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Fuzzy Analysis of the Strategic Actions of Travel Agencies in Boyacá, Colombia, in a Post-COVID-19 Era

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Abstract: The economic impact of COVID-19 is undeniable, and one of the sectors most affected by this situation was tourism; when departures were canceled and what is known as "The Great Lockdown" began, the activity of this sector was paralyzed. In this regard, knowing which strategic actions must be implemented in order to recover economically is vital. This study aims to identify the importance of the strategic actions of travel agencies in Boyacá following the COVID-19 crisis using aggregation operators and fuzzy techniques. The methodology uses the experton method, Bonferroni's OWAAC method, maximum similarity sub-relationships and Pichat's algorithm, and the relative incidence analysis method to determine the importance of the actions taken. The findings show that most managers' implemented strategic actions, including highlighting financial capacity and marketing (improvement actions and establishing alliances), which were the strategic actions with the highest incidence. These actions identify a focus for activities to reactivate the business and are related to the company's routine operations.

Keywords: fuzzy analysis; travel agencies; post-COVID-19; tourism

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1. Introduction

The tourism sector was one of the sectors that was most affected by the COVID-19 crisis. For example, in China alone, canceling the New Year's festival in 2020 is estimated to have resulted in a loss of USD 140 billion [1]. This situation denotes the sector's vulnerability to crises and natural disasters, so decisions are changing and must be adapted to meet market needs, triggering importance in communication, coordination, and cooperation among the different areas in the organization [2–5]. Colombia was not indifferent to these changes, and several sectors and sub-sectors were affected by the COVID-19 pandemic. In the case of Boyacá, among the most affected operators were travel agencies due to their dependence on large operators with a business model based on the commercialization of tourism plans. Boyacá's travel agencies are classified as MSMEs, most of which are led by their founders and owners and have connections in the marketing of regional, national, and international tourism. Their economic activity is based on commissions from hotel chains, airlines, and other operators involved in the marketing of tourist packages and airline tickets, and advice on visa procedures, among others. Likewise, they have a close relationship with the client, where the travel consultant is synonymous with trust and support. With the isolation caused by the COVID-19 pandemic, travel agencies' way of operating changed drastically as they delocalized their activity, laid off personnel, and migrated towards the use of technologies to be able to support themselves, always seeking to minimize costs. These actions lead to rethinking the operation and considering new alternatives to better develop the business.

Given the change in the behavior of tourists due to the risks experienced, it is necessary to rethink the strategies used by companies to meet the new needs of customers [6,7]. An example of this is security within tourist destinations in terms of the sanitary measures that were implemented in the place being visited and the purchase of health insurance, and in general, giving tourists a sense of security, which became vital for a place to be considered an attractive tourist destination [8]. Also, the deterioration of natural tourist destinations has generated important changes in tourism processes, since, if the preservation and conservation of ecosystems are not continued, the continuity of the sector is at risk [9,10]. Consequently, sustainability, in this specific case, is not an element of competitive advantage, but a necessity for the survival of tourism activities [11,12].

Travel agencies had to be reorganized in light of changes due to the COVID-19 pandemic, as they found themselves having to lay off extremely large numbers of workers or receiving complaints from clients due to not being able to reimburse them for their trips due to the difficulties presented [13,14]. As a result of this, a reconfiguration of business processes was needed. Utilizing the Internet to implement different services while continuing to be chosen by clients who wish to carry out the process by themselves led travel agencies to make changes in their strategies in order to follow the new direction in the industry. This included considering the ways in which travel agencies interact with their clients, how to include sustainability in their processes and destinations, or including new digital experiences [15,16]. For example, Abtrate et al. [16] identified the need to improve promotional activities, generate more tourist packages identifying the needs and desires of the consumers, and improve networking and synergy with other actors of the value chain. Also, Pinto and Castro [17] evaluated online travel agencies and identified that price, promotions, online reviews, and photos have an important impact on a consumer's decision.

This study aims to identify the importance of the strategic actions of travel agencies in Boyacá following the COVID-19 crisis using aggregation operators and fuzzy techniques. The methodology used is the experton method, Bonferroni's OWAAC method, maximum similarity sub-relationships and Pichat's algorithm, and the relative incidence analysis method to determine the importance of these actions. Forty-two travel agency managers in Boyacá were surveyed at the time of the post-COVID-19 economic reactivations. The findings showed that most managers' strategic actions included highlighting financial capacity and marketing (improvement actions and establishing alliances). They also showed that considering the business model is of almost no importance. It is evident that routine activities are the most important, strategic activities are moderately important, and activities for change have a lower relevance.

In this sense, the novelty of this article is based on two main aspects. The first is the use and combination of sophisticated techniques that allow the parameterization of the subjective data obtained (semantic valuations) in order to obtain an interrelation and relative incidences in highly complex contexts. The second is related to the contrast of the theoretical considerations on the actions of strategic maneuver with the real facts, highlighting that the aspirations that entrepreneurs have do not necessarily correspond to the actions that they execute to ensure continuity of the business. Finally, being able to analyze tourism agencies for their high permeability in times of crisis shows the interdependence of the extrinsic factors of the organization (business environment) and the intrinsic factors of the manager (decision-maker).

This manuscript is organized as follows: Section 2 develops the theoretical framework for business decision making under uncertainty and includes maneuvers and strategy in business. Section 3 presents the methodology, considering methods and variables used in this document. Section 4 presents the results of the travel agency case in Boyacá, Colombia. Section 5 summarizes the main conclusions of this article.

2. Theoretical Framework

Organizations face constant challenges in the market in which they operate, so their leaders must make decisions that allow the organization to continue despite adverse circumstances and even grow in those moments. Consequently, the choices and strategies made are fundamental to understanding the concepts that are analyzed and explored, such as strategy, decision making, and uncertainty in decision making. The following section briefly reviews the wave of business decisions under uncertainty and strategy as an action maneuver.

2.1. Business Decision Making under Uncertainty

The recent business dynamics represent an interactive system with low stability and constant changes that generate an uncertain market environment, with limited predictability of the results of the actions to be taken. In this sense, establishing strategies and quick decision making to face the market situation are fundamental to ensure business continuity. This decision making can be supported by techniques and tools that allow the consideration of soft and subjective aspects linked to the possibility of the occurrence of an event and the subjectivity of the approximate reasoning.

Business decision making under circumstances of uncertainty is identified because the alternatives and feasible outcomes are unknown. Furthermore, it can only be assessed based on subjective estimates [18], where access to information is limited and environmental conditions are changing. Another characteristic of this decision is that valuations and assumptions are highly subjective, whereas intuition and attitude are notorious for completing missing information and making logical constructs about reality [19]. Intuition plays a vital role in decision making. According to Michael and Pratt [20], intuition is an ability that allows effortless information processing and learning from the experiential, the understood, and the natural. Similarly, Michael & Porter [20] highlight how intuition is considered to be a viable means of assisting managers and leaders in making quick and accurate decisions in organizations, allowing them to complete the missing information to perform tasks with great complexity.

Hence, facing adverse conditions in business dynamics requires combining knowledge, experiences, information, data, and sensations that guide the decision-maker's attitude. In this sense, probabilistic and statistical tools are handy in dealing with datasets, and tools that capture perceptions regarding the possibility and chaining of approximate reasoning represented in ratings and semantic valuations are very valid. Thus, these new insights have allowed the development of sophisticated tools and methods for decision making under uncertainty.

It is important to point out that decision making in uncertain environments delivers valid results from subjectivity and reasoning, which is infused with fuzzy logic [21,22]. This analyzes the concept of fuzzy sets, allowing the use of classical Boolean sets in a multiple-valued logic. Fuzzy sets are a good methodology to deal with the subjectivity of class memberships [22,23]. Thus, decision making in a fuzzy environment is described as a decision process in which the constraints, but not precisely the system under control, are fuzzy. This means that the objectives and/or constraints compose the type of choices, whose boundaries are not visibly defined [24,25].

Based on these premises, their reasoning is incorporated in business studies, where formal, random, and uncertain data are present. Likewise, subjectivity plays a leading role in business decision making due to the high level of uncertainty generated by factors that cannot be controlled or predicted. Thus, this decision making is carried out in complex environments where its consequences are unknown [26]. This urges a rational process that requires data analysis, determining the quality and volume of information when making a judgment and being as assertive as possible [27]. However, the incompatibility among systems, information, and information processing makes combining data and establishing reliable results from such analyses complex. Therefore, the right combination of information, techniques, and tools will allow business decision-makers

to generate maneuvering actions to respond to the pressures of the environment and uncontrolled factors.

2.2. Maneuver and Strategy in Business

The leader within an organization is often the strategic decision-maker [28,29], where their bounded rationality conflicts with the rigid constructs of strategy that are modified by the pressure of factors that the organization does not control. In fact, each strategy put forward must respond to different needs or situations that arise in the organization and create and maintain superior performance through value creation [30,31]. Success or failure is the focus of companies. The decisions and strategies it develops must reflect the company's result, considering its success as achieving a competitive position that leads to superior and sustainable financial performance [32,33]. Likewise, the leader of the organization is tested in terms of their intellect and attitude, and they must be willing to make decisions even when in environments with many uncertain aspects to consider. Decisions must also be made without losing sight of the focus of the role that develops, since it goes beyond the supervision of individual trades and focuses on the approach of the strategy indicating and informing the approach of the company and advocating for a meshing of the activities of the entire organization. Hence, they must consider the different strategic aspects of the organization, financial capacity, business model, marketing, human talent management, formalization, and sustainability.

2.2.1. Financial Capacity

A company's financial capacity plays a fundamental role in developing its organizational objective. Depending on the financial area within the value chain, this can generate an advantage or disadvantage. According to Porter and Valaskova, and Kliestik and Gajdosikova [31,34], financial management in the support activities within the company's infrastructure creates value, and its operations provide the opportunity to analyze each decision and result. Likewise, determining the indebtedness capacity and searching for financing options become an opportunity to leverage the required investments in which cash is unavailable [31,35]. It is important to consider in this process the conditions offered by banks, such as the different types of credits, interest rates, and quota management; all have advantages and disadvantages, depending on the line of financing. Also, a shift from traditional profit-only companies to companies that include the environment, governance, and social (ESG) aspects in their results makes the information analysis and decision process more complex [36].

Similarly, the development of activity will require assets to support the project. Such tangible and intangible assets are essential in the company as physical and often financial assets—that is, working capital [33,37]. Another aspect is the proper management of information, and legal and accounting control, for its analysis and in considering opportunities for improvement against the financial movements of the organization. Hence, good financial management contributes significantly to making strategic decisions for profitability and value generation [38,39].

2.2.2. Business Model

The business model is a compendium of stories that explain how the company works. It is integrated with developing a strategy through the connection between the formulation and execution of a strategy to achieve the objectives to overcome barriers and generate a positive result for the organization [40,41]. Likewise, the organization's business model should aid in determining business objectives that consider aspects such as the product, market, customers, suppliers and competition, and the environment for action [42,43]. A suitable definition of the action plan helps to determine an action plan to position an organization by strengthening each action they develop through their strategic plans, and to consider the constant changes in the environment and market competitors. Therefore, the business model helps to connect the needs and opportunities of the environment with

the company's capabilities. For example, the design of a circular business model that includes phases to reuse materials and energy is one of the most restorative designs to keep products, components, and materials at their maximum utility. This serves as a good formulation for the current scarcity of resources, allowing for helping the regeneration of the environment [44,45].

2.2.3. Marketing

Within the value chain, the primary activities include marketing, sales, and services, which play a fundamental role in the company since they reflect the commercialization strategy proposed by the organization [31,46]. Marketing contemplates the activities associated with providing means by which buyers can acquire products or services, where trust and a desire to buy are relevant. The materialization of marketing strategies can be reflected in sales activities, where channels, the sales force, incentives, and investment help in revenue generation and value creation, such as in the case of green marketing [47]. Green marketing serves as an effort to design, promote, price, and distribute products or services that will not harm the environment [48]. Finally, service is found throughout the pre- and post-sales process, where the customer values the accompaniment during the purchase and the support after the purchase, increasing the value of the product or service. Thus, the service area becomes a clear differential for customers to buy and prefer a company's products and services.

2.2.4. Human Resources Management

Competitiveness in the market is a challenge that companies aspire to overcome, understanding that a determining factor is the management of human talent. This is because human resources management is responsible for cultivating skills and motivating employees, as well as managing the cost of hiring and training the organization's personnel [31,49]. A team of employees with the right working conditions and constant motivation can contribute ideas that positively impact an organization's competitiveness. Likewise, recruitment activities, hiring, development, training, compensation, and effective communication channels for employees are fundamental to carrying out the processes and execution of tasks [31,50]. As a relevant aspect, there is an understanding of the cost in the development of tasks, where human talent management must establish strategies that protect the organization's profitability, for example, knowing the amount invested in recruitment when referring to staff turnover. Furthermore, a new term referred to as green human resources management has been developed, which refers to the importance of sustainable practices and preservation of human resources practices and functions [51].

2.2.5. Formalization

Structuring an organization requires compliance with established norms, rules, and laws, and governs the segment where the company will develop its business. The role of the government is determinant in establishing strategies and competing in the market [31,52]. The policies implemented can hinder or facilitate market entry, as well as reduce or increase the barriers to entry. Likewise, regulations establish limits for the operation of a company. Some of these restrictions are exemplified in the requirement of licenses and restrictions on foreign investment, for example, the protection of intellectual property through patents, the protection of technology created to avoid imitations, the protection of the environment, and those that facilitate market entry through subsidies and incentives, either directly or indirectly, through sponsorship of research or financing for all companies that meet the requirements, thus reducing economies of scale [53,54].

Similarly, the government should encourage the formalization of organizations, where the expected result is the construction of a business fabric that can participate in and benefit from the advantages of the market and government programs. Here, it is important to highlight that if regulations only focus on fiscal and regulatory issues, leaving aside promotion and incentive policies, the number of formalized companies will be lower,

which will feed the fabric of the submerged economies, with effects on the productivity and competitiveness of sectors and industries. Another important effect is the slow progress towards innovation and sophistication of the economy since products and services would lack clear value offers, thus reducing participation in other markets. That is why the rules of the game set by the government must be transparent, the state must be effective without corruption, and its focus must be directed towards promoting and developing industries with clear rules.

2.2.6. Sustainability

Developing a business idea is linked to guaranteeing sustainability in different aspects, given that it considers the economic contribution that can be made to the national economy and the social, environmental, and national welfare impact. The sustainability of the company is related to the competitive advantages that it has managed to generate in the market, and the government is a determining factor encouraging awareness. The organizations wish to obtain a profit hand in hand with a social contribution, generational equity, and citizen inclusion, in such a way that rules and laws must be established that generate control over the socioeconomic and environmental decisions that are developed in the market [54,55].

Similarly, sustainability on a global level has taken a course focused on environmental care and conservation, since the operation of organizations involves exploiting resources that are not always renewable. Elkington and Loviscek [56,57] proposed the triple bottom line, or Triple Bott, and they argued that companies should prepare three bottom lines: the first being the company's profits; the second being the accounting of the people that measures whether the company is socially responsible in its operation; and the third being the accounting of the planet, where environmental responsibility is measured. Freeman and Malik et al. [58,59] suggested that the ability of the company to generate sustainable wealth over time, and thus represent long-term value, is related to its stakeholders, being any group or individual that can affect or is impacted by the achievement of the objectives of the company. The wheel of change, where sustainability must be integrated into the basis of the business, is key, since if it is not carried out in this way and is isolated, it will not achieve real change towards sustainable development. Consequently, it proposes to develop seven principles in the sustainability strategy. Therefore, sustainability is a strategic issue for companies and should be considered in the plans, operation, and interpretation of the value, not only economic, but social and environmental [60,61].

2.2.7. The Effect of COVID-19 on Travel Agency Strategies

The COVID-19 pandemic had a great impact on the global tourism sector, with a decrease of 72% in foreign travelers around the globe from January to October 2020 [62]. As the main requisite is that people travel to a place, with the great confinement, tourism activity was almost completely stopped [63]. In this sense, strategies for countering or recovering from this pandemic disaster are needed [64], not only for a specific company, but the proposition must include a coordinated effort among different agencies [65].

Among the already existing research, Wang and Le [62] studied Vietnamese travel agencies and found that strategies that are related to corporate social responsibility behavior improve company performance. Furthermore, among the main aspects to consider in the strategy are those related to the community, environment, and history. On the other hand, Aburumman [66] analyzed the meetings, incentives, conferences, and events (MICE) of the travel industry in the United Arab Emirates, identifying the use of outsourcing, as a survival and competitive strategy, to be a way of reducing operational costs. Also, the establishment of modern communication systems and promoting digitalization will help to maintain competence.

3. Methodology

To meet the objective of this study, tourism agency managers located in the department of Boyacá were considered from the database of the Ministry of Commerce, Industry, and Tourism of the Republic of Colombia. Agencies were required to be registered with the National Tourism Registry and be active with the Chamber of Commerce for the year 2021, where they are classified into wholesale travel agencies, operating travel agencies, and travel and tourism agencies, and a single agency can have these three classifications. A total of 42 active agencies in the department of Boyacá carried out strategic actions to surpass the COVID-19 crisis. For data collection, an instrument was designed with an endecadary semantic scale, which allows the introduction of a nuanced valuation between 0 and 1 as levels of truth in the notion of incidence [67–69]. The instrument was constructed on the basis of the theoretical approaches provided by Porter [31,33,38,54,70–72], where the theoretical structures for its formulation analysis were determined, defined as strategic action scopes (SASs): strategic management, strategic consulting, financial capacity, business model, marketing (improvement actions), marketing (establishing alliances), marketing (alliances objectives), human resources management, formalization, and sustainability. The validation of the instrument was carried out in a qualitative way due to the nature of the study, which has high subjective content, where validations by experts, by contents, and by theoretical structure were considered [73]. For the treatment of the dataset, the experton method, Bonferroni OWAAC, maximum similarity sub-relations, Pichat's algorithm, and relative incidence analysis method were used. The experton method allows the main dataset to undergo two analyses. First is the maximum similarity sub-relations importance of strategic actions scope, which is determined using Bonferroni OWAAC, maximum similarity sub-relations, and Pichat's algorithm. Second is the relative incidence analysis of strategic actions, which is determined using the dominant eigenvalue, dominant eigenvector, square fuzzy matrix, and fuzzy composition.

Now, we shall briefly review some basic concepts regarding the experton method, Bonferroni OWA, maximum similarity sub-relations and Pichat's algorithm, dominant eigenvalue and eigenvector, the square fuzzy matrix, and fuzzy composition.

3.1. Experton Method

The experton method considers the characteristics of fuzzy sets and possibility theory, which allow the aggregation of the opinions of different experts using a cumulative distribution function based on linguistic expressions valued on an endecadary scale [0, 1] [69].

$$\forall a \in E : \left[a^{j*}(a)\right], \left[a_{j*}(a)\right] \subset [0,1], \tag{1}$$

where $\subset$ is set inclusion, and j represents the expert.

The experton method complies with the characteristics of horizontal and vertical non-strict increasing monotonicity, where level 0 is excluded, which will always be 1.

Therefore,

$$\forall \alpha \in [0,1] : \alpha_1(a) \leq \alpha_2(a) en\ \alpha_1[\alpha_1(a), \alpha_2(a)], \tag{2}$$

$$\forall \alpha\alpha' \in [0,1] : a' > a \Rightarrow (\alpha_1(a)) \leq \alpha_1 a', \alpha_2(a) < a_2(a'), \tag{3}$$

$$(a = 0) \Rightarrow (a_1(a) = 1, a_2(a) = 1). \tag{4}$$

The considerations to be taken into account when using the experton methods are (a) the linguistic expressions must be valued between $\alpha \in [0, 1]$; (b) the opinions will be considered as group opinions from the individual opinions; (c) the process must apply the law of complementary accumulation; and (d) the final result will be the aggregation in a single final opinion, considering the distribution and trend of the subjective opinions.

3.2. Maximum Similarity Sub-Relations Using Bonferroni OWAAC and Pichat's Algorithm

The ordered weighted average adequacy coefficient (OWAAC) operator [74,75] combines the adequacy coefficient (AC) [76,77] and ordered weighted average (OWA) operator. This operator is improved to be associated with Bonferroni means, which permits the interrelation between two elements or datasets [78]. As such, the formulation of the BON-OWAAC operator is the following.

Definition 1. *A BON-OWAAC distance for sets* $X = \{x_1, x_2, \ldots, x_n\}$ *and* $Y = \{y_1, y_2, \ldots, y_n\}$ *is determined by*

$$BON - OWAAC(\langle x_1, y_1\rangle, \ldots, \langle x_n, y_n\rangle) = \left(\frac{1}{n}\sum_{k=1}^{n} D_k^r OWAAC_{w_i}\left(V^i\right)\right)^{\frac{1}{r+q}}, \quad (5)$$

where $OWAAC_{w_i}\left(V^i\right) = \begin{pmatrix} \frac{1}{1-\mathrm{n}}\sum_{\mathrm{j}=1}^{\mathrm{n}} \mathrm{D}_j^q \\ \mathrm{j} \neq \mathrm{k} \end{pmatrix}$, *with* $\left(V^i\right)$ *being the vector of all* $1 \wedge \left(1 - x_j + y_j\right)$, *except* $1 \wedge (1 - x_i + y_i)$, *and* w_i *being an* $n - 1$ *vector* W_i *associated with* α_i *whose components* w_{ij} *are the OWA weights. Likewise,* D_i *is the kth smallest individual distance* $[1 \wedge (1 - x_i + y_i)]$.

3.3. Maximum Similarity Sub-Relations and Pichat's Algorithm

Maximum similarity sub-relations and Pichat's algorithm, proposed by Gil-Aluja [79], allow us to obtain similarity and Boolean matrices. Consequently, the relative adequacy coefficient (AC) was used. The AC allows calculation of the differences between two elements to neutralize the result when the comparison yields a real element superior to the ideal one [76,77]. The formulation is defined as follows:

$$\widetilde{D}(\langle x_1, y_1\rangle, \ldots, \langle x_n, y_n\rangle) = \frac{1}{n}\left(\sum_{\mathrm{j}=1}^{\mathrm{n}} [1 \wedge (1 - x_i + y_i)]\right), \quad (6)$$

where x_i and y_i are the ith arguments of the sets X and Y, respectively.

Pichat's algorithm [80] enables the formation of groups with similar characteristics, displaying maximum similarity relations in subtransitive graphs, known as maximum similarity sub-relations. These graphs are fuzzy, reflexive, and symmetric. They are obtained through a transitive closure. Therefore, the similarity relation $\widetilde{G}$ should be obtained to obtain G:

$$\widetilde{G} = \cup \left(\widetilde{G} \circ \widetilde{G}\right) \cup \left(\widetilde{G} \circ \widetilde{G} \circ \widetilde{G}\right) \cup \ldots, \quad (7)$$

The disjunctive nature of the maximum similarity sublattice from graph $\widetilde{G}$ is achieved by fulfilling the properties of reflexivity, symmetry, and transitivity when making the transitive closure [68,81]. To obtain the similarity matrix, use the formula $\left[\widetilde{G}\right] = \left|1 - \left[\widetilde{D}\right]\right|$, where $\widetilde{D}$ represents the dissimilarity matrix. This method is applicable to finding the Boolean relation of an alpha set, where alpha is equal to n. With the given matrix, we perform a Boolean sum between rows $\mathrm{P_k}: \; k + \mathrm{C_a}.\mathrm{C_b}.\ldots.\mathrm{C_n}$ with the products set. This process excludes rows with one, and if the product of the sum is equal to that of the summand, only one of them is considered $a \dot{+} a = a$. Likewise, if there exist similar summands in the equation, the one with the largest number of elements is eliminated $a \dot{+} a.b.c = a$. Finally, it searches for the complement of each summand to obtain the sub-relations of maximum similarity [79,82].

3.4. Relative Incidence Analysis Method

To establish the dominant eigenvalue, the dominant eigenvector, the fuzzy composition, and the relative incidences, the results of the experton are used.

Definition 2. *A dominant eigenvalue* $E_{va} : [0, 1]^n \times [0, 1]^n \rightarrow [0, 1]$ *has an associated limit weighting vector* $\lambda_1^{(c)}$*, with* $w_j \in [0, 1]$ *and* $\sum_{j=1}^{n} w_j \geq 1$*, then:*

$$E_{va}(\langle x_i, y_k \rangle, \ldots, \langle x_n, y_m \rangle) = \sum_{k=1}^{n} maxw_j(\mu_{ik} * y_k), \tag{8}$$

where x_i *and* y_k *represent the jth largest of sets X and Y, respectively.*

Therefore,

$$\lambda_1^{(c)} = E_{va}max, \tag{9}$$

Definition 3. *A dominant eigenvector* $V^{(c)}$ *has an associated weighting vector* $\lambda_1^{(c)}$*, with* $w_j \in [0, 1]$ *and* $\sum_{j=1}^{n} w_j \leq 1$*, such that*

$$V^c(\langle x_i, y_k \rangle, \ldots, \langle x_n, y_m \rangle) = \sum_{k=1}^{n} \frac{(\mu_{ik} * y_k)}{max(\mu_{ik} * y_k)}, \tag{10}$$

which is then normalized:

$$N^{(c)} = \frac{V^{(c)}}{\sum V^{(c)}}, \tag{11}$$

Thus, the relative importance is presented within the importance matrix $\left[\widetilde{R}\right]$ *for each characteristic, which is defined by*

$$\left[\widetilde{R}\right]^* = N^{(c)} * \left[\widetilde{R}\right], \tag{12}$$

where $\left[\widetilde{R}\right]$ *is the ith argument of the set* X.

Therefore, the square fuzzy matrix is generated by the resulting matrix $\left[\widetilde{R}\right]^*$.

3.4.1. The Square Fuzzy Matrix

The square fuzzy matrix [79] is useful for representing direct and indirect relationships. The relationship of causality is defined by considering the degrees of each relational level. As a result, these comparative relationships are displayed in a square fuzzy matrix.

$$\left[\widetilde{R}\right]^* = \begin{array}{c} \Gamma \\ a_1 \\ a_2 \\ \vdots \\ a_i \end{array} \begin{array}{cccc} a_1 & a_2 & \cdots & a_i \\ (x_1, y_1) & (x_1, y_2) & \cdots & (x_1, y_i) \\ (x_2, y_1) & (x_2, y_2) & \cdots & (x_2, y_i) \\ \vdots & \vdots & \cdots & \vdots \\ (x_i, y_1) & (x_1, y_2) & \cdots & (x_i, y_i) \end{array}, \tag{13}$$

Here, $\left[\widetilde{R}\right]^*$ represents the *i*th arguments of the sets X and Y.

3.4.2. Fuzzy Composition

Fuzzy composition in an uncertain environment depicts the degree of membership and interconnection among elements within a given fuzzy set or two or more in a fuzzy relationship. This concept has been extensively studied and is discussed in the literature [79,83].

Definition 4. *A fuzzy composition* $R \circ S$ *is a fuzzy relation* $U \times W$*, associated with the characteristic functions* $\mu_R(x, y)$ *and* $\mu_S(y, z)$*, which are defined by the composition max–min:*

$$\mu_{R \circ S}(x, z) = \vee_{y \in V}(\mu_R(x, y) \wedge \mu_s(y, z)), \tag{14}$$

where $(x, z) \in (U, W)$.

Therefore, by convolving the fuzzy matrix $\left[\widetilde{R}\right]$ *with itself, it can obtain the fuzzy relative intensity. The convolution ratio's behavior can be observed over time steps.*

Definition 5. *The max–min composition of matrix* $\left[\widetilde{R}\right]$ *is determined by*

$$\begin{array}{c}[\widetilde{R}] \circ [\widetilde{R}] = [\widetilde{R}]^2 \\ [\widetilde{R}] \circ [\widetilde{R}] \circ [\widetilde{R}] = [\widetilde{R}]^2 \circ [\widetilde{R}] = [\widetilde{R}]^3,\end{array} \tag{15}$$

Therefore,

$$[\widetilde{R}] \circ [\widetilde{R}] = [\widetilde{R}]^n \circ [\widetilde{R}] = [\widetilde{R}]^{n+1} \tag{16}$$

When $\left[\widetilde{R}\right]^n = \left[\widetilde{R}\right]^{n+1}$*, the process is stopped.*

3.5. Variables and Matrices

The research variables to be analyzed are defined based on the survey of travel agencies, categorized as travel and tourism agencies, operating travel agencies, and wholesale travel agencies. A survey of 42 agencies active with the national tourism registry was carried out to obtain the information, characterized by one or even the three categories of agencies surveyed. These agencies are in the department of Boyacá. The respondents were categorized with the following profiles within the travel agency: 9 of them were the administrators of the agency, 3 of them were the directors of the agency, 22 of them were the managers, 3 of them were identified as being the owner of the agency, and 5 of them were the legal representatives of the agency. Likewise, the survey was applied considering ten actions: strategic management, strategic consulting, financial capacity, business model, marketing (improvement actions), marketing (establishing alliances), marketing (alliances objectives), human resources management, formalization, and sustainability (see Table 1).

Table 1. Action scope variables.

Cod.	SAS	Cod	Specific SAS
SM	Strategic Management	Ac_1	Redefine objectives.
		Ac_2	New business opportunities.
		Ac_3	Search for support and advice.
		Ac_4	Modify business processes.
		Ac_5	Soliciting customer support.
SC	Strategic Consulting	Ac_1	Improve customer management.
		Ac_2	To prepare human talent.
		Ac_3	Prospect for new business opportunities.
		Ac_4	Development of biosafety protocols.
		Ac_5	Optimize technology.
FC	Financial Capacity	Ac_1	Portfolio management.
		Ac_2	Cost reduction.
		Ac_3	Debt reduction and negotiation.
		Ac_4	External financing.
		Ac_5	Deferral of investments.
		Ac_6	Sale of assets.
SM BM	Strategic Management Business Model	Ac_1	Redefine objectives.
		Ac_1	Diversify service portfolio.
		Ac_2	Investment in digital platforms.
		Ac_3	Training plans with a new operational focus.
		Ac_4	Investment in biosafety protocols.
		Ac_5	Improve and optimize the use of public services.

Table 1. *Cont.*

Cod.	SAS	Cod	Specific SAS
MIA	Marketing (Improvement Actions)	Ac_1	Sales volume affected during pandemic.
		Ac_2	Selling only one product in business portfolio.
		Ac_3	Sales focused on domestic destinations.
		Ac_4	Credit systems for customers.
		Ac_5	Digital platforms for marketing.
MEA	Marketing (Establishing Alliances)	Ac_1	Tourism companies.
		Ac_2	Suppliers.
		Ac_3	Customers.
		Ac_4	Trade other than tourism.
		Ac_5	Associations and foundations.
		Ac_6	Mayor's and Governor's Office.
MAO	Marketing (Alliances Objectives)	Ac_1	Generate growth in sales.
		Ac_2	Facilitate financing.
		Ac_3	New means of marketing.
		Ac_4	Change in marketing direction.
HRM	Human Resources Management	Ac_1	Level of employment affected.
		Ac_2	Distribution and flexibilization of working hours.
		Ac_3	Platforms that minimize prespecialty.
		Ac_4	Guarantees in contracts and salaries to consolidate human talent.
		Ac_5	Hiring new personnel for economic reactivation.
FO	Formalization	Ac_1	Agencies legally constituted and registered with governmental entities.
		Ac_2	Regulation and implementation of fines for informality.
		Ac_3	Prioritization of government aid for legally constituted agencies.
		Ac_4	Government actions favored.
		Ac_5	Training by the government in favor of formalization.
SU	Sustainability	Ac_1	Implement sustainability processes.
		Ac_2	Sustainability requirements by the government.
		Ac_3	Pollution reduction programs.
		Ac_4	Equity, equality, and inclusion programs.
		Ac_5	Sustainability programs to improve customer perception.

Source: Own elaboration.

The valuation level was established between 0 and 10 and described under semantic values as follows (see Table 2). This scale allowed the capture of the expert opinion of each leader, considering both semantic and numeric representation for information processing using the methods presented below. Semantics has a scale that considers the perceived importance of each action. Numeric valuation is the numerical representation of the semantic scale, which enables factorization to obtain values within [0, 1] to use fuzzy methods.

Table 2. Semantic and numeric valuation.

Semantic	Tiny	Far to	Almost	Partly	Fewer	Equally	More	Quite	Almost	Practically	Huge
Numeric	0	1	2	3	4	5	6	7	8	9	10

Source: Own elaboration.

4. Results

The following results show, on the one hand, the importance of the action scope and the relative intensity of these actions for the sector's recovery after the crisis.

4.1. Maximum Similarity Sub-Relations Importance of Strategic Actions Scope

The BON-OWAAC operator, maximum similarity sub-relations, and Pichat's algorithm were used to determine the importance of SASs using the experton matrix. Combining

these methods allowed us to establish continuous interrelationships, compare differences among the different actions, and obtain maximum similarity sub-relations. For this purpose, we used the experton matrix (see Table 3) and the weight vectors of the experts (see Table 4), which were obtained from the questionnaire.

Table 3. Experton matrix.

Dimension	Tiny	Far to	Almost	Partly	Fewer	Equally	More	Quite	Almost	Practically	Huge
SM	5.00	4.69	4.571	4.357	4.262	4.19	3.667	3.262	2.69	1.762	1.119
SC	5.00	4.929	4.286	3.095	2.452	2.333	2.095	1.833	1.286	0.905	0.667
FC	5.00	4.095	3.857	3.5	3.119	2.881	2.524	2.167	1.881	1.452	0.714
BM	5.00	4.714	4.595	4.548	4.333	4.214	3.548	3.167	2.929	2.333	1.476
MIA	5.00	4.333	4.048	3.762	3.429	3.262	2.952	2.667	2.214	1.857	1.357
MEA	6.00	5.119	4.595	3.405	2.619	2.476	2.333	2.238	1.881	1.357	0.81
MAO	4.00	3.905	3.905	3.857	3.81	3.762	3.5	3.214	2.786	2.333	1.571
HRM	5.00	4.571	4.357	4.214	4.024	3.833	3.143	2.952	2.643	2.119	1.333
FO	5.00	4.905	4.881	4.69	4.452	4.31	4.048	3.619	3.452	3.214	2.595
SU	5.00	4.905	4.833	4.762	4.619	4.5	4.119	3.786	3.405	2.762	1.976

Source: Own elaboration.

Table 4. Weight vectors of the experts.

	W_1	W_2	W_3	W_4	W_5	W_6	W_7	W_8	W_9	W_{10}
Weight vectors	0.129	0.183	0.035	0.016	0.024	0.016	0.059	0.089	0.100	0.342

Source: Own elaboration.

The experts considered the three vectors with the highest weight, starting with W_{10} (sustainability), being the one with the highest weight at 0.342, followed by W_2 (strategic consulting), with a vector weight of 0.183, and W_1 (strategic management), with a vector weight of 0.129.

This first analysis showed the importance given to each of the SASs by determining the maximum similarity sub-relations by simultaneously comparing the continuous interrelation according to the experts' criteria. In this regard, Table 5 shows the matrix with the maximum similarity sub-relations between each SAS. These results are expressed in maximum terms, i.e., the highest value is the SAS in its interrelationship. Thus, for clarity, Figure 1 shows the degree of importance of each SAS among themselves. Another significant aspect to highlight is that, in the data provided, in the maximum similarity sub-relationship importance of the SAS matrix (Table 3), the SASs with an important weight are those related to "tiny" or "far" in the 10 SASs. This has an impact on the results and their interpretation. Still, the methods used had a significant compensation by allowing a continuous and simultaneous comparison of the relationships between each SAS.

Table 5. Maximum similarity sub-relationship importance of SAS matrix.

	SM	SC	FC	BM	MIA	MEA	MAO	HRM	FO	SU
SM		0.733	0.715	0.716	0.717	0.716	0.729	0.742	0.717	0.717
SC	0.733		0.702	0.703	0.705	0.704	0.709	0.704	0.723	0.707
FC	0.715	0.702		0.703	0.705	0.704	0.703	0.702	0.721	0.704
BM	0.716	0.703	0.703		0.704	0.704	0.701	0.72	0.703	0.705
MIA	0.717	0.705	0.705	0.704		0.705	0.703	0.705	0.705	0.705
MEA	0.716	0.704	0.704	0.704	0.705		0.703	0.705	0.705	0.706
MAO	0.729	0.709	0.703	0.701	0.703	0.703		0.715	0.715	0.716
HRM	0.742	0.704	0.702	0.72	0.705	0.705	0.715		0.721	0.722
FO	0.717	0.723	0.721	0.703	0.705	0.705	0.715	0.721		0.704
SU	0.717	0.707	0.704	0.705	0.705	0.706	0.716	0.722	0.704	

Source: Own elaboration.

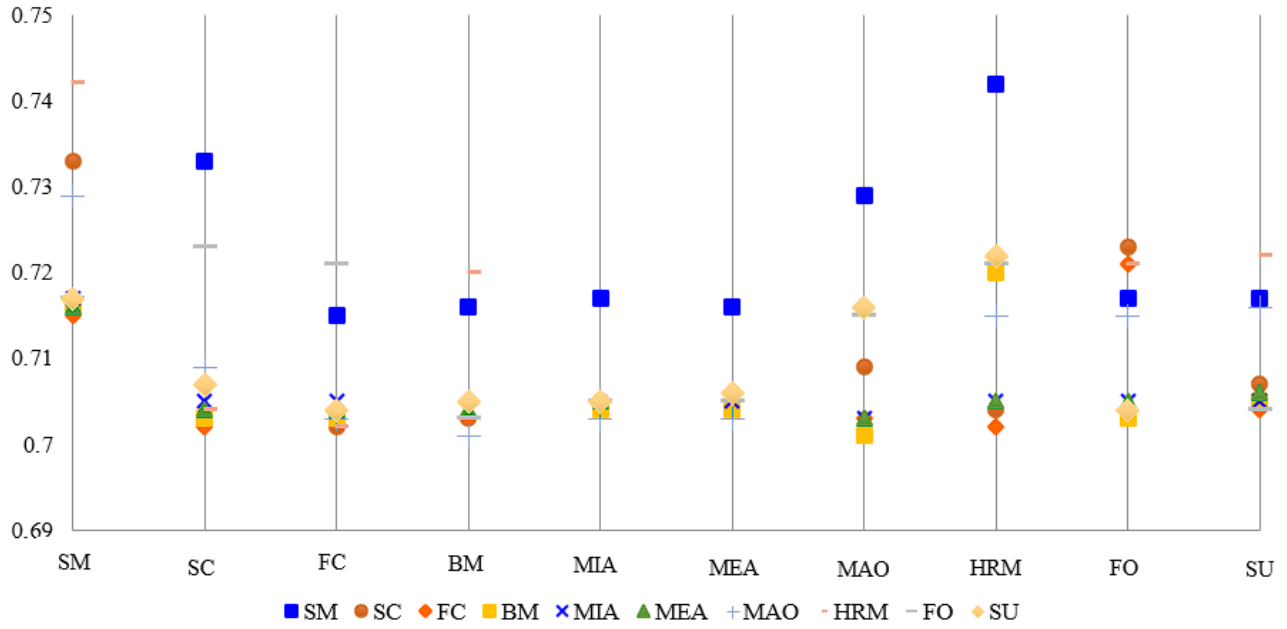


Figure 1. Maximum similarity sub-relationship importance of SAS matrix. Source: Own elaboration.

Figure 1 shows the SAS respondents selected as being the most important in their planning and intention to reactivate the agencies economically. Indeed, the figure shows the interrelationship of one SAS with the others to be achieved. In general terms, it was observed that SM was the most relevant SAS among them, and it had a significant weight, but a maximum similarity sub-relationship importance. Due to being so distant from the others, it might disarticulate with the other SASs, i.e., it might "think strategically", but it may "act reactively and intuitively". It can also be observed that the SASs with the strongest interrelationship, i.e., maximum similarity sub-relationship importance, were MIA and MEA, which were characterized by specific improvement actions and establishing alliances. They were followed by BM and SU, which sought to improve the businesses through the diversification of their portfolios and their openness to offer programs that make sustainable sense. Finally, it was observed that the SASs with a great dispersion in their interrelationships were MAO and HRM, given that their orientation was based on the strategic change in marketing to increase sales and income. This was also due to the retention of personnel. These are aspects that are linked to the same configuration of the industry, where the agencies depend on the dynamics of transportation (land, air, and sea) and the hotel chains to be able to form attractive offers for people and sell tourist packages.

In conclusion, it can be observed that for the leaders of travel agencies, the MS is important. Still, there may be a lack of coordination due to the very nature of the industry, where its location in the value chain generates a large pendency and a narrow margin for maneuver to improve marketing activities, and it is difficult to have the necessary people for the operation due to low income because of insufficient sales. Thus, the survival of the agencies might depend on the offers and travel packages that the large tourist chains can offer them for sale.

With the analysis of the level of importance of the SASs and their interrelation to be achieved, it is relevant to know how intense the management of the SASs is at the time of being executed and to achieve the accomplishment of the actions. In this sense, we sought to identify the relative intensity of each SAS when they are implemented.

4.2. Analysis of the Relative Incidences in the SAS Management Process

For the construction of the analysis of the relative incidences in the SAS management process, the following process is presented (Figure 2).

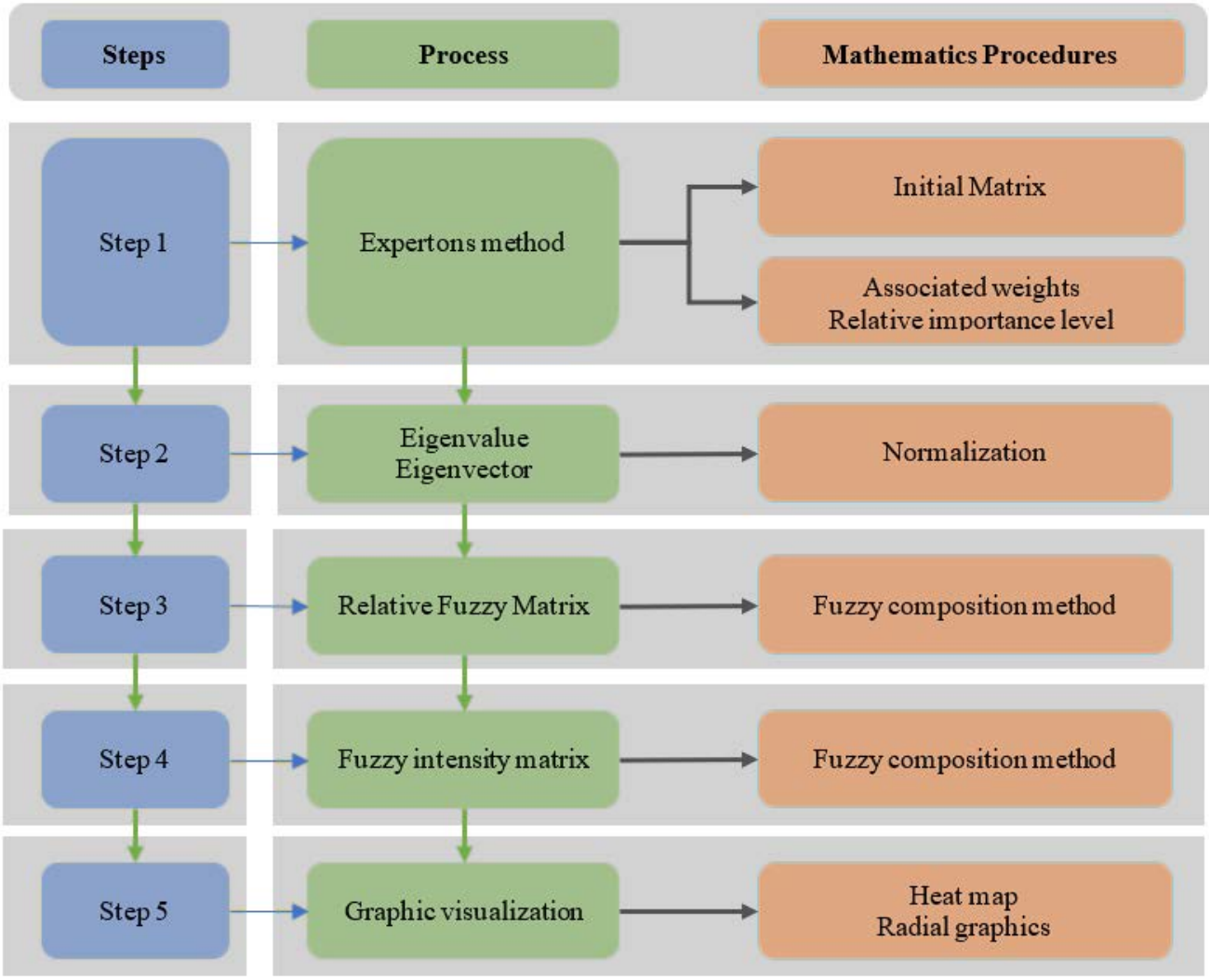


Figure 2. Steps to establish relative incidences. Source: Own elaboration.

Step 1. Considering the experton matrix (see Table 3), the relative importance level is determined, composed of the importance level and the associated weight vectors (see Table 6).

Table 6. Relative level of importance.

	SM	SC	FC	BM	MIA	MEA	MAO	HRM	FO	SU
LI_{SAS}	3.597	2.626	2.835	3.714	3.171	2.433	5.764	3.472	4.106	4.061
W_{SAS}	0.116	0.116	0.173	0.147	0.105	0.105	0.105	0.177	0.135	0.147
RLI_{SAS}	0.416	0.303	0.491	0.547	0.334	0.256	0.607	0.615	0.555	0.595

Source: Own elaboration. LI_{SAS}: Level of importance; W_{SAS}: Weight of each SAS; RLI_{SAS}: Relative level of importance of SASs.

Step 2. After that, (E_{va}) and (V^c) values are obtained using a different RL_{ISC} value (see Table 7). This table shows each SAS's value of (Eva) and (Vc).

Table 7. Relative level of importance.

	SM	SC	FC	BM	MIA	MEA	MAO	HRM	FO	SU
E_{va}	39,571	11,228	22,872	57,324	21,773	13,932	45,883	52,663	78,550	81,461
$V^{(c)}$	1.000	0.207	0.456	1.496	0.485	0.292	1.074	1.284	2.266	2.324
N	0.092	0.019	0.042	0.137	0.045	0.027	0.099	0.118	0.208	0.214

Source: Own elaboration. E_{va}: Dominant eigenvalue; $V^{(c)}$: Dominant eigenvector. Note that the dominant eigenvector has been normalized (N) to establish the weight of each SAS.

Step 3. E_{va} and V^C values obtain a fuzzy relative matrix for each SAS (FR_{MSAS}) and intensity relative matrices for each SAS (IR_{MSAS}). FR_{MSAS} is obtained using the experton matrix (see Table 3) and $V^{(c)}$ normalized. This matrix allows the ambiguity and fuzziness of the immediate SASs to be addressed, from tiny to huge. The data show that closer to 0 indicates that the relationship is weak, and closer to or surpassing 1 indicates that the relationship is stronger. In this case, it is noteworthy that the stronger relationship is close to tiny and far (which considers the perceived importance) (see Table 8).

Table 8. Fuzzy relative matrix in the SAS management process.

	Tiny	Far to	Almost	Partly	Fewer	Equally	More	Quite	Almost	Practically	Huge
SM	0.459	0.431	0.420	0.400	0.392	0.385	0.337	0.300	0.247	0.162	0.103
SC	0.095	0.094	0.082	0.059	0.047	0.044	0.040	0.035	0.024	0.017	0.013
FC	0.209	0.171	0.161	0.147	0.131	0.121	0.106	0.091	0.079	0.061	0.030
BM	0.687	0.648	0.632	0.625	0.596	0.579	0.488	0.435	0.402	0.321	0.203
MIA	0.223	0.193	0.180	0.168	0.153	0.145	0.132	0.119	0.099	0.083	0.060
MEA	0.161	0.137	0.123	0.091	0.070	0.066	0.063	0.060	0.050	0.036	0.022
MAO	0.395	0.385	0.385	0.381	0.376	0.371	0.345	0.317	0.275	0.230	0.155
HRM	0.590	0.540	0.514	0.497	0.475	0.452	0.371	0.348	0.312	0.250	0.157
FO	1.041	1.021	1.016	0.977	0.927	0.897	0.843	0.753	0.719	0.669	0.540
SU	1.068	1.047	1.032	1.017	0.986	0.961	0.879	0.808	0.727	0.590	0.422

Source: Own elaboration.

Step 4. The relative intensity matrix in the SAS management process (IR_{MSAS}) is obtained using the max–min composition under FR_{MSAS} (Table 9). According to Blanco-Mesa et al. [83], the max–min composition allows the simulation of the relationship evolution quickly by a dynamic process associated with incidence and influence.

The relative intensity IR_{MSAS} can be represented in a color scale, which shows the relative incidence of each SAS according to the importance at the time of being managed by the leaders of the travel agencies. This color scale shows the intensity of the incidences, where warm colors show a higher intensity of the incidence, and green colors show a lower intensity of the incidence (see Table 10). Within the warm colors, the SASs BM, FO, and SU stand out because they are in ranges of low importance in management (0 to 3 or tiny to partly). These results show that they are considered to be of low importance when managed, which is very noticeable in Figure 3 in radial 1. The next SAS sets with a more subdued quality color mark are HRM, SM, SC, and MAO. These focus essentially on the strategic execution aspects to improve the agencies' economic activity and personnel management. As mentioned in the maximum similarity sub-relations importance analysis, the survival of the agencies might depend on the offers and travel packages that the large tourist chains can offer them for sale, which establishes a challenge for the agencies since they must redefine company objectives and new business opportunities, seeking support and advice, modifying business processes, and soliciting support from customers. Likewise, it is essential to improve management with the clients, train and prepare the human talent of the available agency, prospect new business opportunities, develop biosecurity protocols, and optimize the implementation of technology. In this sense, radial 2 shows that they must quickly implement these SASs to reactivate more effectively and adapt to the new conditions. Finally, there is a lower incidence, but greater importance, in their management

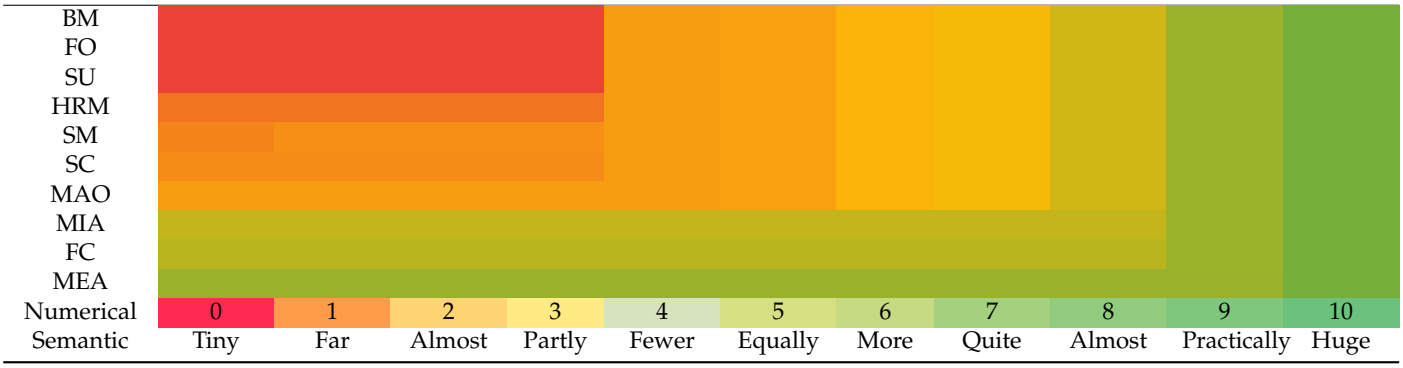
of the SASs, such as MIA, FC, and MEA. These can be considered as the sustainers of the agencies, since they keep the business afloat by valuing alliances that allow them to increase sales, financing facilities and providing a new means of commercialization. Likewise, by the affectation of the sales volume during the pandemic, the sale of a single product in the agency's portfolio resulted in the prioritization in the sale of national products vs. international destinations, credit systems for end customers, and the use of digital platforms to carry out the marketing process. Radial 3 shows this stability in the management and importance of these SASs.

Table 9. Relative intensity matrix in the SAS management process.

	Tiny	Far to	Almost	Partly	Fewer	Equally	More	Quite	Almost	Practically	Huge
SM	0.459	0.431	0.431	0.431	0.392	0.385	0.337	0.3	0.247	0.162	0.103
SC	0.437	0.437	0.437	0.437	0.392	0.385	0.337	0.3	0.247	0.162	0.103
FC	0.209	0.209	0.209	0.209	0.209	0.209	0.209	0.209	0.209	0.162	0.103
BM	0.625	0.625	0.625	0.625	0.392	0.385	0.337	0.3	0.247	0.162	0.103
MIA	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.223	0.162	0.103
MEA	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.161	0.103
MAO	0.395	0.395	0.395	0.395	0.392	0.385	0.337	0.300	0.247	0.162	0.103
HRM	0.497	0.497	0.497	0.497	0.392	0.385	0.337	0.300	0.247	0.162	0.103
FO	0.625	0.625	0.625	0.625	0.392	0.385	0.337	0.300	0.247	0.162	0.103
SU	0.625	0.625	0.625	0.625	0.392	0.385	0.337	0.300	0.247	0.162	0.103

Source: Own elaboration.

Table 10. Relative incidence IR_{MSAS} in management process.



Source: Own elaboration.

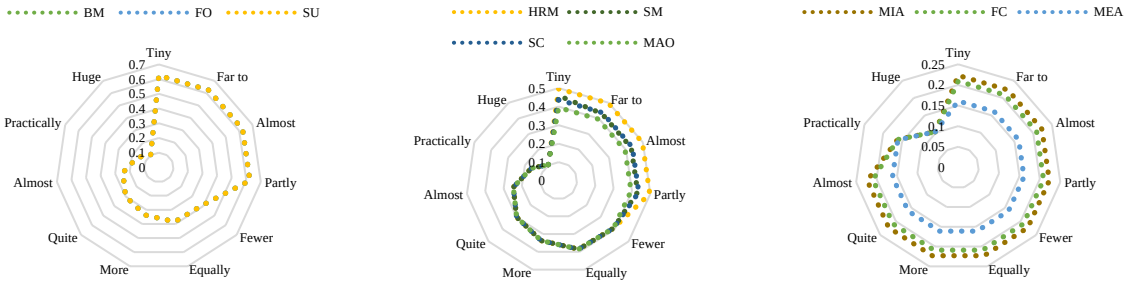


Figure 3. Graphical representation of relative incidence IRMSAS in management process. Source: Own elaboration.

5. Discussion

Using the fuzzy and information aggregation methods allows us to analyze the level of relationship, importance, and intensity of the SASs by considering the opinions of the travel agency managers in the Boyacá department. Table 11 shows the rating of the importance of the SASs around the three elements considered. These were the maximum

sub-relationships, the relative importance, and the relative intensity to find a pattern of the concrete actions taken by the travel agencies after the COVID-19 crisis using the three levels of low, moderate, and high, considering the max–min process. It should be noted that the maximum sub-relationships allow us to observe the importance of the interrelationships of each action with the others. The relative importance allows for observing how important the executed actions are for each manager. The relative intensity allows observation of the incidence of its importance in its execution. Additionally, the interpretation of importance and intensity should be viewed with a pessimistic attitude, i.e., having a high rating is less important, and having a lower rating is more important.

Table 11. Convergence and divergence of the executed SASs.

	SM	SC	FC	BM	MIA	MEA	MAO	HRM	FO	SU
Sub-relation	L	M	H	H	H	H	M	M	L	L
Relative Importance	M	L	L	M	L	L	M	M	H	H
Intensity	M	M	L	H	L	L	M	M	H	H

Source. Own elaboration: H: High; M: Medium; L: Low.

When considering the three analyses, convergences can be observed in each action. FC, MIA, and MEA coincide in that their sub-relation of importance is high, and their importance and intensity are low, i.e., their coupling with the other activities is significant for the manager at the time of prioritizing among the others. MAO and HRM are moderate, indicating that the actions executed had a constant medium execution. Similarly, SM and SC have moderate–low levels (two moderate and one low). For SM, the sub-relation of importance is low, and its importance and intensity are moderate, i.e., its coupling with the other activities is important, as it is important for the manager to prioritize them at a moderate level. For SC, the sub-relation of importance and its intensity are moderate, and their importance is low, i.e., it is considered important, coupled with the other activities, and their execution is moderate. FO, SU, and BM have high levels. FO and SU coincide in that their importance sub-relationship is low, and their importance and intensity are high, i.e., their SAS is unimportant. The sub-relation of importance for BM is high, and its significance and intensity are moderate and high.

Another important characteristic of the results is that activities related to the organization's day-to-day activities, such as FC, MIA, and MEA, have a high relative incidence (see Figure 3). In this sense, to maintain business continuity, it is important to seek the best methods of financing that will allow access to the resources necessary to operate [31], and to control and monitor accounts to make improvements in the financial movements of companies. Also of importance are the improvement actions in marketing, where the cognitive capacity of the decision-maker and the understanding of their perception, emotion, and criteria are key to making such a decision [84]. Finally, the relational capital that managers have to establish for business alliances is important in negotiating collective strategies in their interest [85]. However, when we see those activities with lower results, it is observed that they are FO, SU, and BM, which are related to deeper activities and organizational changes, such as the issue of formalizing or carrying out sustainability activities. In this sense, in order to generate the necessary changes in the agencies in the medium and long term, they must consider that the business model and the development of a strategy have a connection between formulating and executing a strategy, managing to integrate aspects that, in the daily life of the organization, are complex. However, if the strategy is proposed according to the objective business model, barriers can be overcome, and a positive result for the organization can be generated [41]. Likewise, formalization should respond to government policies that should encourage the creation of companies and allow a better market articulation through trust by having clear rules to be complied with [54]. Finally, sustainability should be an issue to be managed among stakeholders, considering the multiple impacts of the actions and strategies proposed [58], seeking a

balance among economic, social, and environmental aspects [56,61]. On the other hand, MAO, HRM, SM, and SC have moderate results, identifying that this group involves mainly strategic activities. Thinking strategically about the organization should be an essential activity for the execution of the activities that guide the decisions of managers, where the factors of the business environment and the internal factors of the agencies can be considered with a holistic vision and adaptability. Likewise, strategic decision making considers factors such as experience, knowledge, environment, and uncertainty as elements that shape the aspirations and attitudes of managers to face the present and the future. Finally, the management of people from the strategic point of view should be assumed as an advantage when providing a service such as tourism, where there are differential factors affecting the degree of customer satisfaction. Thus, employees have valuable information and knowledge of the customer, which raises the need to polish customer service and provide tools to those employees who can generate that differentiation with respect to the competition.

This information is relevant because, in general, we can see three groups of data. This illustrates the importance they have, depending on the speed of response that each of these activities needs, activities related to routine activities being those with the highest result and being those that suppose important changes in the structure of the organization with worse results.

6. Conclusions

The objective of this paper was to identify the importance of strategic actions in travel agencies in a post COVID-19 era. The study was carried out with travel agencies in Boyacá, Colombia, because these types of enterprises experienced a large number of problems with sustaining themselves during the pandemic era, and, because of that, some changes were needed to remain in business. To obtain the information, a survey of 56 questions was constructed, and this was completed by 42 travel agencies. The information was aggregated using different fuzzy techniques, such as the experton method, the Bonferroni OWAAC, and Pichat's algorithm.

Among the main results, it was possible to visualize three different groups where the activities related to finance and marketing had the highest relative incidence. This was in contrast to the activities related to organizational transformation, such as the business model, formalization, and sustainability. With this information, it is possible to assume that the travel agencies were focused on survival in the short term, because the SASs that were related to important changes in the company obtained the lowest results. This situation coincides with what the literature tells us: that many companies sought new ways to survive [86,87]. And even though the effects of the pandemic on the tourism sector are still continuing, by the year 2023, many activities have been reactivated. Therefore, marketing activities to win back customers and the proper use of financial resources are the elements that entrepreneurs of the tourist agencies view as being the most relevant to be able to compete in terms of the new realities of the market [88,89].

The findings of this study consider several implications; the first focuses on the use of fuzzy methods that allow the parameterization of the subjective possibilities for the continuity of a business in times of crisis. Moreover, it is evident that there are differences in what is thought, what is written, and what is executed when strategic planning is carried out. This may lead to a rethink regarding the postulates of strategy, since its process is not linear and symmetrical, but unequal and asymmetrical, and there is a great dependence on the extrinsic factors of the organization and the intrinsic factors of the manager (decision-maker). It is also considered that the use of these tools can help small entrepreneurs to evaluate their actions with a clear strategic orientation for complex scenarios and business aspirations. Regarding limitations, the scope of the population was a limitation of this study. During the pandemic, many agencies disappeared because they did not have the necessary resources to sustain themselves, which has led to a reduced number of surveyed

companies that allow extrapolation of the results, and there is a need to replicate this study in other tourist regions of the country.

In terms of future research, analysis of different actors in the tourism industry will be carried out [90,91]. This will include obtaining information and strategic actions that can help small and medium enterprises (SMEs). Improving their results and adapting to new market realities is vital because they comprise the most important segment of companies in most countries [92,93]. Finally, because of the subjectivity of the perception of managers and owners of companies, additional extensions of aggregation operators and fuzzy methodologies are proposed, such as the inclusion of heavy [94], induced [95], logarithmic [96], linguistic [97], or prioritized [98] operators.

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