognized that organizations emerge in an interconnected environment and that their performance is linked to connections with other entities and institutions (Oliver, 1990; Górriz-Mifsud et al., 2016). In addition, it is possible that, through joint actions, cooperatives achieve gains in scale and market power, which, according to Balestrin and Verschoore (2016), can derive from joint negotiation, enabling more appropriate prices, terms and payment conditions.

Smith (2001) emphasized that cooperatives may have some difficulty surviving in the market, not necessarily due to inefficiencies, but owing to the lack of other cooperatives and to coordination between the activities of cooperatives that enter the market. In this regard, as highlighted by Basterretxea et al. (2019), intercooperation initiatives can favor the survival and development of cooperatives through cost sharing, as well as by obtaining economies of scale, mitigating risks, maximizing capacities, and enabling access to knowledge and resources that are of importance to cooperatives.

The Italian case of Legacoop (The National League of Cooperative and Mutual Societies) and the Spanish case of the Mondragon Corporation (Mondragon Cooperative Corporation), investigated by Smith (2001), Arando and Bengoa (2018), Basterretxea et al. (2019), and Santos-Larrazabal and Basterretxea (2022), are important experiences that demonstrate the importance of the role of the principle of intercooperation for the survival of cooperatives and for the development of the cooperative movement.

As pointed out by Smith (2001), the consumer cooperatives that are part of Legacoop are an important sales channel for the production of agricultural cooperatives; similarly, housing cooperatives are developed by labor cooperatives in the construction sector. Therefore, the intercooperative relationships involving the cooperatives that make up Legacoop not only enable joint actions, but also enhance the organizational results of the cooperatives through commercial relationships.

Furthermore, the Mondragon Corporation, from the Basque region of Spain, consists of cooperatives from different segments such as credit, industry, labor and distribution, which are voluntary members of the cooperative group. Thus, as emphasized by Basterretxea et al. (2019), the will to participate on the part of individual cooperatives and the freedom for them to disassociate themselves from the Mondragon Corporation demonstrate that the shared services and incentives generated through intercooperation generate added value for the participating cooperatives, since most of the members of the cooperative group remain linked for decades.

Leite (1982) specified the concept of "intercooperation" involving relationships between cooperatives in the same segment, as well as between individual cooperatives and their respective centers. Furthermore, Meliá and Igual (2008) emphasized that intercooperation relations are about joint actions performed between two or more cooperatives, although such bonds are not characterized as hierarchical or market relations.

Bialoskorski (2012), in turn, argued that there are different stages of intercooperation: from the relational ties between cooperatives to the integration of management and existing processes. The first stage is an informal relational network between cooperatives, in which the relationship takes place with regard to the coordination of network information about some activities of the cooperatives, mainly in a relational way.

The second stage occurs in the constitution of a formal organization that has the function of proceeding with the management of contracts and information, and even the logistics and brand management. The consortium of cooperatives is an example of this stage. The third stage concerns the constitution of a new centralized company responsible for the

integral management of processes and products; this case includes holdings and centrals that make up a group of cooperatives.

Therefore, intercooperation is understood as referring to relationships involving two or more cooperatives, whether through formal structures, such as central cooperatives, or through direct relationships, such as commercial partnerships or joint work. This is in line with the most recent revision of the ICA principles (1995), where the 6th principle states that "cooperatives serve their members more effectively and strengthen the cooperative movement, working together through local, national, regional and international structures".

Intercooperation can take place horizontally, when a cooperative maintains links with others on the same level, such as working together and commercial relationships between 1st degree cooperatives (Mendina et al., 2019; Sergaki, 2010). Intercooperation can also be undertaken vertically, when a cooperative relates to those of a higher degree, for example, by integrating certain activities through a 2nd degree cooperative or central cooperative (Boccatonda et al., 2019; Božić et al., 2019; Pachón, 2015). In addition, there may be a cooperative relationship between cooperatives in the same sector, as well as between those in different segments (Leite, 1982; Lago & Silva, 2012).

The principle of intercooperation can be classified, therefore, in three dimensions: "unisectoral horizontal intercooperation", "multisectoral horizontal intercooperation", and "vertical intercooperation". The definitions of these dimensions are presented in Table 1.

Table 1

It is suggested that the construct "intercooperation" be measured, in a valid and reliable way, by including the dimensions presented in Table 1.

3. Methodological procedures

For the development and validation of the measurement scale for investigating the principle of intercooperation, we drew on the proposal by Hair et al. (2019), who specified four activities to be operationalized, which are presented in Figure 1.

Figure 1

Specifically, the process for scale validity and reliability followed the steps shown in Figure 2:

Figure 2

Conceptual domain

Based on the literature review, the items that were preliminarily integrated into the measurement scale were defined. It should be noted that the intercooperation construct is formed by three first-order factors: "unisectoral horizontal intercooperation", "multisectoral horizontal intercooperation" and "vertical intercooperation".

As suggested by Hair et al. (2019), in the first stage for scale development and validation (conceptual domain), in addition to the literature review, interviews were carried out with experts.

Thus, from a non-probabilistic sample, 20 interviews were carried out, 17 of them with cooperatives and 3 with organizations representing and promoting cooperativism.

These interviews were carried out between August 2020 and February 2021, and were designed to address aspects related to the study constructs. All interviews were digitally recorded and transcribed.

Theoretical Validation

After reviewing the literature and the interviews with experts, the scale was submitted for evaluation by eight judges, all of whom have PhDs and conduct research in the areas of cooperativism, as well as social management, public policies, regional development, strategic management, social networks, collective actions, interculturality, innovation for cooperatives, cooperative identity, governance, interorganizational relations, and quantitative research methodology.

The judges performed a critical analysis of the scales used to verify whether the questions, in fact, act as indicators of variables and factors, as well as considering the adequacy of the wording, relevance of the questions, and if they reflect the concepts adequately. Finally, they also offered suggestions for inclusion, exclusion or adaptation of the items.

To this end, they were sent a spreadsheet containing the preliminary items. In it, the judges had to evaluate each item, on a scale from 1 to 5, regarding: i) clarity of language, ii) pertinence of the item, and iii) theoretical relevance. They also had to indicate which factors each item was related to and, finally, they were able to present criticism and suggestions for each of the items.

After the scale was submitted to the judges, these validity criteria were analyzed according to the CVC (Content Validity Coefficient) method proposed by Hernandez-Nieto (2002).

Based on the answers, the CVC was calculated in five steps:

1) The averages of the scores for each question are calculated (Mx); 2) With these averages, the initial CVC (CVCi) is calculated by dividing it by the maximum value that the item could receive for relevance or clarity; 3) To minimize possible biases of the judges, the error (Pei) is calculated for each of the items by dividing 1 (one) by the number of judges, raised to the same number as the number of evaluators; 4) The error result is subtracted from the initial CVC (CVCi), thus defining the CVC of each question (CVCc); 5) The total coefficient (CVCt) of each aspect evaluated (clarity, relevance, and theoretical relevance) of the collection instrument is calculated, subtracting the mean of the CVCi from the mean of the Pei. This step demonstrates the validity of the research instrument, or the interview script as a whole.

Considering the possible CVC result of each item (CVCc) and of the instrument as a whole (CVCt) between 0.0 and 1.00, Hernandez-Nieto (2002) regarded validity and agreement to be acceptable when they are greater than 0.80, a value above 0.90 being considered excellent.

The preliminary scale consisted of 48 items, which presented the following CVCt results: 0.76 (clarity of language), 0.88 (item relevance) and 0.89 (theoretical relevance).

From these results, and from the judges' observations, 9 items were excluded (those with CVCc results lower than 0.8), and 21 items were rewritten based on the judges' considerations.

After such adjustments, the measurement scale was sent back for evaluation by the judges, which presented the following CVCt results: 0.78 (clarity of language), 0.86 (item relevance) and 0.90 (theoretical relevance). Thus, 6 items were excluded from the scale.

After the judges' evaluation and reformulations, 33 items made up the measurement scale, which presented the following CVCt results: 0.79 (clarity of language), 0.86 (item relevance) and 0.90 (theoretical relevance).

Based on the CVC results, it is observed that the scale presented adequate theoretical validity regarding the pertinence of the items and theoretical relevance (CVCt results greater than 0.8, as proposed by Hernandez-Nieto (2002)). As for the clarity of the items, the CVCt presented a result 0.01 lower than the proposal by Hernandez-Nieto (2002), although at this stage, it was decided to keep the 33 items, since the results of pertinence of the items and theoretical relevance were higher than 0.8. The scale was later submitted to pre-test and statistical validation, which resulted in new adjustments, the CVCt results being expanded at the end of the process.

Semantic Validation

To estimate the semantic validity, the scale was applied, as a pre-test, to a sample of cooperatives. Nine cooperatives were selected for convenience. These cooperatives were chosen to carry out the pre-test, considering that the evaluation carried out referred both to the understanding of the items that were part of the scale, and to the ability of the respondents to identify, through the indicators contained therein, aspects of intercooperative relationships.

Representatives of the cooperatives responded to the scale (version after the theoretical validation stage) and presented their observations on the clarity and pertinence of the items. After analyzing the pre-test results, the changes suggested in the pre-final version were made, resulting in the version of the scale prior to statistical validation.

Based on pre-test assessments, three items were rewritten. Such reformulations were carried out considering the notes of the pre-test participants on the aforementioned items, specifically regarding their clarity and applicability to the reality of cooperativism. The refinement of the items was obtained through the opinions and criticisms presented, and the difficulties pointed out.

Statistical Validation

After reviewing the literature, interviews with experts, evaluations by judges and pre-testing, the scale was applied to 248 cooperatives. Of these, 2 completed scales were excluded due to duplication, 32 were excluded because they were answered by employees in operational positions, and 1 was excluded because more than 90% of the answers were answered identically, adding up to a total of 35 exclusions.

The validation was thus based on a sample of 213 cooperatives, located in 18 Brazilian states, which make up the 5 regions of the country. Of these, 59 are in the credit line, 58 are in the agricultural segment, 32 are work cooperatives, 27 operate in the transport sector, 22 belong to the health segment, 8 are in the consumer line, and 7 operate in infrastructure. Data were collected between January and April 2021.

It should be noted that the scale was applied to representatives of cooperatives taking into account ethical procedures, with clarification on the anonymity of responses.

After the scale was applied, the Confirmatory Factor Analysis (CFA) was performed, which, according to Aranha and Zambaldi (2008), can be applied to verify whether the items do in fact represent the factors in a reliable and valid manner.

Reliability is the internal consistency of the variables that represent a factor (Hair et al., 2009), that is, whether the items measure the construct of interest in a consistent and reproducible way. Some indicators can be used to assess reliability, including Cronbach's Alpha and Composite Reliability. It should be noted that Cronbach's Alpha has been questioned as to its ability to indicate factor reliability. Thus, we chose to use Composite Reliability, as suggested by Hair et al. (2009).

This measure estimates the internal consistency of items by indicating the degree to which they are manifestations of the factor. A Composite Reliability result equal to or greater

than 0.7 is considered appropriate, and there is an indication of factor reliability (Hair et al., 2009).

Marôco (2014) emphasized the importance of also evaluating the individual reliability of the items, representing the proportion of total variability of the item that is explained by the factor. According to the author, the item demonstrates individual reliability when the square of its factor loading is greater than 0.25.

Validity, which is the ability of the scale to measure the construct that it is actually intended to measure, was evaluated, as suggested by Marôco (2014), through i) factor validity, and ii) convergent validity.

Factor validity occurs when the variables that make up the construct are reflections of the factor that is intended to be measured. It can be verified by the factor loadings of the items, which, according to Aranha and Zambaldi (2008), represent the weight that the factor exerts on each variable and the correlation between the factor and the items. Marôco (2014) pointed out that if all the observed variables that comprise a given factor present factor loadings greater than 0.5, then the construct demonstrates factor validity.

Convergent validity is verified when the items of a factor share an expressive common variance (Hair et al., 2009), that is, the behavior of these items is explained by the same factor and, therefore, the items must be highly related. Marôco (2014) and Hair et al. (2009) suggested evaluating the convergent validity through the Average Variance Extracted (AVE), that is, the average of the variances of the items that the factor explains. The authors consider an AVE result equal to or greater than 0.5 as an indication of adequate convergent validity.

4. Results

Initially, the items that make up the intercooperation construct were defined from the literature review and interviews with specialists.

It must be stressed that this construct consists of three first-order factors, namely: i) unisectoral horizontal intercooperation; ii) multisectoral horizontal intercooperation; and iii) vertical intercooperation. Thus, Table 2 shows the items that integrate the factors.

Table 2

Subsequently, for the development and evaluation of the measurement scale, initially, the validity and reliability of each first-order construct were evaluated. To do so, the factor loadings, the composite reliability, and the average variance extracted were estimated, and can be seen in Table 3.

Table 3

To analyze the factor validity of the first-order factors, it was found that all the items that made up the factors had factor loadings greater than 0.5, which demonstrates factor validity.

Convergent validity was analyzed using the AVE, taking values above 0.5 as a reference to consider convergent validity. It was found that only the first-order factor "Vertical Intercooperation" presented an AVE result above 0.5, that is, the largest portion of the variance is not explained by the other constructs. Therefore, apart from this factor, the others did not show convergent validity.

Individual reliability was then evaluated by means of the squared elevation of the factor loadings, and it was noted that the constructs presented squared factor loadings greater than 0.25 and, therefore, have individual reliability.

Finally, the reliability of the construct was evaluated through the "Composite Reliability". All constructs showed results above 0.7, thus demonstrating that the factors are reliable.

Through the evaluation indicators of validity and reliability of the first-order constructs, it was observed that the factors do not present an adequate composition with regard to convergent validity. Thus, to identify the problems, it was relevant to analyze the standardized residues and the analysis of the modification rates, as suggested by Hair et al. (2009).

First, the estimates of variables and first-order factors were analyzed. Hair et al. (2009) indicated that factor loadings below 0.5 should be eliminated, although the authors consider loads greater than 0.7 ideal. Therefore, it was decided to exclude items that presented factor loadings equal to or less than 0.7. Hence, six items were removed from the first-order factor "Unisectoral Horizontal Intercooperation" and six items from the factor "Multisectoral Horizontal Intercooperation". A second step was to analyze the standardized residues, which, according to Hair et al. (2009), indicate potential for eliminating items with residues greater than 4.0. In this step, no items were deleted. Once the exclusions were carried out, the factor loadings, the composite reliability, and the average variance extracted were estimated again, and are shown in Table 4.

Table 4

It was found that all items had factor loadings greater than 0.7, which proves factor validity. Furthermore, all first-order factors presented AVE results above 0.6, and therefore expressed convergent validity.

The items presented squared factor loadings greater than 0.25 and, thus, have individual reliability. Finally, all first-order factors presented Composite Reliability results above 0.7, thereby demonstrating that the factors present reliability.

It was therefore observed that the adjusted measurement scale presented validity and reliability and was constituted in a more parsimonious way than the original scale.

After the fragmented analysis of first-order factors, the intercooperation construct was analyzed in an integrated manner. Hence, a factor analysis was performed involving all the items that were part of the adjusted scale. To this end, the following steps were carried out: i) analysis of the correlation matrix, ii) verification of the explained variance, and iii) examination of the sedimentation graph (scree plot).

From the analysis of the correlation matrix of the observed variables (presented in the appendix to this article), it was observed that the variables are highly correlated with those that integrate the same first-order factor, although they are not expressively correlated with the variables that integrate the other factors. It is noteworthy that the correlation between the variables that integrate the first two factors with the construct "Vertical Intercooperation" is inexpressive.

As observed in Table 5, only 48.07% of the observed data variance is explained by a factor; therefore, most of the variance in the data is not explained by just one factor.

Table 5

In the next step, the sedimentation graph was examined (scree plot shown in Figure 3).

Figure 3

The criterion suggested by Aranha and Zambaldi (2008) for such an analysis aims to determine the number of factors, from the point where there is a strong change in the slope of the line that joins the representation of eigenvalues. This is justified by the strong reduction in the absorbed variance and by the fact that the residuals are homogeneously divided. Therefore, as indicated in Figure 3, the adoption of two factors is suggested. In fact, the results presented in Table 5 demonstrate that 61.77% of the observed data variance is explained by two factors.

It was observed, however, that the constructs "Unisectoral Horizontal Intercooperation" and "Multisectoral Horizontal Intercooperation" presented a correlation greater than 0.65, which may represent that such factors are integrated in only one factor. Furthermore, there is theoretical support for such a conception, such as the studies by Leite (1982), Koopmans et al. (2018) and Božić et al. (2019), who recognized horizontal cooperation involving unisectoral intercooperation and multisectoral intercooperation.

Hair et al. (2009) explained that the existence of higher-order factors is based on the circumstance in which factors are highly correlated and there is theoretical justification to support them as such. Therefore, both empirical and theoretical justifications must support the existence of a higher-order factor.

Furthermore, according to Hair et al. (2009), the final and most important criterion for the decision to operationalize a measurement scale with the inclusion of a higher-order factor is a theoretical justification. Therefore, based on the expressive correlation between the two constructs and on the studies by Leite (1982), Koopmans et al. (2018) and Božić et al. (2019), we decided to include the higher-order factor called "Horizontal Intercooperation", consisting of the constructs "Unisectoral Horizontal Intercooperation" and "Multisectoral Horizontal Intercooperation". It should be noted that the factor "Horizontal Intercooperation" was also evaluated regarding its validity and reliability.

The assessment of the adjusted measurement scale is presented below, with the inclusion of the higher-order factor.

For the analysis of the validity and reliability of the constructs of the adjusted measurement scale, the Factor Loads, the Composite Reliability, and the Average Variance Extracted (AVE) are presented in Table 6.

Table 6

As for the reliability of the construct, the adjusted scale proved to be adequate, and the Composite Reliability results were higher than 0.7 in all constructs.

All items demonstrated individual validity and reliability, as shown in Table 6, where all of them presented factor loadings greater than 0.5 and squares of factor loadings greater than 0.25.

The convergent validity of the factors proved to be adequate, since all the constructs presented Average Variance Extracted (AVE) greater than 0.6.

It is observed that all factors presented factorial, convergent validity, as well as individual and construct reliability.

Therefore, it is suggested that the principle of intercooperation should be measured through two different scales, one called "Horizontal Intercooperation" (involving unisectoral and multisectoral intercooperation), and another linked to "Vertical Intercooperation".

The aforementioned measurement scales are shown in Tables 7 and 8.

Table 7

Table 8

5. Discussion and conclusions

The results obtained allow us to infer that the principle of intercooperation is a multidimensional construct that can be measured based on the factors "horizontal intercooperation" and "vertical intercooperation".

The first presented a Composite Reliability result equal to 0.81 and Average Variance Extracted equal to 0.68, while the second presented a Composite Reliability result equal to 0.96 and Average Variance Extracted equal to 0.69. It was observed that the proposed intercooperation scales presented indicators of validity and reliability.

The proposed measurement scales contribute to the advancement of scientific knowledge by offering researchers valid and reliable scales to be used in studies that seek to quantitatively investigate the principle of intercooperation. In a practical way, the scales can be used by cooperatives as a means to measure cooperation between them, as well as to enable possible analyses of the influences of intercooperation in important aspects involving cooperativism, such as economic-financial results and social development.

It is thus suggested that future studies use these scales for quantitative research related to the principle of intercooperation. Specifically, it is suggested that cooperatives that are part of groups such as Mondragon and Legacoop should be compared with independent cooperatives. It is also suggested that intercooperation (cooperation between cooperatives) and relational ties should be compared between companies that belong to the same segment. Finally, it is suggested that future studies analyze the influences of intercooperation (through the proposed scale) in favoring the other principles of cooperativism.

It is important that the scales presented here are applied in different countries so that they can be improved and longitudinal studies that make it possible to confirm the validity and reliability of the scales over time should be conducted.

Furthermore, adapting these scales to different levels of cooperativism (such as relationships between cooperative members) requires previous qualitative research that makes it possible to raise other categories and attributes of cooperation that, eventually, may be relevant.

Considering that the sampling method used in this study does not allow the results to be generalized to other structures of interorganizational networks, it is suggested that future studies develop and validate measurement scales for other networks of interfirm relationships, such as franchises, purchasing centers, supply networks, and consortiums of companies.

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Table 1. Dimensions of intercooperation

Dimensions of Intercooperation	Concept	Source
Unisectoral Horizontal Intercooperation	Cooperation between two or more cooperatives of the same degree and the same segment	Meliá and Igual (2008), Bialoskorski (2012), Leite (1982), Mendina et al. (2019); Boccatonda et al. (2019); Božić et al. (2019); Pachón (2015); ICA (1995)
Multisectoral Horizontal Intercooperation	Cooperation between two or more cooperatives of the same degree and different segments	Meliá and Igual (2008), Bialoskorski (2012), Leite (1982), Mendina et al. (2019); Boccatonda et al. (2019); Božić et al. (2019); Pachón (2015); ICA (1995)
Vertical Intercooperation	Cooperation between single cooperatives and higher degree cooperatives	Meliá and Igual (2008), Bialoskorski (2012), Leite (1982), Mendina et al. (2019); Boccatonda et al. (2019); Božić et al. (2019); Pachón (2015); ICA (1995)

Source: Prepared by the authors from the literature review

Table 2. First-order factors and items

Dimensions	Items
Unisectoral Horizontal Intercooperation	1.1 Supply of product/service to other cooperatives 1.2 Purchase of product/service from other cooperatives 1.3 Joint sale 1.4 Purchase made together 1.5. Work done together 1.6 Shared disclosure 1.7 Sharing physical resources 1.8 Sharing of knowledge 1.9 Sharing contacts 1.10 Altruistic support between cooperatives 1.11 Co-branded
Multisectoral Horizontal Intercooperation	2.1 Supply of product/service to other cooperatives 2.2 Purchase of product/service from other cooperatives 2.3 Joint sale 2.4 Purchase made together 2.5. Work done together 2.6 Shared disclosure 2.7 Sharing physical resources 2.8 Sharing of knowledge 2.9 Sharing contacts 2.10 Altruistic support between cooperatives 2.11 Co-branded
Vertical Intercooperation	3.1 Supply of product/service to central cooperative 3.2 Purchase of product/service from central cooperative 3.3 Joint sale 3.4 Purchase made together 3.5. Work done together 3.6 Shared disclosure 3.7 Sharing physical resources 3.8 Sharing of knowledge 3.9 Sharing contacts 3.10 Altruistic support between cooperatives 3.11 Co-branded

Source: Prepared by the authors, based on Leite (1982), Bozic et al. (2019), Mendina et al. (2019), Pachón (2015), Boccatonda et al. (2019), Sergaki (2010), Davis and Bialoskorski (2010), Alves et al. (2019), Luo et al. (2017), Paré (2010), Ruano (2018), Cechin (2014), Bialoskorski (2012), Oczkowski et al.

(2013), Stock et al. (2014), Smith (2001), Arando and Bengoa (2018), Santos-Larrazabal and Basterretxea (2022).

Table 3. Factor Loads, Composite Reliability, and AVE - Preliminary Scale

Factors	Observed Variables	Factor Loads	Composite Reliability	Average Variance Extracted (AVE)	Factorial Validity	Convergent Validity	Individual Reliability	Construct Reliability
Unisectoral Horizontal Intercooperation	IntC.U1	0.61	0.91	0.49	Yes	**No**	Yes	Yes
	IntC.U2	0.57						
	IntC.U3	0.57						
	IntC.U4	0.63						
	IntC.U5	0.85						
	IntC.U6	0.79						
	IntC.U7	0.59						
	IntC.U8	0.84						
	IntC.U9	0.77						
	IntC.U10	0.78						
	IntC.U11	0.65						
Multisectoral Horizontal Intercooperation	IntC.M1	0.63	0.91	0.48	Yes	**No**	Yes	Yes
	IntC.M2	0.62						
	IntC.M3	0.58						
	IntC.M4	0.60						
	IntC.M5	0.81						
	IntC.M6	0.79						
	IntC.M7	0.63						
	IntC.M8	0.79						
	IntC.M9	0.79						
	IntC.M10	0.72						
	IntC.M11	0.64						
Vertical Intercooperation	IntC.V1	0.71	0.96	0.69	Yes	Yes	Yes	Yes
	IntC.V2	0.74						
	IntC.V3	0.75						
	IntC.V4	0.80						
	IntC.V5	0.93						
	IntC.V6	0.89						
	IntC.V7	0.73						
	IntC.V8	0.92						
	IntC.V9	0.91						
	IntC.V10	0.90						
	IntC.V11	0.81						

Source: Prepared by the authors, based on Hair et al. (2009).

Table 4. Factor Loads, Composite Reliability, and AVE - Adjusted Scale

Factors	Observed Variables	Factor Loads	Composite Reliability	Average Variance Extracted (AVE)	Factorial Validity	Convergent Validity	Individual Reliability	Construct Reliability
Unisectoral Horizontal Intercooperation	IntC.U5	0.84	0.91	0.67	Yes	Yes	Yes	Yes
	IntC.U6	0.76						
	IntC.U8	0.89						
	IntC.U9	0.83						
	IntC.U10	0.76						
Multisectoral Horizontal Intercooperation	IntC.M5	0.79	0.89	0.63	Yes	Yes	Yes	Yes
	IntC.M6	0.71						
	IntC.M8	0.86						
	IntC.M9	0.86						
	IntC.M10	0.74						
Vertical Intercooperation	IntC.V1	0.71	0.96	0.69	Yes	Yes	Yes	Yes
	IntC.V2	0.74						
	IntC.V3	0.75						
	IntC.V4	0.80						
	IntC.V5	0.93						
	IntC.V6	0.89						
	IntC.V7	0.73						
	IntC.V8	0.93						
	IntC.V9	0.91						
	IntC.V10	0.90						
	IntC.V11	0.81						

Source: Prepared by the authors, based on Hair et al. (2009).

Table 5. Total variance explained

Factor	Initial Eigenvalues			Extract sums of squared loads		
	Total	% variance	% cumulative	Total	% variance	% cumulative
1	10.676	50.838	50.838	10.095	48.072	**48.072**
2	3.114	14.830	65.668	2.898	13.801	**61.873**
3	1.486	7.078	72.746			

Extraction method: Maximum likelihood.
Source: Prepared by the authors

Table 6. Factor Loads, Composite Reliability, and AVE - Adjusted Scale

Factors	Items	Factor Loads	Composite Reliability	Average Variance Extracted (AVE)	Factorial Validity	Convergent Validity	Individual Reliability	Construct Reliability
Unisectoral Horizontal Intercooperation	IntC.U5	0.84						
	IntC.U6	0.76						
	IntC.U8	0.89	0.91	0.67	Yes	Yes	Yes	Yes
	IntC.U9	0.83						
	IntC.U10	0.76						
Multisectoral Horizontal Intercooperation	IntC.M5	0.79						
	IntC.M6	0.71						
	IntC.M8	0.86	0.89	0.63	Yes	Yes	Yes	Yes
	IntC.M9	0.86						
	IntC.M10	0.74						
Horizontal Intercooperation	Unisectoral	0.91	0.81	0.68	Yes	Yes	Yes	Yes
	Multisectoral	0.72						
Vertical Intercooperation	IntC.V1	0.71						
	IntC.V2	0.74						
	IntC.V3	0.75						
	IntC.V4	0.80						
	IntC.V5	0.93						
	IntC.V6	0.89	0.96	0.69	Yes	Yes	Yes	Yes
	IntC.V7	0.73						
	IntC.V8	0.93						
	IntC.V9	0.91						
	IntC.V10	0.90						
	IntC.V11	0.81						

Source: Prepared by the authors, based on Hair et al. (2009).

Table 7. "Horizontal Intercooperation" Scale

IntH.1	How often does your cooperative work together with other cooperatives in the same segment?
IntH.2	How often does your cooperative carry out advertising in conjunction with other cooperatives in the same segment?
IntH.3	How often does your cooperative share knowledge with other cooperatives in the same segment?
IntH.4	How often does your cooperative share contacts (people, organizations) with other cooperatives in the same segment?
IntH.5	In case of difficulties, how often is your cooperative supported by other cooperatives in the same segment?
IntH.6	How often does your cooperative work together with cooperatives from different segments?
IntH.7	How often does your cooperative carry out advertising in conjunction with cooperatives from different segments?
IntH.8	How often does your cooperative share knowledge with cooperatives from different segments?
IntH.9	How often does your cooperative share contacts (people, organizations) with cooperatives from different segments?
IntH.10	In case of difficulties, how often is your cooperative supported by cooperatives from different segments?

Source: Prepared by the authors

Table 8. "Vertical Intercooperation" Scale

IntV.1	How often does your cooperative provide products/services to the Central Cooperative?
IntV.2	How often does your cooperative purchase products/services from the Central Cooperative?
IntV.3	How often does your cooperative make sales in conjunction with the Central Cooperative?
IntV.4	How often does your cooperative make purchases together with the Central Cooperative?
IntV.5	How often does your cooperative work together with the Central Cooperative?
IntV.6	How often does your cooperative carry out advertising in conjunction with the Central Cooperative?
IntV.7	How often does your cooperative share facilities, machinery, and equipment with the Central Cooperative?
IntV.8	How often does your cooperative share knowledge with the Central Cooperative?
IntV.9	How often does your cooperative share contacts (people, organizations) with the Central Cooperative?
IntV.10	In case of difficulties, how often does your cooperative support and is supported by the Central Cooperative?
IntV.11	How often does your cooperative use co-brand(s) with the Central Cooperative?

Source: Prepared by the authors

Attachment. Correlation Matrix

	IntC.U5	IntC.U6	IntC.U8	IntC.U9	IntC.U10	IntC.M5	IntC.M6	IntC.M8	IntC.M9	IntC.M10	IntC.V1	IntC.V2	IntC.V3	IntC.V4	IntC.V5	IntC.V6	IntC.V7	IntC.V8	IntC.V9	IntC.V10	IntC.V11
IntC.U5	**1.000**	**.736**	**.720**	**.622**	**.668**	.579	.455	.546	.505	.439	.339	.390	.378	.353	.548	.452	.398	.477	.499	.468	.372
IntC.U6	**.736**	**1.000**	**.627**	**.586**	**.572**	.482	.507	.452	.388	.325	.339	.374	.434	.381	.479	.533	.449	.423	.481	.433	.407
IntC.U8	**.720**	**.627**	**1.000**	**.829**	**.666**	.423	.348	.541	.482	.347	.318	.356	.315	.298	.439	.376	.350	.471	.462	.395	.299
IntC.U9	**.622**	**.586**	**.829**	**1.000**	**.632**	.411	.276	.431	.559	.310	.352	.329	.293	.232	.396	.347	.286	.410	.516	.357	.247
IntC.U10	**.668**	**.572**	**.666**	**.632**	**1.000**	.344	.307	.350	.378	.431	.343	.331	.329	.303	.422	.388	.382	.425	.459	.437	.376
IntC.M5	.579	.482	.423	.411	.344	**1.000**	**.646**	**.664**	**.636**	**.577**	.314	.286	.376	.306	.418	.417	.449	.378	.396	.381	.325
IntC.M6	.455	.507	.348	.276	.307	**.646**	**1.000**	**.595**	**.557**	**.550**	.276	.249	.312	.313	.344	.367	.445	.348	.320	.370	.329
IntC.M8	.546	.452	.541	.431	.350	**.664**	**.595**	**1.000**	**.760**	**.602**	.264	.261	.292	.232	.342	.333	.342	.424	.369	.334	.251
IntC.M9	.505	.388	.482	.559	.378	**.636**	**.557**	**.760**	**1.000**	**.684**	.239	.186	.240	.191	.304	.282	.289	.342	.395	.312	.207
IntC.M10	.439	.325	.347	.310	.431	**.577**	**.550**	**.602**	**.684**	**1.000**	.200	.133	.245	.126	.231	.234	.290	.264	.277	.290	.180
IntC.V1	.339	.339	.318	.352	.343	.314	.276	.264	.239	.200	**1.000**	**.687**	**.569**	**.629**	**.652**	**.586**	**.512**	**.634**	**.638**	**.669**	**.535**
IntC.V2	.390	.374	.356	.329	.331	.286	.249	.261	.186	.133	**.687**	**1.000**	**.668**	**.731**	**.702**	**.635**	**.556**	**.656**	**.620**	**.624**	**.565**
IntC.V3	.378	.434	.315	.293	.329	.376	.312	.292	.240	.245	**.569**	**.668**	**1.000**	**.762**	**.711**	**.693**	**.768**	**.626**	**.636**	**.595**	**.561**
IntC.V4	.353	.381	.298	.232	.303	.306	.313	.232	.191	.126	**.629**	**.731**	**.762**	**1.000**	**.758**	**.722**	**.685**	**.678**	**.645**	**.699**	**.635**
IntC.V5	.548	.479	.439	.396	.422	.418	.344	.342	.304	.231	**.652**	**.702**	**.711**	**.758**	**1.000**	**.828**	**.688**	**.863**	**.853**	**.826**	**.721**
IntC.V6	.452	.533	.376	.347	.388	.417	.367	.333	.282	.234	**.586**	**.635**	**.693**	**.722**	**.828**	**1.000**	**.658**	**.820**	**.816**	**.786**	**.786**
IntC.V7	.398	.449	.350	.286	.382	.449	.445	.342	.289	.290	**.512**	**.556**	**.768**	**.685**	**.688**	**.658**	**1.000**	**.621**	**.622**	**.612**	**.573**
IntC.V8	.477	.423	.471	.410	.425	.378	.348	.424	.342	.264	**.634**	**.656**	**.626**	**.678**	**.863**	**.820**	**.621**	**1.000**	**.889**	**.860**	**.752**
IntC.V9	.499	.481	.462	.516	.459	.396	.320	.369	.395	.277	**.638**	**.620**	**.636**	**.645**	**.853**	**.816**	**.622**	**.889**	**1.000**	**.832**	**.722**
IntC.V10	.468	.433	.395	.357	.437	.381	.370	.334	.312	.290	**.669**	**.624**	**.595**	**.699**	**.826**	**.786**	**.612**	**.860**	**.832**	**1.000**	**.794**
IntC.V11	.372	.407	.299	.247	.376	.325	.329	.251	.207	.180	**.535**	**.565**	**.561**	**.635**	**.721**	**.786**	**.573**	**.752**	**.722**	**.794**	**1.000**