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Article

The ANP method to relate innovative personal competencies in sustainable development in Ecuadorian fruit exporting SMEs

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Abstract: The development of the personal innovative competences in workers is of capital importance for the competitiveness of organizations, where the ability of the employees must respond in an innovative way to diverse situations that arise in specific contexts. Considering this, the question arises: How do innovative employees' competences affect the sustainable development of Micro, Small and Medium Enterprises (MSMEs)? Therefore, the objective of this work is to present a multi-criteria method based on the Analytic Network Process (ANP), to relate innovative personal competences and the sustainable development of MSMEs. An instrument was applied to groups of experts from 31 Ecuadorian fruit-exporting MSMEs, to develop a multi-criteria decisional network that allowed identifying the innovative personal abilities that have the greatest impact on the sustainable development of these organizations. The results demonstrate the relevance of the elements of innovative personal competencies, with a cumulative participation of 39.15%, Sustainable Export Development with 32.18% and Improvements with 28.66%. It also presents three types of analysis: i) Global to establish the weight of each variable; ii) Influences, to establish solid cause-effect relationships between the variables and iii) Integrated. The most relevant innovative personal competences for sustainable development and improvements for exporting SMEs are teamwork, critical thinking, and creativity within the international context.

Keywords: ANP method; innovative skills; sustainable development; SMEs

1. Introduction

In the current business context of technological progress, information, and communication, as well as advances in the signing of trade agreements or treaties between countries, organizations need to be increasingly competitive in generating goods and services with added value for customers. In this context, an essential way to contribute to the strategic objective of achieving business improvements is to promote the strengthening of innovative personal competences (hereinafter IPC in employees, which leads to sustainable development in the export context (hereinafter DSE) (Cadalzo-Díaz, 2016; Cerinšek and Dolinšek, 2009).

The relevance of the topic is perceived in the international business environment, where high-income countries have made human talent and innovation the central axes of their public competitiveness and development policies. Indeed, (World Economic Forum, 2022) through the Global Competitiveness Index (GCI) places Switzerland, the United States, and Singapore as the top three countries worldwide that stand out in competitiveness. Likewise, (Dutta et al., 2022), through the Global Innovation Index

(GII), placed Switzerland, Sweden, the United States, and the United Kingdom as the first four most innovative economies in the world.

In Ecuador, even though in 2019 there were 882,766 companies, of which 99.5% were considered as MSMEs and generated 1,832,967 jobs, being 60.4% of the total jobs registered by the Ecuadorian Social Security Institute (IESS), according to the report of the INEC Business Directory (INEC, 2019); the promotion of ICP shows a low development in the business segment of MSMEs. This problem is evident, considering external factors such as limitations in access to capital and internal factors such as the scarce research process in pursuit of innovation. (Scarone Carlos A., 2005). A specific case is explained with Ecuadorian fruit SMEs, which seek to improve their organizational development by strengthening the ICP, through increasing their exports, which allows sustainability in foreign markets (Institute for the Promotion of Exports and Investments, 2019).

On the other hand, there is little interest in innovating in the production and commercial chain, due to endogenous and exogenous factors inherent to this economic activity. Therefore, it is important to have employees who develop their innovative skills for the DSE, which allows them to contribute their work performance for business sustainability. Thus, (Ponce Vaca et al., 2016) highlights the importance of promoting innovation, participation, and continuous training processes, since these activities contribute to addressing the complexity and particularity of a value chain in the agricultural sector.

Studies that report on some type of relationship between the study variables, as well as the application of a multi-criteria methodology to identify the most relevant ICP that are related to the DSE, are scarce. Although there are works (Jiménez and Sanz Valle, 2006; Keskin, 2006; Salim and Sulaiman, 2011), which have reported a relationship between innovation capabilities or competencies and organizational performance, where some connection to a certain level of internationalization is assumed. However, determining the incidence of IPC on the SDE of fruit-producing SMEs is an interesting and relevant topic. Therefore, the research question is: How do the employees ICP affect the SDE of Ecuadorian fruit-exporting SMEs? In this sense, the purpose of this work is to develop a multi-criteria ANP method to interrelate the IPC with the DSE of the MSMEs, under an integrated approach, considering the elements of both variables, as well as their internal and external relationships that allow obtaining results for decision making.

2. Literature review

2.1. Personal innovative competences

As a precedent, Prahalad and Hamel (1990) introduce the concept of core competencies and define them as a harmonized combination of multiple resources and skills that distinguish a company in the market and, therefore, are the basis of competitiveness. In this sense, Cardy and Selvarajan (2006) classify the key competencies of the company into: i) Personal, which correspond to individuals within the organization and who possess knowledge, capabilities, skills, experience and personality traits and, ii) Corporate, which are processes and structures that reside

within the organization and belong to it even when individuals leave. These categories interact and influence each other.

Consequently, personal competencies associated with innovation can have a decisive impact on organizational development, with innovative personal competencies being the main category of study in this work. Innovative competence is defined as an individual's propensity to act and react in an innovative way to deal with different problems or tasks that occur in a given context. This competence involves a way of acting and solving problems, considering innovation to generate change that adds value, whether to the company, the economy or society (Cerinšek and Dolinšek, 2009). Also (Rass et al., 2013) identifies six key competences to achieve the innovation drive and the necessary connection between the organization and its members, these are: Questioning-Exploiting-Empathizing-Networking-Associating ideas and Undertaking.

For his part, (Cobo Cristóbal, 2016) mentions that creativity, adaptability, and entrepreneurial and multidisciplinary competences are understood as competences for innovation. Likewise (Waychal et al., 2011), focusing more on the specific competences of an individual to be innovative, considers that five abilities are required: the ability to associate, to question, to observe, to experiment and, finally, to work in a group.

Likewise, there are international organizations that have developed several studies to identify key competencies for personal and professional development. Among them, the following stand out:

1) The 4 C model, derived from the 21st Century Skills and Competencies Report (OECD, 2010). These learning and innovation skills include four dimensions: critical thinking and problem-solving skills, creativity and innovation, communication, and collaboration.
2) ii) The Framework for Innovation Competencies Development and Assessment (FINCODA) proposed by (Marin-Garcia et al., 2016). This model includes three dimensions: creativity, critical thinking, and a set of capabilities, which are under the label of intrapreneurship (initiative, teamwork and networking).
3) iii) Catalog of key competencies for innovation at work, proposed by (Secretariat of Labor and Social Welfare of Mexico, 2010). The Catalog presents thirty-one competencies grouped into: knowledge, attitudes and values that workers must possess, and that business owners and employers must foster to promote favorable environments to develop the creative and innovative capacity of workers and achieve superior performance at the individual, group and organizational levels.

Figure 1 presents the Conceptual Framework of the IPC obtained from the literature review. This framework structures and classifies those most relevant competencies that are associated with the SDE in the international context.

Figure 1. Conceptual framework of personal innovative competencies.

Creativity: Ability defined as the mental capacity to generate latest ideas, without considering their practical application or future added value. It includes components such as different thinking, intuition and self-knowledge, implementation of ideas, original solutions, improvement of processes and products, novel ideas, inventiveness, new methods, and refinement of ideas (Cerinšek and Dolinšek, 2009; Marin-Garcia et al., 2016).

Critical thinking: A competency that fosters coherence in a shared vision of sustainability, supports innovation, and provides technical skills for the development of core processes. It includes the following elements: Using trial and error to solve problems, developing and experimenting with new ways of solving problems, challenging the status quo, approaching tasks from different perspectives, preventing impacts on users; formulating questions such as “why?”, “why not?” and “what if?” with a clear purpose (Choi and Kim, 2017; Marin-Garcia et al., 2016; Paiva et al., 2022).

Teamwork: The formation of efficient work teams allows the development of skills for strategic decision-making within the organization. In addition, it encourages people to be more dynamic and didactic by contributing ideas, knowledge and experiences that contribute to continuous improvements in processes. Key elements, which include: Promoting improvements in the organization of work, assuming an acceptable level of risk to support innovative ideas, Surpassing expectations in tasks without being asked, Convincing others to support innovative ideas, Systematic introduction of new work practices, Acting quickly and energetically (Marin-Garcia et al., 2016; Palamary D’Aguillo, 2012; Talke et al., 2006).

Networking: Networking is a crucial ability for business expansion through the establishment of internal and external contacts in the professional field. It facilitates business expansion and the exchange of knowledge, developing new perspectives to create strategies that drive sustainable export development. Key elements include: Meeting people with diverse ideas and perspectives to expand one’s own knowledge; Acquiring, assimilating, transforming and exploiting external knowledge to manage informal organizational ties; Sharing timely information with appropriate stakeholders; Building relationships outside the team or organization; Involving people outside the work group from the beginning; Working in multidisciplinary environments (Marin-Garcia et al., 2016; Mu et al., 2017).

2.2. Sustainable export development and business improvement

The United Nations (UN) promotes a comprehensive approach that balances economic growth with social equity and environmental protection in the context of the SDE. (UN, 2022). In the economic field, the diversification of exports is highlighted to reduce dependence on basic products and strengthen economic resilience. In addition, it encourages innovation and the use of sustainable technologies to improve competitiveness and reduce environmental impact. In the social field, it is emphasized that economic growth derived from exports should benefit all segments of society, creating decent employment and reducing poverty. It also insists on protecting labor rights and guaranteeing safe and fair working conditions for all workers involved in the production of exported goods. In the environmental context, the importance of integrating sustainable practices in export activities to minimize environmental impact is stressed. It promotes the adoption of clean technologies and production processes that reduce carbon emissions and the use of natural resources. In agreement, Kousar et al. (2024), conducted a study for decision making with multiple criteria regarding the mitigation of air pollution, finding significant results in this area.

The World Trade Organization WTO) considers international trade as a key tool for sustainable economic development and global well-being. In the economic sphere, it works to reduce trade barriers and facilitate the free flow of goods and services, thus helping developing countries to better integrate into the global economy. In the social sphere, it emphasizes the need to equitably distribute the benefits of trade, highlighting its role in poverty reduction and job creation, and providing technical assistance and training to developing countries. In the environmental context, it promotes sustainable trade practices that minimize environmental damage. It supports trade in environmental goods and services, such as clean technologies and green products, and encourages countries to assess the environmental impact of their trade policies (World Trade Organization, 2016).

For its part, the Economic Commission for Latin America (CEPAL) adopts the concept of innovation for export in the context of SMEs. This approach, based on the Oslo Manual, includes innovation in products, processes, organization, and marketing, and it is oriented towards the demands of the external market.

Figure 2 presents the Conceptual Framework of the SDE derived from literature, where the most relevant dimensions of the SDE are structured and classified and which generate business improvements, because of obtaining the strategic objectives of sustainable development.

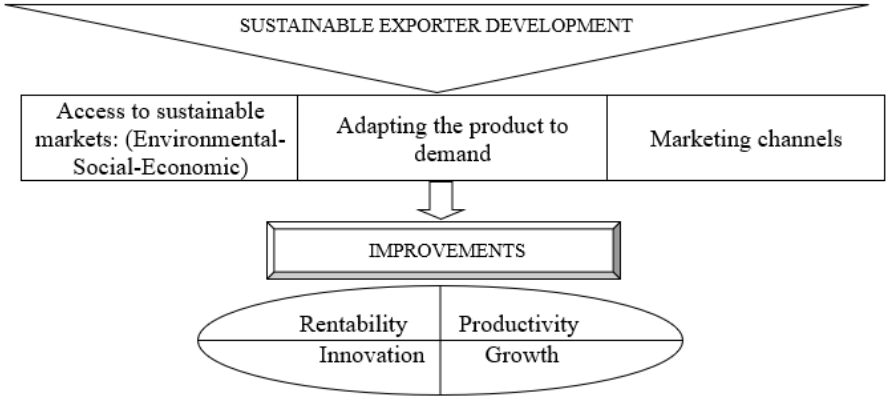

Figure 2. Conceptual framework of SDE and improvements.

Access to sustainable markets: The introduction of innovations in SMEs is crucial to comply with technical, sanitary, and phytosanitary standards, as well as mandatory and voluntary regulations required by destination markets. These requirements include quality standards, environmental standards, safety standards, and voluntary standards such as organic products and fair trade. The main obstacles are the high associated costs, which include the hiring of professionals, certifications, and the interventions necessary to comply with the required indicators. This dimension includes environmental, social and economic aspects, and covers: International certifications granted by accredited bodies, Income requirements associated with established regulations and standards, Mandatory and voluntary requirements for products, processes or situations, Obstacles to comply with income requirements, complicating the development of documents and procedures, Human resource needs to hire adequate staff, Estimation of financial resources needed to carry out activities or projects (Frohmann et al., 2016).

Adapting the product to demand: This involves innovations to adapt it to the tastes, trends, and preferences of the target market. Exporting companies must have a deep understanding of the product consumed in the target market and adapt their offer effectively, including aspects such as packaging and labelling. This adaptation process includes: National and international sales; Consumer tastes and preferences; Strategies to better understand market preferences; Product modifications; Obstacles to implementing changes; Adapting products for different markets; Market information and intelligence; Human resources needed for adaptation; Financial resources needed for adaptation; and Networks of institutions that collaborate to identify market tastes (Frohmann et al., 2016).

Marketing channels: This can be defined in several ways: territorial, institutional, direct sales, own brand or as an input in a value chain and can be oriented to an ethnic group or a particular attribute. Innovations include the creation of databases and commercial contracts, as well as aspects related to transportation, logistics, storage, distribution, marketing and legal advice. Traditional channels have improved, representing a constant challenge for suppliers. Technological and management innovations are essential to achieve competitive superiority in these constantly evolving channels. It includes the following elements: Marketing channels: means used to distribute and sell products to the final consumer; Use of a single marketing channel, focused on activities close to the company; Use of multiple marketing

channels; Obstacles to identifying the most appropriate channels; Human resources needed to manage the marketing channel; Financial resources needed to identify and manage the appropriate channels and Networks of institutions that collaborate in the identification of the channels (Frohmann et al., 2016; Tuominen and Hyvönen, 2004).

Business improvements

Improvements are the expected results of achieving the organization's strategic objectives. Although there is empirical evidence that SDE improves the performance of many companies, its impact on SMEs is less conclusive, because they differ from large companies in aspects such as ownership, resources, organizational structures and management systems, which determine their internal limitations and competitive capacity in international markets. Empirical studies show that the impact of SDE on SMEs varies according to factors such as productivity level, knowledge intensity and the sector to which they belong. The discrepancy in the results is due to the variety of indicators used to evaluate the multidimensional complexity of business performance, among which the following improvements are defined (Focus, 2015; World Trade Organization, 2016).

Improvements in Profitability. Empirical data on the relationship between SDE and SME profitability are mixed. Several studies indicate a positive and linear effect of SDE on the economic performance of SMEs (Pangarkar, 2008; World Trade Organization, 2016). In certain cases, profitability depends more on the ability to enter specific markets than on the volume of exports. Other studies identify a U-shaped relationship, where profitability decreases initially, but increases in the medium and long term with higher levels of SDE (Lu and Beamish, 2001). In contrast, some studies suggest an inverted U-shaped curve (Pérez et al., 2002). Furthermore, the relationship between SDE and profitability could vary depending on the size of the companies (Ortíz Rojas and Pérez Uribe, 2010).

Productivity improvements. Empirical studies on the effects of DSE on SME productivity are limited. Some small firms have improved their productivity soon after entering export markets, with a more significant short-term impact compared to large firms. However, in other cases, productivity improvements are less pronounced for small firms. Some SMEs have improved their technical efficiency through knowledge transfer, while others have increased their investments in capital goods before exporting (Love and Roper, 2015; World Trade Organization, 2016).

Improvements in innovative activity. Several studies confirm the complementary relationship between export and innovation decisions in SMEs. Small firms with a history of innovation tend to export more than those that do not innovate. In addition, SMEs that export often invest in research and development (R&D), which increases their chances of export success. This creates positive feedback between innovation and export strategies. Consequently, the likelihood and benefits of investing in R&D increase when a firm enters foreign markets (Esteve-Pérez and Rodríguez, 2013; Love and Roper, 2015; World Trade Organization, 2016).

Improved growth. Numerous empirical publications confirm that exporting often leads to increased employment and sales (Serti and Tomasi, 2008; World Trade Organization, 2016). However, the DOS impact on SME growth and survival varies depending on their age, managerial experience, and available resources. SMEs need

time to acquire knowledge and experience in international markets before achieving successful DOS. Recent data suggest that international experience is more important than age. Once accumulated, this experience becomes a crucial intangible resource, with the acquisition of new experience and the improvement of knowledge being more important than experience accumulated over the years.

2.3. Multicriteria decision analysis technique MCDA and analytic network process

MCDA techniques are suitable for problems that contain intangible variables, with no historical or inaccurate data. Specifically, Uriarte (2020) has preselected eight MCDA techniques to identify the relationships between performance variables and their impact on judoka's strategic objectives. This approach is very similar to the present article, in terms of the relationships to be identified and the subjective nature of the variables as well as the absence of historical data; therefore, this work is taken as a starting point to select the most appropriate MCDA technique within the framework of this research.

In summary, three key points are considered for the selection of the most appropriate MCDA technique: 1) The level of knowledge of the use of the data used. Decision makers must have sufficient capacity to establish comparisons between variables and assess the intensity between them. 2) The level of flexibility of the technique, so that it allows comparing various options by including, modifying and eliminating variables and, 3) The availability of free software that promotes the use of the MCDA technique, which allows reducing costs in time and money in terms of developing the programming for the application of the technique.

The following table evaluates some MCDA techniques, from which the ANP method was selected for meeting the three key points indicated above.

From the table above, it can be concluded that the ANP technique is the most suitable compared to the other MCDA techniques, if one wants to use a technique that requires a deep knowledge of the data, a high level of flexibility and associated software that facilitates the application of the technique. Another benefit of using ANP is that it allows modeling complex problems with a network structure, integrating interdependencies and feedback between its elements.

Regarding recently developed methods of multi-criteria decision analysis (MCDA), such as BWM, FUCOM and others, they have not been considered in this work, since they do not have free software.

Therefore, one of the most widely used methods is the Analytic Network Process (ANP) introduced by (Saaty, 1996). Furthermore, there are three main reasons for using ANP in this context:

(1) It allows modeling of complex problems with a network structure, integrating interdependence and feedback between its elements.

(2) It is suitable for solving problems with both qualitative and quantitative aspects, which is crucial for assessing innovative competencies such as creativity and critical thinking (Peniwati, 2007).

(3) It is useful in group decision problems, such as in the case of relationships between study variables (Erdoğmuş et al., 2005; Levy and Taji, 2007).

Previous studies have shown that the ANP produces very favorable results in similar problems. Verdecho et al. (2012) used the ANP to manage collaborative relationships between companies, while (Arteaga et al., 2020) used the method to quantify the impact of Supply Chain Management (SCM) elements on SSO (Yurdakul, 2003), on the other hand, used the ANP model to measure the long-term performance of a manufacturing company. This method made it possible to determine the weight and influence of each variable, as well as those that influence the achievement of others, modeling the problem as a multi-criteria decisional network that allows the introduction of essential elements for decision-making. Consequently, with this method, the CPITs with the greatest potential for success and alignment with the SDE objectives of Ecuadorian fruit exporting SMEs will be evaluated and selected.

2.4. The research gap

This study is based on the integration of the elements of the IPC and the DSE, which reveals a system of reciprocal influences between both variables, with complex internal interrelations. Some IPC impact other competencies, while certain elements of DSE affect other aspects of organizational development. This complex and mutual network of influences has not been widely studied in scientific literature. The above reflections contextualize the challenge of quantifying the impact of the relevant elements of the IPC on the SDE, justifying the need for an effective and replicable methodology. Therefore, it is crucial to develop a method that integrates the variables and their elements, allowing their interrelations to be established and their impact to be quantified.

Figure 3 presents the Framework of conceptual blocks and their relationships, supported by the literature, which structures and classifies the elements to be related, using the ANP multicriteria technique.

Figure 3. Relationships between conceptual blocks and their determinants.

In the figure above, the implementation of the ICP (Inputs) will have a direct impact on the achievement of the DSE objectives and, in addition, will generate Business Improvements (Outputs). At the same time, the achievement of the SDE objectives will also affect both the ICP elements and the Improvements; and ultimately, the Improvements will influence the achievement of the SDE.

3. Materials and methodology

The work used a constructivist research methodology focused on problem solving through the construction of organizational procedures or models. (Coughlan and Coghlan, 2002; Meredith, 1993). This methodology was developed in three phases: i) identify a problem of practical relevance and obtain a general understanding of the main topic to develop the proposal; ii) apply and demonstrate the effectiveness of the proposal; and iii) show the theoretical connections, the contribution of the proposal and outline future lines of research (Kasanen and Lukka, 1993).

This study was developed in the fruit sector of the province of Guayas-Ecuador, with 31 Ecuadorian MSMEs exporting mango, over a period of 12 months. To obtain the results of the research, a qualitative and quantitative approach was applied, with a relational scope. For the qualitative scope, the criteria of the exporting experts were obtained and for the quantitative aspect, the weighting of the criteria was carried out, as well as their relationships, using the Superdecision software. The multicriteria technique was used through the ANP method that allowed establishing the relationship and incidence between the study variables and their elements, organizing all the elements according to their relative importance, determined by the preferences of experts in a particular context. To do so, a questionnaire of paired comparisons was applied to groups of business experts from the MSMEs, using the scale of (Saaty and Shih, 2009).

The inclusion criteria for selecting the companies were: a) the number of employees to ensure representative results, b) the willingness to participate in the research, and c) stability in the international market in recent years. Planned sessions were held in which the authors of the article acted as consultants and moderators. Their role was to explain the objectives of each session, describe the main aspects, and provide information on the terminology and procedure for developing methodological applications. According to (Peniwati, 2007), this method is developed in six phases, indicated in **Figure 4**.

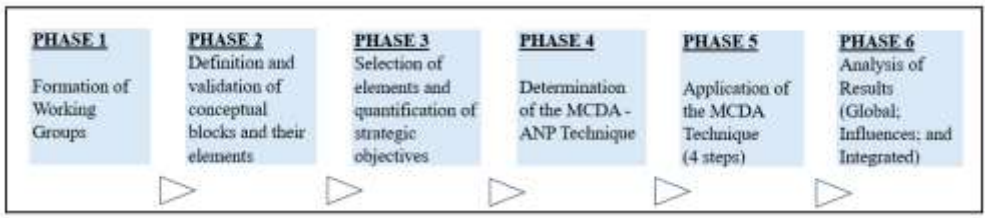

Figure 4. Phases corresponding to the ANP method.

Each phase of the methodological process is detailed below:

Phase 1. Formation of the Working Groups: At this stage, a group of experts was formed for each company, responsible for selecting the most representative elements of each conceptual block (clusters). The multidisciplinary team included workers from different hierarchical levels, especially those with greater operational control (head of human talent and marketing). For data collection, the "focus group" method was used to ensure an adequate procedure (Hernández Sampieri and Mendoza Torres, 2018). Several work meetings were held with the experts to develop the influence matrix, structure the decisional network and consolidate the paired comparison instrument.

Phase 2. Definition and validation of conceptual blocks, components, and elements: In this phase, the experts defined and validated the conceptual blocks and their components, as well as their elements. The definition of the main elements of the ICP facilitates the fulfillment of the SDE objectives and the generation of improvements that create value for the organization. Subsequently, the elements of each component were identified and coded to establish a network of relationships both between elements of each component and between the different components.

Phase 3. Selection of elements and quantification of goals: In this phase, the expert groups selected the key elements of each conceptual block based on their knowledge and experience. Thus, the following were identified: i) 15 elements of the ITQ, ii) nine elements of SDE considering the environmental, social and economic aspects and iii) four elements of Business Improvements, which include Profitability, Productivity, Innovation and Growth.

Table 1 presents the elements of the IPC selected by the experts with their respective coding.

Table 1. Evaluation of the MCDA technique.

MCDA Technique	Level of knowledge of data use	Level of flexibility	Availability of free software
AHP	High	Low	Yes
ANP	High	High	Yes
Fuzzy AHP	Low	Low	Not
COMET	High	High	Not
Fuzzy Topsis	Low	High	Not
Fuzzy VIKOR	Low	High	Not
IDRA	High	High	Not
REMBRANDT	High	High	Not

Table 2 presents the SDE elements selected by the experts and duly coded. Some of these elements are associated with sustainability aspects (Environmental—Social—Economic). Goals that SMEs are expected to achieve were also projected.

Table 2. Elements of ICP selected by the experts.

Dimensions	Selected items
Creativity	CR5: Improve Processes/Products CR6: Novel Ideas CR8: New methods
Critical Thinking	CT2: New Forms of Resolution CT4: Facing Task CT5: Impact Forecast
Initiative	IN3: Task Expectation IN4: Conviction IN5: New Ideas
Networking	NW1: Different Types of Ideas NW3: Timely information NW4: External Relations
Teamwork	TW1: Attending others. TW4: Sources of Conflict TW5: Constructive Feedback

Table 3 shows the selected elements of the DSE with their goal projections.

Table 3. Selection and quantification of DSE elements.

Dimensions	Selected items	Denomination	Goal	Sustainability Dimension
Access to Sustainable Market	* Sustainable Market Entry Criteria (quality, safety, environmental standards and standards such as organic products and fair trade)	SMA2	Decrease 10%	Environmental
	* Specify the necessary Human Resources	SMA5	Increase 2%	Social
	* Estimate Financial Resources Needed	SMA6	2%	Economic
Product Adaptation	* Tastes and Preferences	PO2	10%	
	* Changes in your product	PO4	4%	
	* HR to cope with adaptation	PO8	Increase 3%	
Marketing Channels	* Other Marketing Channels	MCO3	7%	
	* Obstacles to Knowing Appropriate Channels	MCO4	Decrease 7%	
	* Groups or Networks of Institutions that can collaborate to identify channels	MCO7	Increase 10%	

Table 4 presents the coded and projected elements of Business Improvements. The experts considered that the four business improvements supported by the literature were relevant and applicable in their companies.

Table 4 Selection and quantification of business improvement elements.

Improvements	Denomination	Goals
Rentability	REN1	10%
Productivity	PRO2	10%
Innovation	INN3	8%
Growth	CRE4	6%

Phase 4. Determination of the MCDA-ANP Technique: The multicriteria technique was used with the ANP method, since it is considered the most suitable and easy option to manage to measure the relationship of the variables in a quantitative way. Saaty (1996) mentions that the Multicriteria ANP technique is a tool that allows us to relate the various elements that a decisional network presents.

Phase 5. Application of the MCDA-ANP Technique: The use of the ANP technique is carried out in four steps, to measure and establish the relationships between the elements of the various components. The application of the steps mentioned in this phase and their results will be presented in the results section.

Step 1: Present the selected elements, prepare the influence matrix and prepare the ANP decisional network.

Step 2: Identify the degree of preference and determine the Internal Priorities (Unweighted Matrix)

Step 3: Determine External Priorities (Weighted Matrix)

Step 4: Present the Super Limit Matrix

Phase 6 Analysis of Results: Three types of analysis will be generated: i) Global, which presents the priorities according to the experts, that is, the elements ordered from highest to lowest importance, ii) Influences, which reveals the relationships

between the elements of the IPC and the SDE, indicating three levels of relationships: strong, medium and weak and, iii) Integrated, which unifies the results of the global analysis with that of influence, in order to detail the elements of IPC that must be promoted to achieve the DSE objectives. Finally, it is important to indicate that the Superdecision Software was used to work on phases 3 to 6 and to obtain the results of the study.

4. Results

The main results obtained in the development of each of the steps of phase 5 of the methodological application are presented, as well as phase 6 of the ANP method.

Step 1: In this step, an influence matrix is created to identify how an element influences others. The indicated matrix is a zero-one matrix that is used to compare, in pairs (row-column intersections), all the elements of all the clusters. The entry in the matrix is on the left and the decision is whether the element in the left row significantly influences the element in the column placed at the top of the matrix. Therefore, if a variable significantly influences, it is assigned a 1 and if it does not influence, it is assigned a 0; in addition, the variables do not influence themselves. **Table 5** presents the results of the influence matrix.

Table 5. Matrix of influences.

		INNOVATIVE COMPETENCES OF THE WORKER (Independent variable)															SUSTAINABLE EXPORTER DEVELOPMENT (V. Dependent)									Business Improvements-Outputs			
		CREATIVITY			CRITICAL THINKING			INICIATIVE			NETWORKING			TEAMWORK			SUSTAINABLE MARKET ACCESS			PRODUCT ADAPTATION			MARKETING CHANNELS			0utputs-objetives			
Cluster	**Elementos**	**CR5**	**CR6**	**CR8**	**CT2**	**CT4**	**CT5**	**IN3**	**IN4**	**IN6**	**NW1**	**NW3**	**NW4**	**TW1**	**TW4**	**TW5**	**SMA2**	**SMA5**	**SMA6**	**PO2**	**PO4**	**PO8**	**MCO3**	**MCO4**	**MCO7**	**REN1**	**PRO2**	**INN3**	**CRE4**
CREATIVITY	CR5		1	1	0	0	1	0	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	1	0
	CR6	1		1	0	1	0	0	0	1	1	1	0	0	0	1	0	0	0	1	1	0	1	0	0	1	1	1	1
	CR8	1	1		1	1	1	0	1	0	1	1	1	1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	0
CRITICAL THINKING	CT2	1	1	1		0	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
	CT4	0	1	1	0		1	1	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	0	1	1
	CT5	0	1	0	0	1		0	1	0	1	1	0	0	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0
INICIATIVE	IN3	1	1	1	1	0	0		1	1	0	1	0	1	1	1	1	1	1	1	0	1	1	1	1	0	0	1	0
	IN4	1	1	1	0	0	1	1		1	1	0	0	1	1	1	1	1	0	0	1	1	1	1	1	1	0	1	1
	IN6	1	1	0	1	0	1	1	1		1	1	1	0	1	0	1	0	0	1	1	1	1	1	1	1	1	0	0
NETWORKING	NW1	1	1	1	1	0	1	0	1	1		0	1	1	0	1	0	0	1	1	0	1	1	1	1	1	1	1	0
	NW3	1	0	0	1	0	1	0	0	1	0		1	1	1	1	0	0	1	1	0	1	0	1	1	0	0	0	1
	NW4	0	0	0	0	0	0	0	0	1	1	1		1	1	1	0	1	1	1	0	1	0	1	1	1	1	1	1
TEAMWORK	TW1	1	0	1	0	1	0	1	1	0	1	1	1		0	1	1	1	0	1	0	0	0	1	1	0	0	0	0
	TW4	0	0	1	0	0	1	1	1	1	1	1	1	0		1	1	0	1	1	1	1	0	1	0	1	1	0	1
	TW5	1	1	0	1	1	1	1	1	0	0	1	1	1	1		0	1	0	1	1	1	0	0	0	1	1	1	1
SUSTAINABLE MARKET ACCESS	SMA2	1	0	0	1	0	1	0	1	1	0	0	0	1	1	0		0	1	1	1	1	0	0	0	0	0	1	0
	SMA5	0	0	1	1	0	1	1	1	0	1	0	1	0	0	1	0		0	1	1	0	0	0	0	1	1	1	0
	SMA6	0	0	1	1	0	1	0	0	0	1	1	1	1	1	0	1	0		0	1	1	1	1	1	1	1	1	1
PRODUCT ADAPTATION	PO2	0	1	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	0		1	0	0	0	0	0	1	1	0
	PO4	1	1	0	1	0	0	0	1	0	1	0	0	1	1	1	1	0	1	1		1	1	0	0	1	1	1	1
	PO8	1	0	1	1	1	1	0	1	1	1	1	1	1	1	1	1	0	1	0	1		1	1	1	1	1	0	1

Table 5. (*Continued*).

		INNOVATIVE COMPETENCES OF THE WORKER (Independent variable)															SUSTAINABLE EXPORTER DEVELOPMENT (V. Dependent)									Business Improvements-Outputs			
		CREATIVITY			CRITICAL THINKING			INICIATIVE			NETWORKING			TEAMWORK			SUSTAINABLE MARKET ACCESS			PRODUCT ADAPTATION			MARKETING CHANNELS			0utputs-objetives			
Cluster	**Elementos**	**CR5**	**CR6**	**CR8**	**CT2**	**CT4**	**CT5**	**IN3**	**IN4**	**IN6**	**NW1**	**NW3**	**NW4**	**TW1**	**TW4**	**TW5**	**SMA2**	**SMA5**	**SMA6**	**PO2**	**PO4**	**PO8**	**MCO3**	**MCO4**	**MCO7**	**REN1**	**PRO2**	**INN3**	**CRE4**
MARKETING CHANNELS	MCO3	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1		1	1	0	0	1	1
	MCO4	1	1	0	1	0	1	1	1	1	0	0	1	1	0	0	0	1	1	1	1	0	1		1	1	0	1	1
	MCO7	0	0	0	1	1	1	1	0	1	0	1	1	0	0	1	0	1	1	0	0	0	1	1		0	0	1	1
0utputs-objetives	REN1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0		1	0	1
	PRO2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	1	1		0	1
	INN3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	1	0	0	0	1		1
	CRE4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	1	1	1	1	

With this information, a decision network is built divided into three blocks: ICP, DSE and Business Improvements with their dimensions (clusters) and elements (alternatives) that show interdependence connections between clusters and feedback within each cluster. Thus, the decision network is generated, made up of: i) five IPC clusters with their elements, ii) three SDE Exporter clusters with their elements and iii) four Improvements clusters (outputs). **Figure 5** presents the decision network generated using Superdecision Software.

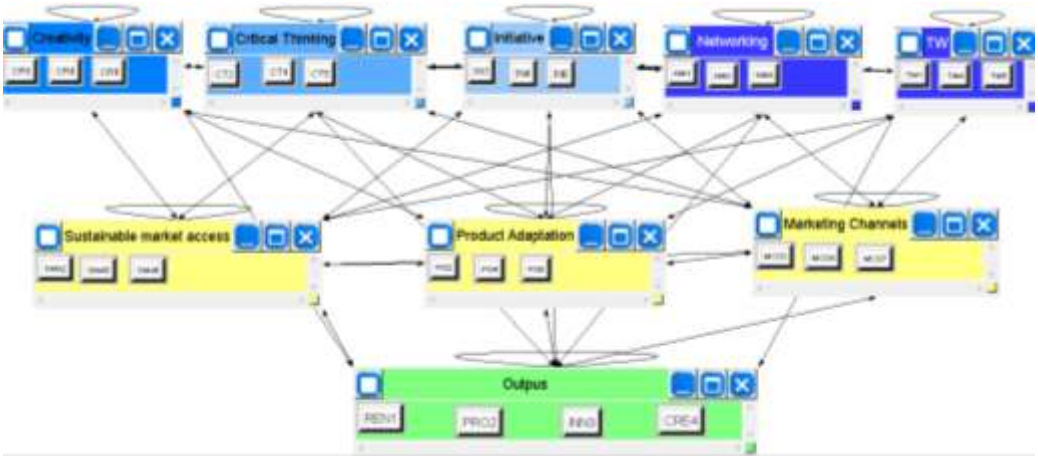

Figure 5. ANP decision network.

The instrument was then applied to the experts, where they answered a questionnaire of paired comparisons using the scale of (Saaty, 1996). The experts chose a value according to the importance they attributed to the elements. The consolidated answers were recorded in the superdecisions software to obtain the respective weights of each element.

Step 2: The unweighted matrix is created, which shows the relative weight assigned to each element according to the answers obtained from the experts, revealing the internal priorities of the elements analyzed (see **Table 6**). It is a non-stochastic matrix, which means that the sum of its columns is not equal to 1.

Step 3: The weighted matrix is generated, where the weight of each element is based on the assessment of the paired comparisons made with the experts' criteria and with the cluster matrix. This is done to convert it into a stochastic matrix, where the sum of the columns is equal to 1. This matrix reveals the relationships between the study variables. (see **Table 7**).

Table 6. Weighted matrix.

	SMA2	SMA5	SMA6	PO2	PO4	PO8	MCO3	MCO4	MCO7	CR5	CR6	CR8	IN3	IN4	IN6	CRE4	INN3	PRO2	REN1	CT2	CT4	CT5	TW1	TW4	TW5	NW1	NW3	NW4
SMA2	0.000 00	0.000 00	100.0 00	0.875 00	0.900 00	0.500 00	0.000 00	0.000 00	0.000 00	100.0 00	0.000 00	0.000 00	0.360 81	0.111 11	100.0 00	0.041 58	100.0 00	0.041 58	0.000 00	0.778 49	0.000 00	0.900 00	0.900 00	0.900 00	0.000 00	0.000 00	0.000 00	0.000 00
SMA5	0.000 00	0.000 00	0.000 00	0.125 00	0.000 00	0.000 00	0.000 00	0.900 00	0.900 00	0.000 00	0.000 00	0.888 89	0.289 87	0.888 89	0.000 00	0.179 93	0.000 00	0.179 93	100.0 00	0.041 58	0.000 00	0.100 00	0.100 00	0.000 00	100.0 00	0.000 00	0.000 00	0.900 00
SMA6	100.0 00	0.000 00	0.000 00	0.000 00	0.100 00	0.500 00	100.0 00	0.100 00	0.100 00	0.000 00	0.000 00	0.111 11	0.349 31	0.000 00	0.000 00	0.778 49	0.000 00	0.778 49	0.000 00	0.179 93	100.0 00	0.000 00	0.000 00	0.100 00	0.000 00	100.0 00	100.0 00	0.100 00
PO2	0.333 33	0.900 00	0.000 00	0.000 00	0.900 00	0.000 00	0.000 00	0.900 00	0.000 00	0.000 00	0.100 00	0.787 01	0.100 00	0.000 00	0.332 55	0.000 00	0.900 00	0.179 93	0.361 61	0.778 49	0.000 00	0.000 00	100.0 00	0.185 17	0.185 17	0.100 00	0.100 00	0.900 00
PO4	0.333 33	0.100 00	0.100 00	100.0 00	0.000 00	100.0 00	0.875 00	0.100 00	0.000 00	0.900 00	0.900 00	0.045 71	0.000 00	0.111 11	0.305 83	0.000 00	0.100 00	0.041 58	0.305 83	0.179 93	0.100 00	0.000 00	0.000 00	0.044 51	0.044 51	0.000 00	0.000 00	0.000 00
PO8	0.333 33	0.000 00	0.900 00	0.000 00	0.100 00	0.000 00	0.125 00	0.000 00	0.000 00	0.100 00	0.000 00	0.167 28	0.900 00	0.888 89	0.361 61	0.000 00	0.000 00	0.778 49	0.332 55	0.041 58	0.900 00	100.0 00	0.000 00	0.770 32	0.770 32	0.900 00	0.900 00	0.100 00
MCO3	0.000 00	0.000 00	0.044 51	0.000 00	100.0 00	0.041 58	0.000 00	0.875 00	0.900 00	0.167 28	100.0 00	0.191 19	0.042 55	0.332 55	0.333 33	0.100 00	100.0 00	0.000 00	0.000 00	0.203 24	0.041 58	0.041 58	0.000 00	0.000 00	0.000 00	0.179 93	0.000 00	0.000 00
MCO4	0.000 00	0.000 00	0.185 17	0.000 00	0.000 00	0.179 93	0.125 00	0.000 00	0.100 00	0.787 01	0.000 00	0.048 05	0.765 96	0.361 61	0.333 33	0.000 00	0.000 00	0.000 00	0.000 00	0.049 11	0.179 93	0.179 93	0.100 00	100.0 00	0.000 00	0.041 58	0.111 11	0.900 00
MCO7	0.000 00	0.000 00	0.770 32	0.000 00	0.000 00	0.778 49	0.875 00	0.125 00	0.000 00	0.045 71	0.000 00	0.760 76	0.191 49	0.305 83	0.333 33	0.900 00	0.000 00	100.0 00	0.000 00	0.747 65	0.778 49	0.778 49	0.900 00	0.000 00	0.000 00	0.778 49	0.888 89	0.100 00
CR5	100.0 00	0.000 00	0.000 00	0.000 00	0.100 00	0.100 00	0.000 00	0.100 00	0.000 00	0.000 00	0.125 00	0.125 00	0.305 83	0.173 91	0.100 00	0.000 00	0.000 00	0.000 00	0.000 00	0.179 93	0.000 00	0.000 00	0.900 00	0.000 00	0.100 00	0.041 58	100.0 00	0.000 00
CR6	0.000 00	0.000 00	0.000 00	0.900 00	0.900 00	0.000 00	0.000 00	0.900 00	0.000 00	0.900 00	0.000 00	0.875 00	0.361 61	0.782 61	0.900 00	0.000 00	0.000 00	0.000 00	0.000 00	0.778 49	0.900 00	100.0 00	0.000 00	0.000 00	0.900 00	0.778 49	0.000 00	0.000 00
CR8	0.000 00	100.0 00	100.0 00	0.100 00	0.000 00	0.900 00	0.000 00	0.000 00	0.000 00	0.100 00	0.875 00	0.000 00	0.332 55	0.043 48	0.000 00	0.000 00	0.000 00	0.000 00	0.000 00	0.041 58	0.100 00	0.000 00	0.100 00	100.0 00	0.000 00	0.179 93	0.000 00	0.000 00
IN3	0.000 00	0.900 00	0.000 00	0.000 00	0.000 00	0.000 00	0.125 00	0.765 96	0.100 00	0.000 00	0.000 00	0.000 00	0.000 00	0.900 00	0.100 00	0.000 00	0.000 00	0.000 00	0.000 00	0.041 58	0.179 93	0.000 00	0.888 89	0.179 93	0.900 00	0.000 00	0.000 00	0.000 00
IN4	0.888 89	0.100 00	0.000 00	0.100 00	100.0 00	0.100 00	0.875 00	0.191 49	0.000 00	0.875 00	0.000 00	100.0 00	0.100 00	0.000 00	0.900 00	0.000 00	0.000 00	0.000 00	0.000 00	0.179 93	0.041 58	100.0 00	0.111 11	0.041 58	0.100 00	0.100 00	0.000 00	0.000 00

Table 6. (*Continued*).

	SMA2	SMA5	SMA6	PO2	PO4	PO8	MCO3	MCO4	MCO7	CR5	CR6	CR8	IN3	IN4	IN6	CRE4	INN3	PRO2	REN1	CT2	CT4	CT5	TW1	TW4	TW5	NW1	NW3	NW4
IN6	0.11111	0.00000	0.00000	0.90000	0.00000	0.90000	0.00000	0.04255	0.90000	0.12500	100.000	0.00000	0.90000	0.10000	0.00000	0.00000	0.00000	0.00000	0.00000	0.77849	0.77849	0.00000	0.00000	0.77849	0.00000	0.90000	100.000	100.000
CRE4	0.00000	0.00000	0.02500	0.00000	0.02500	0.77849	0.90000	0.77849	0.10000	0.00000	0.02500	0.00000	0.00000	0.75576	0.00000	0.00000	0.90000	0.10000	0.10000	0.00000	0.17993	0.00000	0.00000	0.17993	0.02500	0.00000	100.000	0.15749
INN3	100.000	0.16728	0.67500	0.90000	0.67500	0.00000	0.10000	0.04158	0.90000	0.78261	0.67500	0.78701	100.000	0.04566	0.00000	0.33333	0.00000	0.00000	0.00000	0.00000	0.77849	0.00000	0.00000	0.00000	0.67500	0.77849	0.00000	0.52587
PRO2	0.00000	0.78701	0.22500	0.10000	0.22500	0.17993	0.00000	0.00000	0.00000	0.04348	0.22500	0.04571	0.00000	0.00000	0.90000	0.33333	0.10000	0.00000	0.90000	0.10000	0.00000	0.10000	0.00000	0.77849	0.22500	0.04158	0.00000	0.17124
REN1	0.00000	0.04571	0.07500	0.00000	0.07500	0.04158	0.00000	0.17993	0.00000	0.17391	0.07500	0.16728	0.00000	0.19858	0.10000	0.33333	0.00000	0.90000	0.00000	0.90000	0.04158	0.90000	0.00000	0.04158	0.07500	0.17993	0.00000	0.14540
CT2	0.10000	0.10000	0.10000	0.10000	100.000	0.17993	0.87500	0.90000	0.04158	0.00000	0.00000	0.19119	100.000	0.00000	0.10000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.17993	0.10000	0.10000	0.00000
CT4	0.00000	0.00000	0.00000	0.00000	0.00000	0.04158	0.12500	0.00000	0.17993	0.00000	100.000	0.04805	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	100.000	100.000	0.00000	0.04158	0.00000	0.00000	0.00000
CT5	0.90000	0.90000	0.90000	0.90000	0.00000	0.77849	0.00000	0.10000	0.77849	100.000	0.00000	0.76076	0.00000	100.000	0.90000	0.00000	0.00000	0.00000	0.00000	0.00000	100.000	0.00000	0.00000	100.000	0.77849	0.90000	0.90000	0.00000
TW1	0.10000	0.00000	0.10000	0.33333	0.33333	0.04158	0.00000	100.000	0.00000	0.30583	0.00000	0.10000	0.04158	0.34650	0.00000	0.00000	0.00000	0.00000	0.00000	0.04348	0.10000	0.00000	0.00000	0.00000	0.10000	0.50000	0.32033	0.77849
TW4	0.90000	0.00000	0.90000	0.33333	0.33333	0.77849	0.00000	0.00000	0.00000	0.33255	0.00000	0.90000	0.77849	0.32033	100.000	0.00000	0.00000	0.00000	0.00000	0.17391	0.00000	0.90000	0.00000	0.00000	0.90000	0.00000	0.34650	0.17993
TW5	0.00000	100.000	0.00000	0.33333	0.33333	0.17993	0.00000	0.00000	100.000	0.36161	100.000	0.00000	0.17993	0.33316	0.00000	0.00000	0.00000	0.00000	0.00000	0.78261	0.90000	0.10000	100.000	100.000	0.00000	0.50000	0.33316	0.04158
NW1	0.00000	0.10000	0.04158	0.00000	100.000	0.17993	0.00000	0.00000	0.00000	0.33333	0.90000	0.73215	0.00000	100.000	0.77849	0.00000	0.00000	0.00000	0.00000	0.10000	0.77032	0.10000	0.17993	0.17993	0.00000	0.00000	0.00000	0.10000
NW3	0.00000	0.00000	0.17993	0.10000	0.00000	0.04158	0.00000	0.00000	0.87500	0.33333	0.10000	0.05028	100.000	0.00000	0.17993	0.00000	0.00000	0.00000	0.00000	0.90000	0.18517	0.90000	0.04158	0.77849	0.90000	0.00000	0.00000	0.90000
NW4	0.00000	0.90000	0.77849	0.90000	0.00000	0.77849	0.00000	100.000	0.12500	0.33333	0.00000	0.21756	0.00000	0.00000	0.04158	0.00000	0.00000	0.00000	0.00000	0.00000	0.04451	0.00000	0.77849	0.04158	0.10000	100.000	100.000	0.00000

Table 7. Weighted matrix.

	SMA2	SMA5	SMA6	PO2	PO4	PO8	MCO3	MCO4	MCO7	CR5	CR6	CR8	IN3	IN4	IN6	CRE4	INN3	PRO2	REN1	CT2	CT4	CT5	TW1	TW4	TW5	NW1	NW3	NW4
SMA2	0.000 00	0.000 00	0.052 20	0.064 00	0.059 83	0.033 24	0.000 00	0.000 00	0.000 00	0.055 21	0.000 00	0.000 00	0.044 92	0.013 83	0.124 49	0.009 04	0.154 31	0.006 42	0.000 00	0.073 38	0.000 00	0.081 53	0.108 63	0.087 47	0.000 00	0.000 00	0.000 00	0.000 00
SMA5	0.000 00	0.000 00	0.000 00	0.009 14	0.000 00	0.000 00	0.000 00	0.062 83	0.075 51	0.000 00	0.000 00	0.049 08	0.036 09	0.110 66	0.000 00	0.039 12	0.000 00	0.027 76	0.195 71	0.003 92	0.000 00	0.009 06	0.012 07	0.000 00	0.102 90	0.000 00	0.000 00	0.101 83
SMA6	0.058 26	0.000 00	0.000 00	0.000 00	0.006 65	0.033 24	0.105 85	0.006 98	0.008 39	0.000 00	0.000 00	0.006 13	0.043 49	0.000 00	0.000 00	0.169 27	0.000 00	0.120 13	0.000 00	0.016 96	0.090 59	0.000 00	0.000 00	0.009 72	0.000 00	0.090 28	0.090 28	0.011 32
PO2	0.018 91	0.050 95	0.000 00	0.000 00	0.043 58	0.000 00	0.000 00	0.079 08	0.000 00	0.000 00	0.006 58	0.048 91	0.003 22	0.000 00	0.010 71	0.000 00	0.261 30	0.052 24	0.133 16	0.053 69	0.000 00	0.000 00	0.115 54	0.017 23	0.018 24	0.008 93	0.008 93	0.100 76
PO4	0.018 91	0.005 66	0.005 08	0.053 28	0.000 00	0.048 43	0.116 58	0.008 79	0.000 00	0.055 93	0.059 20	0.002 84	0.000 00	0.003 58	0.009 85	0.000 00	0.029 03	0.012 07	0.112 62	0.012 41	0.006 63	0.000 00	0.000 00	0.004 14	0.004 38	0.000 00	0.000 00	0.000 00
PO8	0.018 91	0.000 00	0.045 75	0.000 00	0.004 84	0.000 00	0.016 66	0.000 00	0.000 00	0.006 21	0.000 00	0.010 40	0.028 98	0.028 62	0.011 64	0.000 00	0.000 00	0.226 02	0.122 45	0.002 87	0.059 66	0.066 28	0.000 00	0.071 67	0.075 88	0.080 40	0.080 40	0.011 20
MCO3	0.000 00	0.000 00	0.004 70	0.000 00	0.091 14	0.003 79	0.000 00	0.054 39	0.067 24	0.009 60	0.060 76	0.010 98	0.005 54	0.043 30	0.043 40	0.029 81	0.211 53	0.000 00	0.000 00	0.018 30	0.003 60	0.003 60	0.000 00	0.000 00	0.000 00	0.007 66	0.000 00	0.000 00
MCO4	0.000 00	0.000 00	0.019 56	0.000 00	0.000 00	0.016 40	0.011 78	0.000 00	0.007 47	0.045 18	0.000 00	0.002 76	0.099 73	0.047 08	0.043 40	0.000 00	0.000 00	0.000 00	0.000 00	0.004 42	0.015 57	0.015 57	0.006 89	0.055 51	0.000 00	0.001 77	0.004 73	0.048 03
MCO7	0.000 00	0.000 00	0.081 39	0.000 00	0.000 00	0.070 95	0.082 48	0.007 77	0.000 00	0.002 62	0.000 00	0.043 67	0.024 93	0.039 82	0.043 40	0.268 27	0.000 00	0.211 53	0.000 00	0.067 31	0.067 36	0.067 36	0.062 04	0.000 00	0.000 00	0.033 15	0.037 85	0.005 34
CR5	0.081 35	0.000 00	0.000 00	0.000 00	0.007 61	0.007 61	0.000 00	0.008 01	0.000 00	0.000 00	0.006 29	0.005 94	0.044 37	0.025 23	0.014 51	0.000 00	0.000 00	0.000 00	0.000 00	0.022 53	0.000 00	0.000 00	0.124 05	0.000 00	0.011 75	0.004 81	0.115 56	0.000 00
CR6	0.000 00	0.000 00	0.000 00	0.075 39	0.068 52	0.000 00	0.000 00	0.072 07	0.000 00	0.042 77	0.000 00	0.041 58	0.052 47	0.113 55	0.130 58	0.000 00	0.000 00	0.000 00	0.000 00	0.097 49	0.108 33	0.120 37	0.000 00	0.000 00	0.105 76	0.089 96	0.000 00	0.000 00
CR8	0.000 00	0.081 18	0.072 88	0.008 38	0.000 00	0.068 52	0.000 00	0.000 00	0.000 00	0.004 75	0.044 01	0.000 00	0.048 25	0.006 31	0.000 00	0.000 00	0.000 00	0.000 00	0.000 00	0.005 21	0.012 04	0.000 00	0.013 78	0.110 99	0.000 00	0.020 79	0.000 00	0.000 00
IN3	0.000 00	0.055 79	0.000 00	0.000 00	0.000 00	0.000 00	0.022 95	0.092 73	0.014 55	0.000 00	0.000 00	0.000 00	0.000 00	0.086 62	0.009 62	0.000 00	0.000 00	0.000 00	0.000 00	0.004 36	0.018 14	0.000 00	0.161 99	0.026 40	0.139 83	0.000 00	0.000 00	0.000 00
IN4	0.055 22	0.006 20	0.000 00	0.007 69	0.069 86	0.006 99	0.160 62	0.023 18	0.000 00	0.192 59	0.000 00	0.220 10	0.009 62	0.000 00	0.086 62	0.000 00	0.000 00	0.000 00	0.000 00	0.018 88	0.004 19	0.100 84	0.020 25	0.006 10	0.015 54	0.006 87	0.000 00	0.000 00
IN6	0.006 90	0.000 00	0.000 00	0.069 18	0.000 00	0.062 88	0.000 00	0.005 15	0.130 95	0.027 51	0.232 96	0.000 00	0.086 62	0.009 62	0.000 00	0.000 00	0.000 00	0.000 00	0.000 00	0.081 68	0.078 51	0.000 00	0.000 00	0.114 24	0.000 00	0.061 80	0.068 66	0.086 06

Table 7. (*Continued*).

	SMA2	SMA5	SMA6	PO2	PO4	PO8	MCO3	MCO4	MCO7	CR5	CR6	CR8	IN3	IN4	IN6	CRE4	INN3	PRO2	REN1	CT2	CT4	CT5	TW1	TW4	TW5	NW1	NW3	NW4
CRE4	0.00000	0.00000	0.00707	0.00000	0.00592	0.18442	0.33685	0.19216	0.02967	0.00000	0.00462	0.00000	0.00000	0.17550	0.00000	0.00000	0.30944	0.03438	0.04361	0.00000	0.03430	0.00000	0.00000	0.03505	0.00516	0.00000	0.25520	0.05037
INN3	0.31557	0.05268	0.19085	0.23458	0.15990	0.00000	0.03743	0.01027	0.26699	0.13657	0.12467	0.13733	0.23221	0.01060	0.00000	0.16150	0.00000	0.00000	0.00000	0.00000	0.14841	0.00000	0.00000	0.00000	0.13920	0.19867	0.00000	0.16820
PRO2	0.00000	0.24785	0.06362	0.02607	0.05330	0.04262	0.00000	0.00000	0.00000	0.00759	0.04156	0.00798	0.00000	0.00000	0.20899	0.16150	0.03438	0.00000	0.39246	0.01983	0.00000	0.01906	0.00000	0.15163	0.04640	0.01061	0.00000	0.05477
REN1	0.00000	0.01440	0.02121	0.00000	0.01777	0.00985	0.00000	0.04441	0.00000	0.03035	0.01385	0.02919	0.00000	0.04611	0.02322	0.16150	0.00000	0.30944	0.00000	0.17851	0.00793	0.17157	0.00000	0.00810	0.01547	0.04592	0.00000	0.04651
CT2	0.00332	0.00331	0.00297	0.00180	0.01639	0.00295	0.09521	0.06458	0.00359	0.00000	0.00000	0.01507	0.04056	0.00000	0.00406	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.01692	0.00866	0.00866	0.00000
CT4	0.00000	0.00000	0.00000	0.00000	0.00000	0.00068	0.01360	0.00000	0.01552	0.00000	0.08343	0.00379	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.03885	0.11030	0.00000	0.00391	0.00000	0.00000	0.00000
CT5	0.02985	0.02978	0.02674	0.01623	0.00000	0.01276	0.00000	0.00718	0.06714	0.07882	0.00000	0.05997	0.00000	0.04056	0.03650	0.00000	0.00000	0.00000	0.00000	0.00000	0.03885	0.00000	0.00000	0.08882	0.07321	0.07791	0.07791	0.00000
TW1	0.03928	0.00000	0.03519	0.09449	0.08588	0.01071	0.00000	0.20720	0.00000	0.06899	0.00000	0.02256	0.00509	0.04240	0.00000	0.00000	0.00000	0.00000	0.00000	0.00823	0.01820	0.00000	0.00000	0.00000	0.00315	0.08314	0.05326	0.16223
TW4	0.35352	0.00000	0.31674	0.09450	0.08588	0.20058	0.00000	0.00000	0.00000	0.07502	0.00000	0.20302	0.09526	0.03920	0.12237	0.00000	0.00000	0.00000	0.00000	0.03294	0.00000	0.16384	0.00000	0.00000	0.02835	0.00000	0.05761	0.03750
TW5	0.00000	0.39199	0.00000	0.09450	0.08588	0.04636	0.00000	0.00000	0.24902	0.08157	0.23876	0.00000	0.02202	0.04077	0.00000	0.00000	0.00000	0.00000	0.00000	0.14823	0.16384	0.01820	0.03695	0.02975	0.00000	0.08314	0.05540	0.00867
NW1	0.00000	0.00602	0.00225	0.00000	0.13703	0.02466	0.00000	0.00000	0.00000	0.02624	0.07498	0.05763	0.00000	0.07665	0.05967	0.00000	0.00000	0.00000	0.00000	0.01289	0.09541	0.01239	0.04093	0.03296	0.00000	0.00000	0.00000	0.01072
NW3	0.00000	0.00000	0.00973	0.01508	0.00000	0.00570	0.00000	0.00000	0.05598	0.02624	0.00833	0.00396	0.07665	0.00000	0.01379	0.00000	0.00000	0.00000	0.00000	0.11598	0.02294	0.11148	0.00946	0.14261	0.17456	0.00000	0.00000	0.09651
NW4	0.00000	0.05419	0.04208	0.13569	0.00000	0.10668	0.00000	0.05324	0.00800	0.02624	0.00000	0.01712	0.00000	0.00000	0.00319	0.00000	0.00000	0.00000	0.00000	0.00000	0.00551	0.00000	0.17710	0.00762	0.01939	0.08556	0.08556	0.00000

Step 4: Obtain the superlimit matrix to identify the elements that have higher weights or priorities compared to the others. Multiply the weighted matrix by itself as many times as necessary until it converges so that all columns are equal and approaches unity (see **Table 8**).

Table 8. Results of the limit matrix.

Proportion		Cluster	ID	Abrev.	Individual Value	Accumulated Value	Sorted from largest to smallest X cluster	ID
CI	39.15%	Creativity	Improve Processes	CR5	0.01349	0.01349	0.02772	CR6
			Novel Ideas	CR6	0.02772	0.04121	0.01855	CR8
			New Methods	CR8	0.01855	0.05976	0.01349	CR5
		Critical Thinking	New Forms of Resolution	CT2	0.00769	0.06745	0.02594	CT5
			Facing Task	CT4	0.00741	0.07486	0.00769	CT2
			Impact Forecast	CT5	0.02594	0.10080	0.00741	CT4
		Initiative	Task Expectation	IN3	0.01989	0.12069	0.03575	IN6
			Conviction	IN4	0.02486	0.14555	0.02486	IN4
			Fast Acting	IN6	0.03575	0.18130	0.01989	IN3
		Teamwork	Attention to others	TW1	0.02261	0.20391	0.06129	TW4
			Identify Sources of Conflict	TW4	0.06129	0.26520	0.05260	TW5
			Constructive Feedback	TW5	0.05260	0.31780	0.02261	TW1
		Networking	Different Types of Ideas	NW1	0.01627	0.33407	0.03158	NW3
			Timely Information	NW3	0.03158	0.36565	0.02589	NW4
			External Relations	NW4	0.02589	0.39154	0.01627	NW1

Table 8. (*Continued*).

Proportion		Cluster	ID	Abrev.	Individual Value	Accumulated Value	Sorted from largest to smallest X cluster	ID
I	32.18%	Access to Sustainable Market	Sustainable entry criteria	SMA2	0.04003	0.43157	0.04003	AM2
			Specify the Necessary Human Resources	SMA5	0.03275	0.46432	0.03599	AM6
			Estimate Financial Resources Needed	SMA6	0.03599	0.50031	0.03275	AM5
		Product Adaptation	Tastes and Preferences	PO2	0.04849	0.54880	0.04849	PD2
			Changes to your Product	PO4	0.02237	0.57117	0.04200	PD8
			HR to cope with Adaptation	PO8	0.04200	0.61317	0.02237	PD4
		Marketing Channels	Other Marketing Channels	MCO3	0.03356	0.64673	0.05355	CC7
			Obstacles to knowing the right channels	MCO4	0.01309	0.65982	0.03356	CC3
			Groups or Networks of Institutions that can Collaborate Identify Channels	MCO7	0.05355	0.71337	0.01309	CC4
IMPROVEMENTS	28.66%	Outputs - Improvements	Performance	REN1	0.04913	0.76250	0.09244	INN3
			Productivity	PRO2	0.07179	0.83429	0.07328	CRE4
			Innovación	INN3	0.09244	0.92673	0.07179	PRO2
			Growth	CRE4	0.07328	1	0.04913	REN1

Based on the results obtained in the previous steps, the following analyses are carried out:

4.1. Analysis of results

Based on the results obtained in the previous steps, the following analyses are carried out:

1) general and block analysis with a Pareto approach, 2) analysis of influences and 3) integrated analysis.

4.1.1. Analysis under the pareto approach.

a) General Analysis: The three conceptual blocks are analyzed to classify the elements according to their participation, from the highest value to the lowest value. To do this, the Pareto approach is used, which according to (Wilkinson, 2006) is based on the idea that a small set of causes contributes to most of the results, following an approximate proportion of 80% to 20%. The priority assigned by the experts is also considered, resulting in three categories. Segment A includes up to 80%, segment B covers 81 to 98%, and the remaining values are classified in segment C. The results of the global analysis are presented in **Table 9**.

Table 9. Global analysis under the pareto approach.

Proportion	Identification	Denomination	Abrev.	Individual Value	Participation	Accumulated Participation	Pareto Ranking
Outpus	Outpus-Improvements	Innovation	INN3	0.09244	9.24%	9.24%	A
Outpus	Outpus-Improvements	Growth	CRE4	0.07328	7.33%	16.57%	A
Outpus	Outpus-Improvements	Productivity	PRO2	0.07179	7.18%	23.75%	A
IPC	Teamwork	Identify Sources of Conflict	TW4	0.06129	6.13%	29.88%	A
ESD	Marketing channels	Groups or Networks of Institutions that can Collaborate Identify Channels	MCO7	0.05355	5.36%	35.24%	A
IPC	Teamwork	Constructive Feedback	TW5	0.05260	5.26%	40.50%	A
Outpus	Outpus-Improvements	Performance	REN1	0.04913	4.91%	45.41%	A
ESD	Product Adaptation	Tastes and Preferences	PO2	0.04849	4.85%	50.26%	A
ESD	Product Adaptation	HR to cope with Adaptation	PO8	0.04200	4.20%	54.46%	A
ESD	Access to Sustainable Market	Sustainable selection criteria	SMA2	0.04003	4.00%	58.46%	A
ESD	Access to Sustainable Market	Estimate Financial Resources Needed	SMA6	0.03599	3.60%	62.06%	A
IPC	Iniciative	Fast Acting	IN6	0.03575	3.58%	65.63%	A
ESD	Marketing channels	Other Marketing Channels	MCO3	0.03356	3.36%	68.99%	A
ESD	Access to Sustainable Market	Specify the Necessary Human Resources	SMA5	0.03275	3.28%	72.27%	A

Table 9. (*Continued*).

Proportion	Identification	Denomination	Abrev.	Individual Value	Participation	Accumulated Participation	Pareto Ranking
IPC	Networking	Timely Information	NW3	0.03158	3.16%	75.42%	A
IPC	Creativity	Novel Ideas	CR6	0.02772	2.77%	78.20%	A
IPC	Critical Thinking	Impact Forecast	CT5	0.02594	2.59%	80.79%	B
IPC	Networking	External Relations	NW4	0.02589	2.59%	83.38%	B
IPC	Iniciative	Conviction	IN4	0.02486	2.49%	85.86%	B
IPC	Teamwork	Attention to others	TW1	0.02261	2.26%	88.13%	B
ESD	Product Adaptation	Changes to your Product	PO4	0.02237	2.24%	90.36%	B
IPC	Iniciative	Task Expectation	IN3	0.01989	1.99%	92.35%	B
IPC	Creativity	New methods	CR8	0.01855	1.86%	94.21%	B
IPC	Networking	Different Types of Ideas	NW1	0.01627	1.63%	95.83%	B
IPC	Creativity	Improve Processes	CR5	0.01349	1.35%	97.18%	B
ESD	Marketing Channels	Obstacles to knowing the right channels	MCO4	0.01309	1.31%	98.49%	C
IPC	Critical Thinking	New Forms of Resolution	CT2	0.00769	0.77%	99.26%	C
IPC	Critical Thinking	Facing Task	CT4	0.00741	0.74%	100.00%	C

From a general perspective, the most relevant elements in the network are those that have been categorized as class A. It is observed that the three elements of Improvements (INN3, CRE4 and PRO2), have more priority for the experts and together represent 23.75% of the total. Likewise, in class A there are three elements that correspond to the strategic objectives of SDE, which indicates that sustainability has a high degree of importance within the network. The remaining elements that make up class A are: one element of improvements (REN1) and five elements of IPC (TW4, TW5, IN6, NW3 and CR6) corresponding to the clusters of Teamwork, Initiative and Creativity. In class B, eight elements of the IPC are presented (CT5, NW4, IN4, TW1, IN3, CR8, NW1, CR5) corresponding to the clusters of Critical thinking, networking, teamwork, initiative and creativity. Finally, in class C, elements of both SDE (MCO4) and IPC (CT2, CT4) corresponding to the critical thinking cluster are shown.

In turn, in **Table 10**, the projected quantifications of the SDE elements are compared with the quantifications obtained at the end of the process. It is observed that the values obtained are within the projected values, which reflects the feasibility of fulfilling what was planned.

Table 10. Projected and obtained quantifications of DSE elements.

Dimensions	Elements	Denomination	Projected Goal	Result obtained	Sustainability Dimension
Access to Sustainable Market	* Sustainable Entry Criteria	SMA2	Decrease 10%	4.00%	Ambiental
	* Specify the necessary Human Resources	SMA5	Increase 2%	3.28%	Social
	* Estimate Financial Resources Needed	SMA6	2%	3.60%	Económico
Product Adaptation	* Tastes and Preferences	PO2	10%	4.85%	
	* Changes in your product	PO4	4%	2.24%	
	* HR to cope with adaptation	PO8	Increase 3%	4.20%	
Marketing Channels	* Other Marketing Channels	MCO3	7%	3.36%	
	* Other Marketing Channels	MCO4	Decrease 7%	1.31%	
	* Groups or Networks of Institutions that can collaborate to identify channels	MCO7	Increase 10%	5.36%	

The same occurs with the projected elements of Business Improvements (see **Table 3**). For example, a goal proposed by the experts is that Profitability is projected at 10% and with the results obtained in the general analysis, a weight of 4.91% is obtained, resulting in being within the range with respect to what was projected. The following **Table 11** shows the projected and obtained values of the business improvement elements.

Table 11. Projected and obtained quantifications of the improvement elements.

Improvements	Denomination	Projected Goal	Result obtained
Profitability	REN1	10%	4.91%
Productivity	PRO2	10%	7.18%
Innovation	INN3	8%	9.24%
Growth	CRE4	6%	7.33%

In summary, it is seen that an effective user interface in a decision support system must be intuitive, visually appealing and capable of presenting complex information in a clear and concise manner. By providing users with the necessary tools to explore, analyze and understand data, these systems can help organizations make more informed and strategic decisions.

b) Analysis by Conceptual Block

b1) In the SDE block, class A is made up of two sustainable strategic objectives (SMA2, SMA6), which refer to the Sustainable Entry Criteria (Environmental) and estimate necessary financial resources (Economic). While the other sustainability objective (Social) is classified in class B (SMA5-Specify the necessary human resources). It can be indicated that the economic and environmental sustainability strategic objectives are of high priority (Class A), while the social sustainability objective is of relative importance (Class B-SMA5). **Figure 6** presents the results of this block, under the Pareto approach.

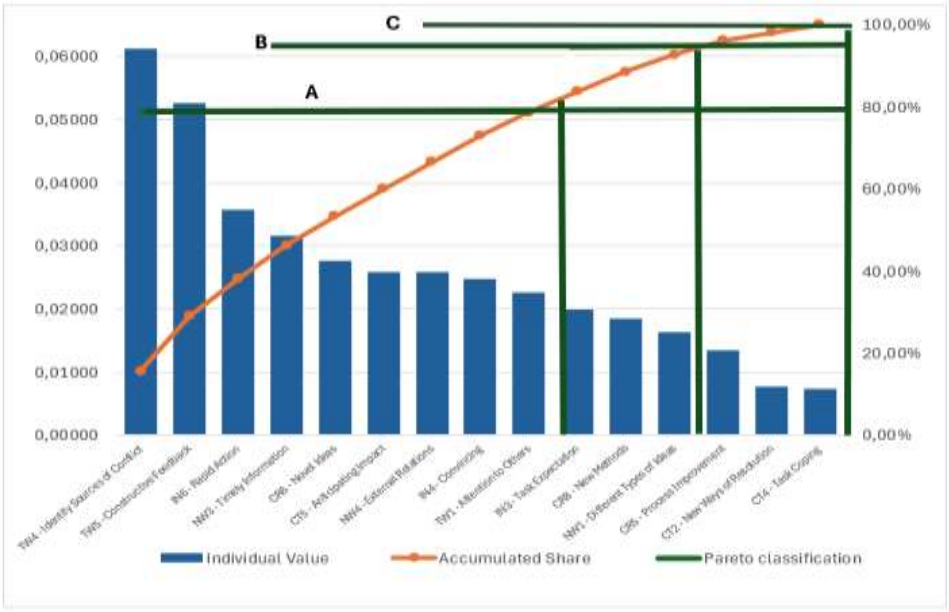

Figure 6. SDE structural block analysis.

b2) In the IPC block, the elements of class A are: (TW4, TW5, IN6, NW3, CR6, CT5, NW4, IN4 and TW1). In this classification, elements from the five clusters are found; however, the cluster that maintains all its elements in class A is Teamwork, which is the competence with the highest priority for the experts. On the other hand, in Class B, the elements of initiative, networking and creativity (IN3, CR8, NW1, CR5) are considered of relative importance for the experts. **Figure 7** shows the results of this block.

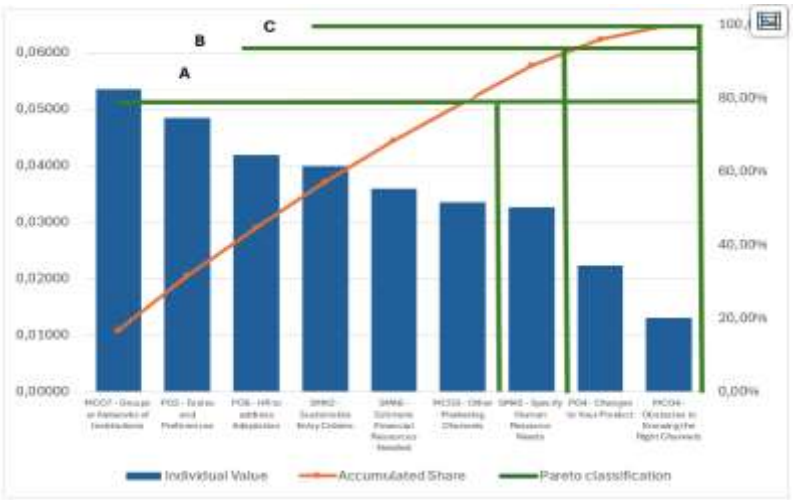

Figure 7. Structural block analysis of personal innovation competencies.

b3) Finally, in the business improvement block, the experts prioritized the elements as follows: i) Innovation, ii) Growth, iii) Productivity and iv) Performance. **Figure 8** shows the results of this block.

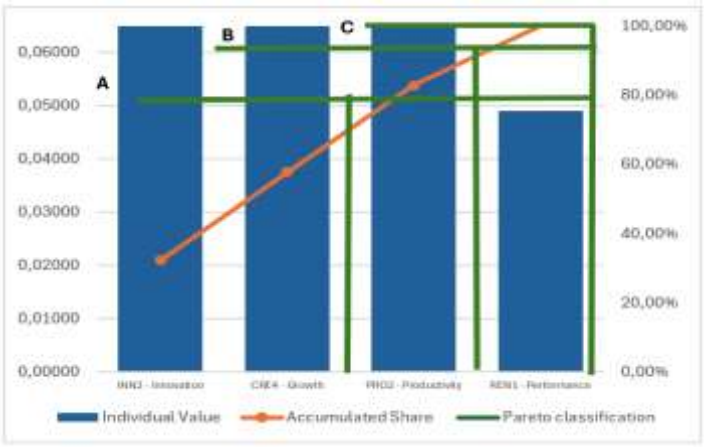

Figure 8. Structural block analysis of business improvements.

4.1.2. Influence analysis

This section details the relationships between the network elements, using the weighted matrix, highlighting the most significant connections that generate a cause-effect relationship for the SDE elements. **Table 12** presents the values obtained for influence analysis.

Table 12. Weighted matrix for the analysis of influences.

		SMA2	SMA5	SMA6	MCO3	MCO4	MCO7	PO2	PO4	PO8
Creativity	CR5	0.08135	0.00000	0.00000	0.00000	0.00801	0.00000	0.00000	0.00761	0.00761
	CR6	0.00000	0.00000	0.00000	0.00000	0.07207	0.00000	0.07539	0.06852	0.00000
	CR8	0.00000	0.08118	0.07288	0.00000	0.00000	0.00000	0.00838	0.00000	0.06852
Critical Thinking	CT2	0.00332	0.00331	0.00297	0.09521	0.06458	0.00359	0.00180	0.01639	0.00295
	CT4	0.00000	0.00000	0.00000	0.01360	0.00000	0.01552	0.00000	0.00000	0.00068
	CT5	0.02985	0.02978	0.02674	0.00000	0.00718	0.06714	0.01623	0.00000	0.01276
Iniciative	IN3	0.00000	0.05579	0.00000	0.02295	0.09273	0.01455	0.00000	0.00000	0.00000
	IN4	0.05522	0.00620	0.00000	0.16062	0.02318	0.00000	0.00769	0.06986	0.00699
	IN6	0.00690	0.00000	0.00000	0.00000	0.00515	0.13095	0.06918	0.00000	0.06288
Networking	NW1	0.00000	0.00602	0.00225	0.00000	0.00000	0.00000	0.00000	0.13703	0.02466
	NW3	0.00000	0.00000	0.00973	0.00000	0.00000	0.05598	0.01508	0.00000	0.00570
	NW4	0.00000	0.05419	0.04208	0.00000	0.05324	0.00800	0.13569	0.00000	0.10668
Teamwork	TW1	0.03928	0.00000	0.03519	0.00000	0.20720	0.00000	0.09449	0.08588	0.01071
	TW4	0.35352	0.00000	0.31674	0.00000	0.00000	0.00000	0.09450	0.08588	0.20058
	TW5	0.00000	0.39199	0.00000	0.00000	0.00000	0.24902	0.09450	0.08588	0.04636
Improvements Outputs	REN1	0.00000	0.01440	0.02121	0.00000	0.04441	0.00000	0.00000	0.01777	0.00985
	PRO2	0.00000	0.24785	0.06362	0.00000	0.00000	0.00000	0.02607	0.05330	0.04262
	INN3	0.31557	0.05268	0.19085	0.03743	0.01027	0.26699	0.23458	0.15990	0.00000
	CRE4	0.00000	0.00000	0.00707	0.33685	0.19216	0.02967	0.00000	0.00592	0.18442

Three types of relationships are presented: i) strong relationships, which have values equal to or greater than 10%, specifically considering the relationships between the elements of IPC and Improvements with the DSE, ii) medium relationships that

have values between 5% and 10%, and iii) weak relationships that have values less than 5%. The strong relationships between the elements of the network are shown in **Figure 9**. It can be observed that the IPC element that maintains the highest priority and relevance for SDE elements is TW4 (Identify sources of conflict) because it has more than two strong relationships with the SDE elements, that is, working on the identification of conflicts allows for the improvement or perfection of the requirements for entering the markets, the improvement of the estimation of financial resources and the human resources to face the adaptation. On the other hand, regarding business improvements, the INN3 element (Innovation) maintains a greater number of relationships with the elements of the SDE, that is, by working on innovation within SMEs, income requirements, the estimation of financial resources, changes in products and groups that collaborate with the identification of marketing channels are improved and perfected.

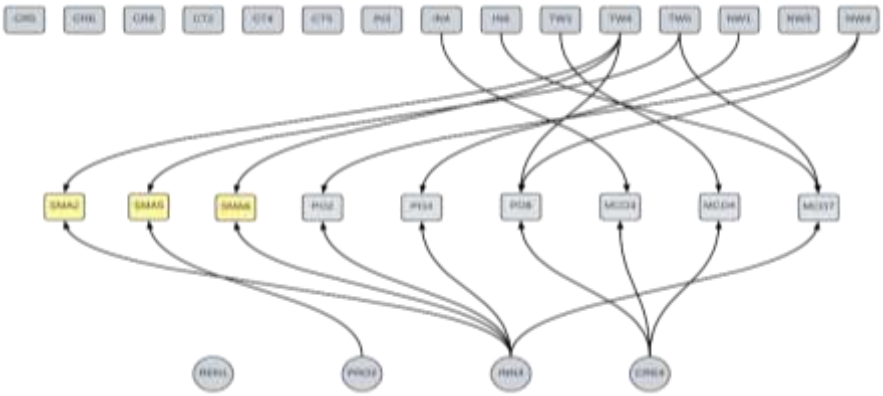

Figure 9. Strong relationships between network elements.

Regarding the elements associated with sustainability, the following relationships can be observed:

In the Environmental Dimension, the SMA2 (Entry into sustainable market) element maintains a strong relationship only with the TW4 element (Identify sources of conflict) of 35.35%. On the other hand, it maintains two medium relationships with the CR5 elements (Process improvement) of 8.14% and with IN4 (Convincing) of 5.52%.

In the Economic Dimension, the SMA6 element (Estimate financial resources) maintains a strong relationship only with the TW4 element (Identify sources of conflict) of 31.67%. On the other hand, it maintains medium relationships only with the CR8 element (New Methods) of 7.29%.

In the Social Dimension, the SMA5 element (Specify human resources) maintains a strong relationship only with the TW5 element (Constructive Feedback) of 39.20%. On the other hand, it maintains three average relationships with the elements CR8 (New methods) of 8.12%, IN3 (Task Expectation) of 5.58% and NW4 (External Relations) of 5.42%.

On the other hand, in **Figure 10**, the average relationships between the elements of IPC with the elements of SDE are presented. It can be observed that the element of IPC that has two relationships with elements of SDE is the element CR8 (New methods); that is, it helps to specify the necessary human resources, estimate financial

resources and human resources to face the adaptation. In the case of Improvements, the element PRO2 (Productivity) stands out and has two average relationships with elements of SDE, that is, it helps to improve and perfect the estimation of financial resources, and the changes generated in the products.

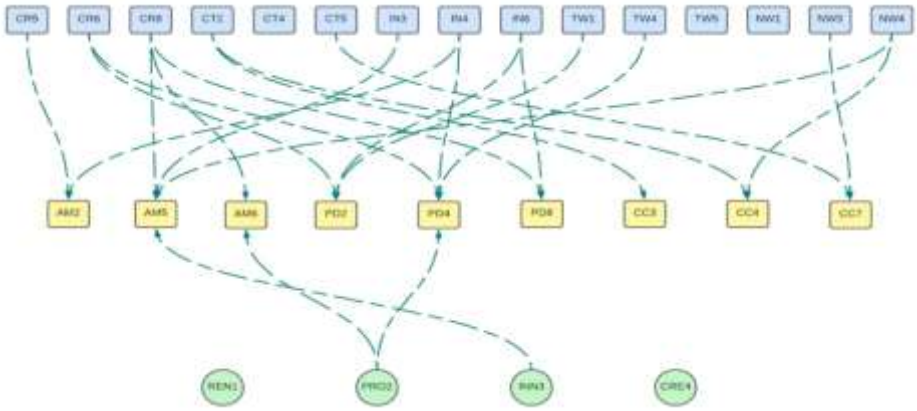

Figure 10. Average relationships between network elements.

4.2. Integrated analysis

This analysis represents the product of combining both the Global analysis and the influence analysis, using a systematic coverage approach mainly focused on business sustainability, since it can reduce the complexity of options to a minimum and provide decision makers with some suggestions, provided they are committed to promoting and achieving the strategic objectives of the SDE. **Table 13** presents in general terms the aspects of the integrated analysis.

Table 13. Integrated analysis.

	GLOBAL ANALYSIS		**ANALYSIS OF INFLUENCES**	
	Sustainability Dimension	**Strategic Objective**	**Strong Relationships**	**Average Relationships**
1	Environmental	SMA2. Sustainable Entry Criteria	TW4	CR5, IN4
2	Economic	SMA6. Estimate necessary financial resources	TW4	CR8
3	Social	SMA5. Specify the necessary human resources	TW5	CR8, IN3, NW4

The results indicate that entrepreneurs should focus on developing and maintaining the teamwork cluster (elements of the IPC) with its elements TW4 (Identify sources of conflict) and TW5 (Constructive feedback), because they maintain strong relationships with the three sustainable strategic objectives (SMA2, SMA6 and SMA5). Likewise, they should focus on developing the elements of the Creativity cluster, such as CR5 (Process improvement), CR8 (New methods), IN3 (Task expectancy), IN4 (Convincing) and NW4 (External relations), because they maintain medium relationships with the three sustainable strategic objectives (SMA2, SMA6 and SMA5).

Concluding, ANP as a decision support system is considered a valuable tool that can help reduce confusion and uncertainty in complex environments such as foreign trade. By providing structured information, analysis and visualization tools, ANP enables decision makers to make more informed and strategic decisions.

5. Discussion of results

This article provides a valuable contribution to the analysis of the interdependence of IC in SDE by developing a methodology based on the ANP. This methodology not only allows us to identify and quantify the strong and weak relationships between both variables, showing that certain elements of the IPC teamwork have a strong relationship (equal to or greater than 10%) with the market access elements of the SDE. It also shows us, according to the experts' perception, those elements that are most relevant from the Pareto approach, in each conceptual block of analysis. Thus, for example, within the block of the IPC, teamwork, creativity and critical thinking are the IPC with the highest weighting that can influence the SDE.

These results are added to the previous studies, such as that of (Boj et al., 2014), which examine intangible assets and their impact on organizational performance. Moreover, this approach provides a global and partial view of the relationships between variables, as expressed in the works that address quality control techniques and sustainable organizational strategic development (Arteaga et al., 2020) or in the measurement of long-term performance using the ANP approach. (Yurdakul, 2003).

The present research uses a structured approach to relate ICP to DSE that complements the current literature: (i) defining organizational improvements or results, generated as a result of applying IPC elements; (ii) model the problem as a decisional ANP network, which can be analyzed at three levels (conceptual blocks, components and elements); (iii) define three types of analysis (global, influences and integrated) of the results to show the impact of the IPC on the SDE in the context of fruit MSMEs.

From a practical point of view, the main contributions of this research are: (i) provide decision makers with additional information to understand to what extent strengthening IPC contributes to achieving the DSE?; (ii) determine which IP are most important when trying to achieve the sustainable strategic objectives of the organization; (iii) show the degree of importance of the DSEs for the organization; (iv) prioritize the elements of the IPC to achieve the most important SDE objectives, indicating which of them the organization should effectively strengthen.

Summarizing, IPCs impact SDE, considered as a driver of continuous improvement that drives companies to be more competitive, innovative and resilient. Likewise, by providing valuable information about the market, customers and internal processes, export performance allows for more strategic and effective decisions, which in turn contributes to greater growth and long-term success.

6. Limitations and future investigation lines

The limitations of this study are related to: (i) the application of the proposed methodology to MSMEs in a specific sector; (ii) The group of experts selected at a given time, from which the Dependency matrix is derived and, therefore, the relationships between the variables. The selection of other members could evaluate these relationships differently, leading to other results; (iii) IPC have been used to relate SDE objectives to sustainability dimensions, while other SDE measurement frameworks could be used.

Future research could: (i) apply the methodology to organizations of other sizes, i.e., large companies; (ii) apply the methodology to service organizations; (iii) use other multi-criteria techniques that incorporate fuzzy elements, such as Fuzzy-ANP.

7. Conclusions

By applying the ANP methodology, the necessary IPC for the SDE of fruit SMEs are identified. The elements of the Teamwork competency are the most relevant, since they allow maintaining the necessary dynamics between workers and managers in the export context. In the global ABC analysis with Pareto approach, the weights of each competency were shown, resulting in the elements of the team competencies, such as identifying sources of conflict with 6.13% and constructive feedback with 5.26%. with greater priority for experts. This facilitates the generation of new and improved ideas for efficient production processes that comply with those international standards and allows improving their marketing logistics processes.

The results of the limit matrix demonstrate the relevance of the IPC elements in the SDE and in the Improvements, since they have an accumulated participation of 39.15% compared to 32.18% of SDE and 28.66% of Improvements. In addition, important connections are established, since the competencies that maintain strong relationships (weight greater than 10%) with elements of SDE are: Identifying sources of conflict (TW4) with three strong relationships from 20% to 30%, Constructive feedback (TW5) with two strong relationships from 2table4% to 39% and External relations (NW4) with two strong relationships from 10% to 13%.

There are relevant relationships between the conceptual blocks, since the IPC element that has a great impact with the SDE is “Constructive feedback” belonging to the teamwork cluster. On the other hand, between SDE and the IPC, the most relevant element is “Income Requirements” belonging to the Sustainable Market Access cluster. Likewise, between DOS Exporter and Improvements, the element that has the most relationship is “Groups that collaborate in identifying channels” belonging to the marketing channels cluster and finally, between business improvements with SDE, the element that has the most relationship is “Growth”.

In conclusion, these companies require entrepreneurial, competent and innovative people, with a high degree of flexibility to adapt to new changes in the business environment and who develop skills associated with innovation to improve their performance and contribute to sustainable organizational development and business improvements, considered as one of the strategic objectives of fruit SMEs. Finalmente, en futuros trabajos de investigacion, se puede aplicar este estudio a otros sectores exportadores, incorporando otras elementos endogenos y exogenos que incidan en el desempeño exportador de las organizaciones.

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