# METHOD OF EXPERTS FOR EX-ANTE ASSESSMENT OF A ORGANIZATIONAL SOLUTION

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## ABSTRACT

One difficulty in the design of procedures for solving problems related to business management is the assessment of potential effects before application. In this sense, this paper presents the application of a procedure based on a method of experts to assess ex-ante the potential methodological designs intended to solve organizational problems. The procedure was applied to the case of a methodological instruments designed for creating and managing networks of flexible cooperation of Small and Medium Enterprises (SMEs) in the province of Misiones, Argentina. The main results suggest that the method provides useful projections on potential impacts application of methodological designs in solving organizational problems in the economic, social and environmental spheres.

**KEYWORDS**: Method of Experts; Ex-ante Evaluation; Procedures; Decision Making; Province of Misiones - Argentina.

## INTRODUCTION

The design of procedures to solve organizational problems in the field of management (economic, political, social, business, etc.) generally presents the need for ex-ante in order to argue their feasibility of implementation (Burinskienė and Rudzkienė, 2009). In the solution of organizational problems, there are complex interrelationships between the various resources involved resulting emerging behavior of cyclical or permanent patterns, (Sterman, 2000 apud. Schaffernicht, 2009), which

are difficult to predict due to the absence of factual information before its practical implementation, which, in turn, is costly in terms of time, money and / or possible undesirable effects considered.

In this problem, methods of forecasting experts help in situations of no information (Salazar Ordóñez and Sayadi, 2006) and additionally can provide key information related to the causes of the problem, the scientific basis, the quality of the solution, and predict the consequences of their application (Cruz Ramírez and Martínez Cepena, 2012).

Therefore, the objective of this paper is to present the application of a method based on an expert procedure constitutes an alternative that allows prospective qualitative assessments have ex-ante type on the instruments developed in the solution of an organizational problem to have better substantiated when deciding on the implementation of the proposed solution arguments.

The results of its application are presented in a methodological assessment instruments designed for creating and managing networks of flexible cooperation of SMEs in the province of Misiones, Argentina. The results confirm the benefits of the proposed assessment procedure and provide the favorable effects of application of methodological instruments evaluated.

## DEVELOPMENT

### Methods of experts in prospective analyzes

As accurate Ortega Mohedano:

> "Research methods oriented foresight, can be grouped into three main types: expert methods (based on the opinions of knowledgeable of the problem to be analyzed); extrapolative methods (based on historical data that can be extrapolated into the future) and correlation methods (based on the identification of relevant factors and its evolution into the future)" [Ortega Mohedano, F., 2008, p. 32][(1)]

Given the need to evaluate a proposed methodology, it is possible to resort to expert judgment using the knowledge which has a group of people as a tool to investigate the feasibility of application (Gallego Pereira et al., 2008) and refine and enrich the proposal made by recommendations from the experience of each of the members consulted. Expert methods used in prospective studies related to a variety of situations; for example in the area of quality and forecasting technological and social developments (Dalkey, 1969; Camisón Zornoza et al., 2009).

Expert means, "[…]the individual itself as a group of individuals or organizations able to provide conclusive rating problem and make recommendations regarding their fundamental moments with up to competition" [Ramírez Urizarri, L. and Toledo Fernández, A., 2005, p. 4][(2)]. It is based on insuring

performing precise questions (no possibility of double interpretation) and get answers that can be quantified and processed through qualimetric methods (Lissabet Rivero, 1998).

There is no unanimous agreement on several issues related to the methods of experts, such as the selection of individuals or choosing the best method to use for a particular problem situation (Burinskienė and Rudzkienė, 2009); although in the state of art, the method has been widely applied the so-called Delphi method (Okoli and Pawlowski, 2004; Seuring and Müller, 2008; Ortega Mohedano, 2008; Elmer et al. 2010), there are other methods to the solution of organizational problems including highlights Methods Listings Single, Nominal Group Technique and Method of Consensus Group (Corral, 2009).

In this contribution we decided to use the so-called Method of Individual Aggregates, to be a relatively quick and inexpensive method to provide prospective views to help guide decision making, evaluate or improve a methodological proposal and explore the effects that occur on property application when it is not feasible to apply other evaluation tools available. The method is that each expert makes a direct assessment of every aspect consulted on the subject under evaluation.

On the application of this method are recorded in history related to medical research and/or educational (Ramírez Urizarri and Toledo Fernández, 2005), and its use in evaluation and validation of methodological approaches in the business field (Sotolongo Sánchez, 2005; De la Rosa Betancourt, 2008). A suitable alternative to the case because, among its advantages, the lack of communication between specialists, who conduct their evaluations individually and only once, allowing for expeditious implementation from the point of view stands out is considered costs (economic as well as in terms of time-consuming application). Also helps to avoid bias due to inter-personal conflicts, and/or the predominance of opinion of people with strong character or chain of command over others (Corral, 2009).

## Materials and methods

In Figure 1 are summarized the structure of the procedure used for the ex-ante evaluation of new or improved methodological tools designed, they can be considered as organizational innovations in the field of business management, which is based on the conceptual contributions of Urizarri and Toledo Fernández Ramírez (2005) and Mesa Anoceto (2007). Below we present a summary of each of the step.

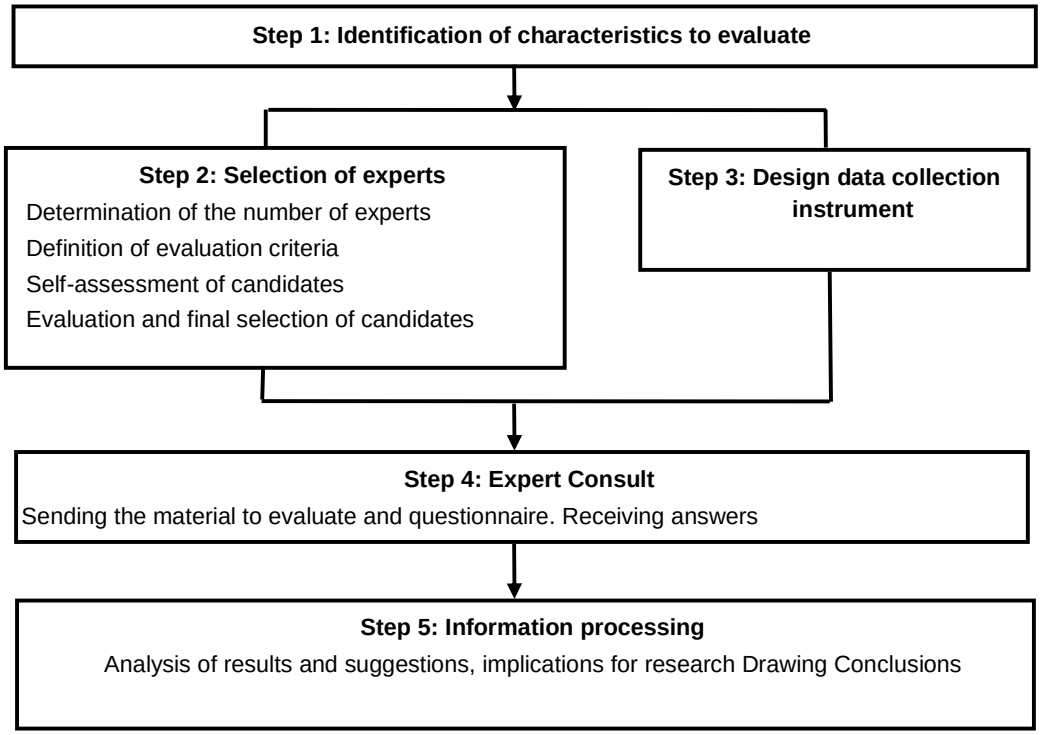


**Figure 1: Procedure for the application of the expert method proposed**
**Source:** Michalus (2011)

**Step 1: Identification of characteristics to evaluate.** The procedure begins with an analysis of the methodology from the conceptual point of view, in order to specify the characteristics that experts should evaluate. Should proceed to identify in a casuistry way the structure, procedures, sub-procedures and other elements that comprise (values, principles, structures, actors, relationships, etc.). It is also important to determine the application context and clarify the effects and consequences that then provide your start-up, on which the expert opinion is required.

**Step 2: Selection of Experts.** The selection of experts involves careful procedure for the participation of a group of good people in the process. Is proposed to be performed following the method of self-evaluation report from the proposal of Ramírez Urizarri and Toledo Fernández (2005) and Mesa Anoceto (2007) adapted to the case in three sequential activities: a) determining the number of experts; b) definition of valuation and self-assessment of candidates c) evaluation and final selection of candidates.

a) Determination of the number of experts. To determine the number of experts needed are different criteria ranging from a minimum of seven (7) individuals required, up to 50 (Soliño Millán,

2003; Vera Toste, 2006; Salazar Ordóñez and Sayadi, 2006). In the literature other methods of calculation are also reported through mathematical expressions (for example, Febles, 2003; Rodríguez, 2007); however, some researchers suggest that the improvement in the prediction of the results is caused by the diversity of knowledge, rather than on the number of experts (Gallego Pereira et al., 2008, Camisón Zornoza et al., 2009). As is clear from the original study of Dalkey (1969) and by other researchers assert (Lissabet Rivero, 1998; Córdova Martínez, 2004, among others), the error in the forecasts decreases exponentially with the number of experts added, reaching values 5% upper bound, for a total of 15 individuals, which result from the decrease is not significant. On this basis it is considered that the appropriate number of experts should be 15 or more individuals.

b) Definition of valuation and self-assessment of candidates. Based on the approaches of Mesa Anoceto (2007), the proposed criteria for selecting experts are:

- Demonstrate willingness to participate in the survey and have real time to do so.
- Having a capacity analysis to understand the issues raised and issue a reliable judgment, foresight and the ability to analyze situations that might occur from the application of the proposed solution.
- Possess high competition (calculated through the competition coefficient K)

The competence of experts is determined by calculating the coefficient of competition (K), according to expression (1).

$$K = \frac{1}{2}.\left(K_c + K_a\right) \qquad (1)$$

Where:

$K_c$: coefficient of knowledge or information.

$K_a$: coefficient of argument or reasoning.

The coefficient of knowledge or information $K_c$ is calculated based on the valuation of own expert about knowledge or information it deems have about the issues on which it is consulted (general and particular problems, theoretical knowledge and / or practical etc..), through a series of questions to assess on a scale of 0 to 10, where the lower value (0) indicates complete ignorance, and the top (10), the full knowledge of that problem (Córdova Martínez, 2004). Then, the coefficient $K_c$ of each expert is calculated by the expression (2).

$$K_C = \frac{\sum_{i=1}^{i=n} K_{pi}}{10.n} \quad (2)$$

Where:

$K_{pi}$: self valoration expert on the pi question of the questionnaire.

n: total number of self-assessment questionnaire.

Meanwhile, the coefficient of argument or reasoning ($K_a$) of the criteria of the expert is determined as the result of the score that the expert himself assigned to the main sources of knowledge in their responses. A table is provided showing the sources listed in the rows, where each expert should indicate the degree of influence of the source declared their knowledge on the subject, according to the High level (H), Medium (M) and Low supplied (L). Then is calculated $K_a$ as the sum of the points from compare cells marked by the expert with a table, establishing a priori the score assigned to each source.

The sources of argument and assigned points vary with the investigation and judgment of the researcher (Mesa Anoceto, 2007). In general it is customary to include the following: theoretical and/or experimental research related to the subject, experience in professional activity, analysis of the specialized publications and national and foreign authors and knowledge of the current state of the problem in the country and literature abroad.

c) Evaluation and final selection of candidates. Finally, the coefficient is calculated K competition according to expression (1) and the competence of the expert is evaluated by aplying the following scale (Ramírez Urizarri and Toledo Fernández, 2005; Mesa Anoceto, 2007):

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c) Evaluation and final selection of candidates. Finally, the coefficient is calculated K competition according to expression (1) and the competence of the expert is evaluated by applying the following scale (Ramírez Urizarri and Toledo Fernández, 2005; Mesa Anoceto, 2007):

- If: $0{,}80 < K \leq 1{,}00$; is considered that the candidate has a High competition.
- If: $0{,}50 < K \leq 0{,}80$; is considered that the candidate has a Media competition.
- If: $K \leq 0{,}50$; is considered that the candidate has LOW competition; if that were the case, then is discarded as an expert.

All candidates for competition experts whose coefficient K is HIGH and comply also with the criteria established in Step 2: Selection of expert, are selected. It may incorporate any expert with media coefficient always when the average value of K (including the case in question) is higher (higher than 0.80).

**Step 3. Design data collection instrument.** "The expert knowledge is used to determine those influences (variables) of which depends the future development of the problem. Questionnaires both closed and open (or semi) may be used" [Calduch Cervera, R., 1998, p. 148][(3)]. For this it is necessary to design a questionnaire containing questions and provide a wealth of information on the methodology

and procedures developed for the experts to evaluate its theoretical conception, feasibility and predictable results of their application.

It is recommended that this questionnaire is developed following the guidelines of specialists in research methodology (Mesa Anoceto, 2007; Hernández Sampieri, 2010), in areas such as: variables and indicators, measurement scales, clarity of concepts, suitable extension of each question, as well as the data collection instrument. You also need to submit the questionnaire to a review by specialists and/or perform a test pilot for a refined, proper and complete final instrument.

**Step 4. Expert consult.** Consultation with selected experts should be performed by delivery of written material with rich and detailed information on all aspects of the proposed methodology to assess their associated procedures and other elements, together with the instrument of assessment and basic instructions for performing the same. In this step a permanent interaction with experts in order to solve efficiently the doubts that arise in the process is necessary. By providing detailed information and evacuation of questions seeks to minimize the possibility of misinterpretation, so that help to ensure greater accuracy and quality of responses.

**Step 5. Information processing, analysis of results and suggestions, implications for research.** Finally, the data are processed and proceeds to perform the corresponding analysis (you can enlist the help of specialized software). There are several types of analyzes and tests in the literature (Córdova Martínez, 2004; Ramírez Urizarri and Toledo Fernández, 2005; De la Rosa Betancourt, 2008), however, its use will depend on each particular case. It is clear, following Corral (2009) that certain instruments do not warrant the calculation of reliability, such as: interviews, rating scales, checklists, observation guides, leaves records. Additionally, it is advisable to test the ideas, views, suggestions and contributions of experts through the comments made, because from the expertise of each may help improve and enrich the / the method/s raised/s.

## Results and discussion

To apply the evaluation procedure here proposed, was taken as a case study a methodological approach developed in the framework of a joint project between the National University of Misiones (Argentina), the Central University Marta Abreu de Las Villas (Cuba) and National University of Colombia, Manizales (Colombia), for cooperative networking oriented Sustainable Local Development (assumptions, values, principles actors, and estates that comprise overall structure proposal), and the

feasibility of implementation in small and medium enterprises (SMEs) in the micro-regions or municipalities in the province of Misiones, Argentina. The main results are presented below.

**Step 1: Identification of the proposed methodology to evaluate.** Misiones is located in what is called the Argentinian Mesopotamia, in the northeast region. The province exhibits an unbalanced regional development, with financial and human resources distributed unevenly (González Villar, 2005). Much of the production is concentrated in a few companies (collection of snuff, pulp mills, large sawmills), which, in turn, incorporate skilled labor and technology, which helps to increase the gap between firms named and a lot SMEs who complete the provincial productive, create wealth, jobs and stimulate the economy (SPE, 2005; EGES, 2009), but generally have a limited performance by the lack of financial, human, poor planning, production and management resources (Fernández Jardón, 2007; Michalus and Hernández Pérez, 2008).

In this context, various sectors have been undertaken alternatives to solve the problems described; in particular, a methodological proposal for a cooperative model of integration of SMEs flexible character and inter-sectoral scope was made from a consistently oriented sustainable local development in a process approach that would strengthen the synergy between companies, based on reaching best individual and collective performance.

Figure 2 summarizes the proposed essentially methodological procedure, which was submitted for consideration by the experts in a longer version that included a complete package of detailed procedures.

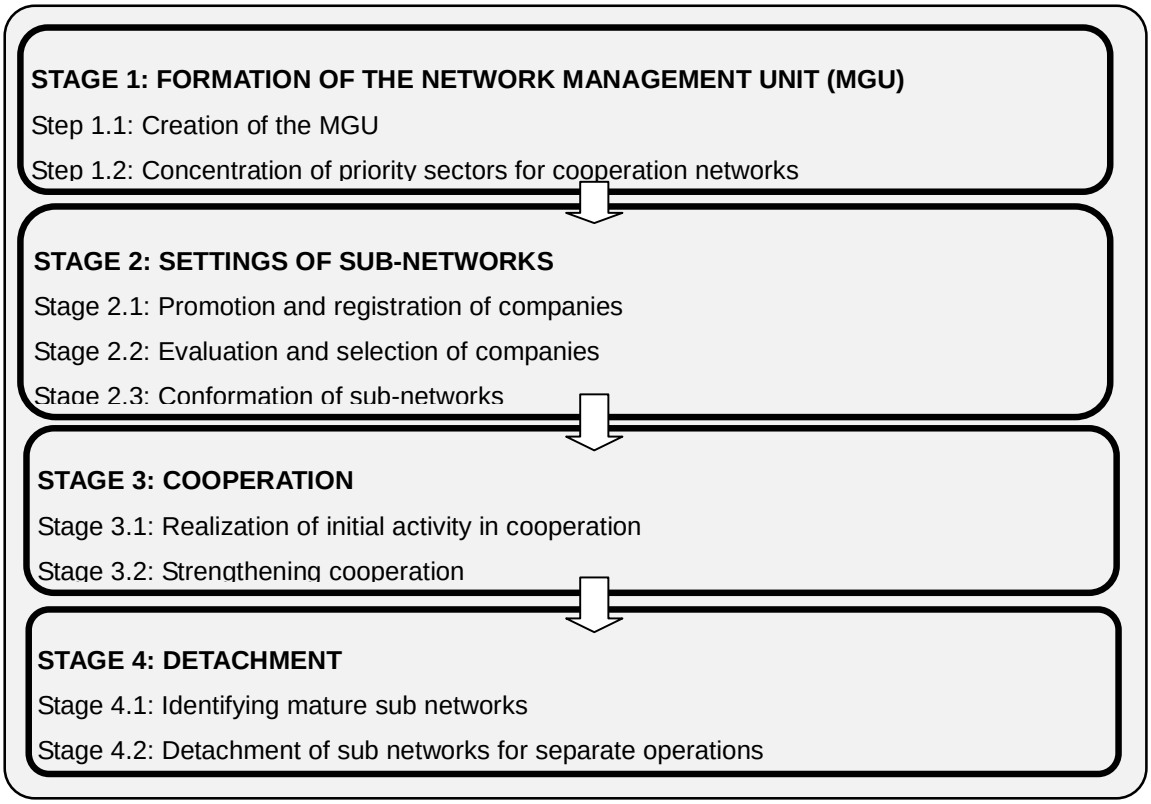


**Figure 2: General methodological procedure (Simplified) to implement flexible network-oriented SME cooperation Sustainable Local Development**
**Source:** Michalus (2011)

**Step 2: Selection of experts.** 16 experts were selected (see Table 1) that met the criteria (as explained in Step 2: Selection of Experts, paragraph b).

All selected individuals have university education, 14 of them reported experience in activities related to the academy, 4 had a history as officials at the local and provincial level, 10 entrepreneurs and 13 recorded experiences of participation and / or management in local organizations. Once the count was made, the obtained average result of K was = 0,85 (Kc = 0,79; Ka = 0,92).

**Table N°1: Characterization and determination of e xpert competition coefficient**

| Expert N° | Complete studies | | | | Expertise in: | | | Competition coefficinent |
|---|---|---|---|---|---|---|---|---|
| | | Academy | State | Company | Local organizations | $K_c$ | $K_a$ | $K$ |
| **1** | Magister | X | | | X | 0,75 | 0,94 | 0,84 |
| **2** | Specialist | | | X | X | 0,74 | 0,82 | 0,78 (*) |
| **3** | Specialist | X | X | | X | 0,80 | 0,90 | 0,85 |
| **4** | Magister | X | | X | X | 0,82 | 1,00 | 0,91 |
| **5** | Magister | X | | | X | 0,78 | 0,91 | 0,84 |
| **6** | Doctor | X | X | X | X | 0,68 | 0,95 | 0,81 |
| **7** | Doctor | X | X | X | X | 0,94 | 1,00 | 0,97 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **8** | Doctor | X | | X | X | 0,94 | 1,00 | 0,97 |
| **9** | Engineer | X | | X | | 0,68 | 0,94 | 0,81 |
| **10** | Doctor | X | | | X | 0,80 | 0,83 | 0,81 |
| **11** | Specialist | X | X | | X | 0,76 | 0,88 | 0,82 |
| **12** | Magister | X | | | X | 0,74 | 0,87 | 0,80 |
| **13** | Engineer | | | X | X | 0,74 | 0,88 | 0,81 |
| **14** | Engineer | X | | X | X | 0,80 | 0,84 | 0,82 |
| **15** | Magister | X | | X | | 0,80 | 0,97 | 0,88 |
| **16** | Doctor | X | | X | | 0,88 | 0,92 | 0,90 |
| **Overall Mean** | | | | | | 0,79 | 0,92 | 0,85 |

(*): includes expert with coefficient $K_{(medio)}$ due to the $K_{(promedio)}$ was high (higher than 0,80)

**Source:** Own Elaboration

**Step 3. Design data collection instrument.** The data collection instrument was divided into 20 questions related to the assumptions, values and principles that support the proposed methodology to assess the actors who are part of it, as well as procedures and the overall structure within it. The items tested can be seen in Table 2.

**Table N°2: Summary of evaluated Items by experts a nd their main descriptive statistics**

| ASPECTS EVALUATED BY EXPERTS | Average | Typical Std. |
|---|---|---|
| Suitability of Premises flexible cooperation model oriented SME Sustainable Local Development | 4,50 | 0,73 |
| Values and principles reflected in the conception of the model and its procedures | 4,63 | 0,50 |
| Appropriate stakeholders to form Management Unit | 4,69 | 0,60 |
| Components of the Estates Management Unit (General Assembly, Executive Board, Executive Director and group managers) appropriate | 4,50 | 0,63 |
| Adaptation of the general structure given to the purposes for which it was conceived | 4,56 | 0,63 |
| Appropriate methodological design stage | --- | --- |
| Creating Management Unit | 4,69 | 0,48 |
| Conclusion of priority sectors for cooperation networks | 4,44 | 0,73 |
| Promotion and registration of companies | 4,63 | 0,62 |
| Diagnosis and selection of companies | 4,56 | 0,51 |
| Formation of sub-networks | 4,56 | 0,63 |
| Specification of initial activity in cooperation | 4,63 | 0,62 |
| Strengthening cooperation | 4,50 | 0,73 |
| Identification of sub-networks mature | 4,44 | 0,73 |
| Detachment of independent sub-networks functioning | 4,63 | 0,50 |
| Possibility of applying the proposed model in the province of Misiones, Argentina | 4,19 | 0,91 |
| Possibility of generating specific solutions inter-sectoral cooperation Flexible SMEs through its application | 4,25 | 0,85 |
| Instrumental capacity designed to create network oriented SMEs Sustainable Local Development | 4,06 | 0,85 |
| Instrumental capacity designed to improve the operating conditions of SMEs | 4,50 | 0,63 |
| Influence of internal network on the chances of success in the future application of the model proposed factors | 4,38 | 0,81 |
| Influence of external factors to the network in the chances of success in the future application of the proposed model | 4,38 | 0,81 |

**Source:** Own Elaboration

**Step 4. Expert consult.** Were contacted selected experts, and the material is presented to evaluate (detailed description of the methodological approach developed), together with the

assessment instrument and basic instructions for use. Consultations were answered, doubts were clarified and coordinated return to the researcher.

**Step 5. Information processing, analysis of results and suggestions, implications for research.** Being an instrument containing scales estimation was not necessary an estimate of reliability (Corral, 2009). Expert evaluations were performed on an ordinal scale (1 to 5) and are summarized in Table 2. They have an overall average of 4.48 (greater than 4.06 in all cases), indicating that all questions have been evaluated close to the best value, set or agree (5) with the statement or request that was submitted to the nominee. The results showed a standard deviation between 0.48 and 0.91, which is acceptable because this type of prospective analysis is a complex and difficult exercise, with a high degree of uncertainty (Michalus, 2011).

From the analysis of the answers given by the experts the following was derived:

- The premises are considered suitable defined (average: 4.50); experts also considered that the values and principles underpinning the model and procedures are reflected in the design of the various phases and component steps (average: 4.62).
- The actors defined to conform Management Unit (Academy, SMEs, state, and local organizations) were considered suitable for the case (average: 4.69).
- The estates proposed to form the structure of the Management Unit (General Assembly, Executive Board, Executive Director and group managers) were eligible (mean: 4.50).

The proposed general structure was also considered appropriate for the purposes for which it was designed: to generate specific workarounds flexible cooperation of SMEs oriented Sustainable Local Development and enable firms operating in more favorable conditions individually (average: 4 56).

Moreover, it has also asked the experts to analyze and evaluate the methodological design of the various stages (components of the phases shown in Figure 2), the specific procedures and steps, which were considered adequate, evaluated with average ranging between 4.44 and 4.62 (standard deviation between 0.48 and 0.73). These results contribute to the general procedure and validate the various proposed specific procedures, which were considered generally well-conceived; some minor additions recommendations that were incorporated in the relevant parts of the proposed solution were performed.

Regarding the feasibility of application, panelists assessed the model and procedures as follows:

- The model is feasible to be applied to form networks of flexible cooperation of SMEs in the municipalities of the province of Misiones (average: 4.19).
- In general, the application model and procedures designed to generate specific solutions of flexible cooperation of SMEs with the participation of companies from various sectors of production and / or services through their (average: 4.25) application.
- The ability of instruments designed for such networks are oriented to Sustainable Local Development is appropriate (average: 4.06).
- The methodological instrument designed will improve the operating conditions of SMEs in the province (average: 4.50).
- The influence of internal network (for example, trust among enterprises, planning and coordination, participation in the network) factors on the chances of success in the future application of the proposed model is considered high (average: 4.37).
- The influence of external network (eg, institutional, socio-economic and political environment) factors on the chances of success in the future application of the proposed model is considered high (average: 4.37).

From the above, it follows that the group of experts chosen for their academic and scientific education, labor and professional experience, as well as their knowledge of the subject of theoretical and practical study, considered the model and procedures designed had a structure and suitable for the purpose for which they were conceived design methodology; also applied to SMBs Misiones considered feasible and likely to generate the expected positive results for Local Sustainable Development.

## CONCLUSION

One of the main difficulties in making business decisions is the assessment of potential impacts that a methodological and/or procedural solution can generate the desired results in the company. Anticipated positive or negative effects of a proposed solution to a problem is not an easy task to carry out, because in the internal and external organizational systems complex relationships between different actors and resources involved are presented.

In this regard, the experts used procedure is shown as an appropriate tool to evaluate the main design features of a proposed methodology and procedures for its implementation and explore possible results to be obtained prior to commissioning. The use of expert method allowed having additional ex-

ante forecasts that are useful to help the decision maker/s on the economic, social and environmental impacts that could result in your application; allowed to provide further measures to strengthen those who are favorable, while mitigating the negative effects.

Although methods of experts, in practice, have inherent difficulties of working with humans, such as the subjective evaluation, the diversity of views on a single object of work, experience and level of knowledge, among others, the procedure used allows maintaining the process within certain ranges of control so as to ensure the validity of the results. In particular, the calculation of the coefficients of competence, knowledge or information and argument or reasoning, are very useful for such purposes and are applicable to other scenarios decision.

In the case study addressed in Misiones province (Argentina), the proposed method was suitable for the purpose of gathering information (in the absence of empirical data) providing evidence for the proposed methodological procedure to create flexible networks of SMEs in cooperation municipalities and regions of lower socio-economic development of rational and effective, from a strategic orientation to sustainable local development that enhances local capacities. These results allow the decision maker assess with greater certainty the potential impact before implementation and address the actions needed to enhance the expected positive effects.

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## BIOGRAPHICAL ABSTRACT

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