



Theoretical proposal of a methodology for the analysis of business risks using processes and fuzzy logic in the Cuban tourism sector

Propuesta teórica de una metodología para el análisis de los riesgos empresariales por procesos y lógica difusa en el sector turístico cubano

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Abstract

The usefulness of the risk management process in companies in the Cuban tourism sector depends largely on the successful design of tools that facilitate the prevention and detection of risks that could derail the strategic objectives of the company. The little use of methods and tools in the tourism industry in Cuba that allow the treatment of uncertain information on the management of operational financial risks and that facilitate their evaluation, constitute elements where studies carried out so far offer unexploited gaps. In this sense, the objective is to propose a methodology for operational financial risk management with a process management approach and the use of fuzzy logic allowing the transfer of common language, subjective, imprecise and in many cases not quantifiable, to a formal mathematical language.

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Keywords: fuzzy logic; risk management; process management

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Resumen

La utilidad del proceso de gestión de riesgos en las empresas del sector turístico cubano depende en gran medida del diseño exitoso de herramientas que faciliten la prevención y detección de riesgos que puedan entrar en contraposición con los objetivos estratégicos de la empresa. La poca utilización de métodos y herramientas en la industria del turismo en Cuba que permitan el tratamiento de la información incierta en materia de gestión de riesgos y que facilite su evaluación, constituyen elementos donde estudios realizados hasta el momento ofrecen brechas sin explotar. En tal sentido el objetivo que se fija en el presente trabajo es proponer una metodología de gestión de riesgos con un enfoque de gestión por procesos y lógica difusa que permita trasladar el lenguaje común, subjetivo, impreciso y en algunos casos no cuantificables, a un lenguaje matemático formal.

Código JEL: C10, G60, M15

Palabras clave: lógica difusa; gestión de riesgos; gestión por proceso

Introduction

In Cuba, risk management and process management are not incipient activities, but given the constant transformations in the economy and current monetary policies, it is necessary to have tools that contribute to the improvement of state activity and thus increase the benefits and satisfaction of the clients (Rodríguez Fajardo, 2022).

Amid the complex international economic environment in which the Cuban economy is developing, transforming uncertainty into measurable risks is the challenge faced by Cuba in the 21st century, which has been a turning point and a challenge for risk managers, hence the need for and importance of developing instruments that facilitate risk management in Cuban companies that contribute to the decision-making process in terms of reducing the impact of risks. Concerning the previous approach and as stated by Barcellos de Paula and Gil Lafuente (2018)(p.63), "any problem located in the field of uncertainty is susceptible to being treated through the theory of fuzzy subsets since as time goes by, it is becoming increasingly feasible to introduce, in formal schemes, mechanisms of thought such as sensations and numerical opinions." Thus, the fuzzy logic technique has been selected for the treatment of business risks, which is the objective of the research.

Current legislation in Cuba includes the principles and requirements that characterize risk management in Cuban companies. However, in some cases, they have not been applied with a systemic approach and incorporated as necessary elements within the general management process of business organizations.

Although Resolution No.60/2011 on Internal Control in Cuba sets out the general indications for the management and prevention of risks, and establishes the bases for their identification and analysis,

it does not internalize the different types of risks and the methodology to be used for their identification and evaluation (Ramos Crespo et al., 2013).

The research is a theoretical study and focuses on the field of tourism, specifically on the tourist destination of Varadero, due to the importance of this category for the Cuban economy in terms of foreign exchange earnings and as a source of employment.

The reasons that justify this research are the results obtained in previous studies carried out in the Varadero Tourism Pole that highlight the inconsistencies in the market data due to the loss of liquidity that affects the valuations and the parameterization of the risk model linked to the change in risk appetite and the extreme volatility of the market manifested in all asset classes (Rodríguez Fajardo, 2021b). On the other hand, there is a lack of understanding by the management and workers of the Varadero Tourism Pole of the potential risks involved in simplifying operational processes and failing to obtain quantitative results in the analysis that would translate into correct decision-making. In the same vein, the possibility of exploiting fuzzy logic in quantifying business risks in the Varadero Tourism Pole will facilitate the modeling of a general indicator that measures the behavior of operational risk and makes its evaluation possible (Rodríguez Fajardo, 2021a).

All this is linked to the deficiencies in identifying the risks associated with the processes that operationalize the fundamental activity of the company, hence the loss of sight of the essential elements for correct decision making. Accordingly, improving the quality of internal processes closely related to the identification and timely treatment of risks that could threaten the objectives set, so as to improve service and increase revenues, is a priority. Based on what has been stated so far and the importance of the current problems in the area of company risk management in Varadero, manifested by the scarcity of tools for risk management and quantification, the objective of the research is to propose a methodology for company risk management with a process management approach and fuzzy logic that contributes to the improvement of the company management system and the treatment of uncertain and subjective information in the process of risk assessment in the Varadero tourist resort.

Literature review

Risk management

In the epistemological field, the concept of risk has undergone different semantic displacements even to the present day. It emerged in a scattered fashion, but from 1500, with the introduction of the printing

press, it spread in commercial and legal language and at the end of the twentieth century, it became a key concept in sociology (Brito Gómez, 2018).

Risk management is a moving component of good management practices that has strengthened internal organizational control over the years. Although the topic of risk and risk management is not new, its complexity has changed. Guidelines, regulations, and pronouncements of leading business organizations and institutions have emerged, demanding that managers and executives modify their management practices to include and expressly recognize them (Hernández & Dopico, 2017).

Regardless of its size, every organization should seek to identify the risks that generate adverse effects on the achievement of its objectives or opportunities that can be taken advantage of; to this end, it is necessary to structure in an orderly and systematic manner the steps to follow so that risk management generates value, is part of each of the processes, is considered in decision making, and considers the uncertainty factor. All this is with the aim of understanding and proposing responses or action plans against the analyzed risk, orienting its contribution toward continuous improvement (Gómez Betancourt et al., 2020).

Company risk management plays a very important role in adapting new organizational management policies; therefore, current executives increasingly demand to use the information as a management tool in the different aspects of current organizations. Hence, within the framework of these demands, organizations in their different stages require executives who are increasingly prepared and adaptable to the environments surrounding them. Thus, company risk management is a management tool of great importance, and the research field is more effectively focused when managing the information generated by the different organizations, to make available to executives the different methodologies, analyses, and results of company risk management in the world (Hasper Tabares et al., 2017).

From the business point of view, risks can have different classifications, like financial and economic risks. These can be understood as the probability of occurrence of financial actions linked to the execution of production processes and the market, which may harm the operation of the company, its results, workers, and the external environment, meaning an adequate perception and science of risk that makes it possible to assess the consequences of the finance and credit actions for the company (Barzaga Sablón et al., 2018).

Despite the intense debate about the effectiveness and relevance of risk management among finance academics, its practice has spread and evolved over the last six decades (McShane, 2018). Risk management finds its main enemy in decisions based on information from past events; accordingly, applying the fuzzy technique means that companies obtain results that enable projections into the future. Fuzzy logic makes it possible to know and apply fuzzy numbers not located in the financial analysis. It

improves decision options and mitigates risks by providing data that directly affect the appropriate decision-making (Saldaña & Guamán, 2019).

In response to the constant changes companies are going through, caused by internal and external factors, methods were developed to provide a global and strategic vision of organizations and their environment. These efforts generated various control approaches that promoted a new management culture in all types of organizations and served as a platform for various definitions and control models at the international level, such as Cobit, Candbury, COCO, COSO I, COSO II (Sanchez Sanchez, 2015), COSO III, and COSO IV, among others.

Building on the COSO (2017) criteria, it is understood that company risk management can be called both an art and a science. It enriches the management dialogue by adding perspective to the strengths and weaknesses of a strategy as conditions change and indicates how well a strategy fits with the mission and vision of the organization. It makes it possible for management to feel more confident that they have examined alternative strategies and considered the input of those in their organization who will implement the selected strategy.

Management by process

A significant part of analyzing business risks is played by identifying them, considering the different processes involved in the business activity. These are considered the most important and widespread elements in the management of innovative companies, especially those that base their management system on total quality. Processes are considered the operational basis of most organizations and have gradually become the structural basis of many companies (Zaratiegui, 1999).

Processes are an orderly and logical sequence of transformation activities, starting from inputs to achieve program results, which are delivered to those who have requested them, the clients of each process (Zaratiegui, 1999).

On the other hand, Barrios Hernández et al. (2019) define process management in the organization as identifying objectives to design and develop actions that integrate a set of control, management, and supervisory measures to guide activities toward organizational objectives and goals, always considering the needs of clients and aligned with their expectations.

By considering the processes necessary for producing products or providing services, companies acquire a clearer vision of the tasks and activities which are really necessary and how they interact with each other. This perspective facilitates a better understanding of the processes and the progressive achievement of more efficient results (9001, 2015), coupled with the timely identification of the risks that may threaten each process.

The process-based approach is based on the idea that "companies are only as efficient as their processes are" (Amozarrain, 1999). The experiences and benefits recorded by some countries in the implementation of process management indicate an increase in the effectiveness and efficiency indicators in the management of public services (Alarcón Barrero & Sánchez Vignau, 2018).

Based on the criteria of authors such as Bravo (2009); Salvador-Oliván and Fernández-Ruiz (2012); Llanes-Font, Isaac-Godínez, Moreno-Pino, and García-Vidal (2014); Medina, Nogueira, Medina, and Suárez (2016); Pirolo and Zacarías (2017); and ISO 9001 (2015), on the concept of process management, a consensus is evident when considering process management as an interrelated system that contributes to the achievement of the strategic objectives of any organization whose purpose is to obtain the satisfaction of the internal and external client. Process management is the way to manage the entire company based on the orderly and sequential integration of all the activities carried out by the company to transform inputs into outputs or expected results for a final destination (Rodríguez Fajardo, 2022).

The need to manage risks using an integral approach is due to highly interdependent risks with impacts in areas other than where they originated. If the company is conceived as a system, it can be more easily understood that the effects in one of its subsystems will affect the rest of the business subsystems (Blanco Campins, 2007).

Fuzzy logic

In the international business context, numerous techniques and tools are used in risk management to reduce or prevent losses caused by external or internal factors, one of which is fuzzy logic. As stated by Díaz Córdova et al. (2017), when interpreting risk indicators with emphasis on fuzzy logic, a more flexible environment is obtained in interpreting financial information.

Fuzzy logic, as a tool, enables the analysis of business phenomena, trying to deform them to make them precise and certain. With a treatment of uncertainty, starting from fuzzy concepts, the field of science application is opened (Muñoz Palma et al., 2016).

On the other hand, by applying the fuzzy logic technique, a company will be able to provide aspects that have a greater impact within the company and, thus, correct time anomalies that may affect the company's performance (Saldaña & Guamán, 2019).

Its use has become widespread in financial problems since it facilitates better modeling and management of banking risks. Among the Latin American authors who have referred to this scenario are Medina (2006), Martínez (2007), and Camargo (2013), among others. Fuzzy logic, which offers a different view from that granted by classical logic, appears then as one of the tools that make it possible to obtain

numerical values from such qualitative variables in most financial models (Martínez & Armenteros, 2017).

Systems based on fuzzy rules have three elements: rules representing the dynamics to understand the system, input information, and output information. These elements are obtained through the observer's experience or intuition of the system operation (Mendoza Saboya, 2009).

Fuzzy logic helps to understand and apply fuzzy numbers that are not readily apparent in financial analysis. The technique improves decision options and mitigates risks. It is also worth mentioning that companies possess information about past events, which causes decisions to be made based on those facts, representing difficulties for the proper management of companies. Applying the Fuzzy Logic technique means that companies obtain predictive results that make possible future projections (Saldaña & Guamán, 2019).

The research proposes integrating risk management, process management, and fuzzy logic into a single work tool, taking into account the elements above.

Methods

The research is carried out with the support of theoretical methods, such as analysis and synthesis, induction and deduction, transit from the abstract to the concrete, documentary analysis as an empirical method, and the use of tools, such as Brainstorming, surveys, and interviews.

Before arriving at the methodology employed, a bibliographic study of the different studies related to the application of the topic in Cuba was required. All this made it possible to make a summary table (Table 1) where the main works in Cuba are shown, which helps to identify gaps in the field of company risk management in the national tourism sector and thus offers the possibility of making contributions in this branch of the science.

Consequently, as a result of the analysis of the research listed in the national framework, the main gaps in company risk management in Cuba can be identified as the lack of use of mathematical methods for the quantification of risk with a process-based risk management approach that contributes to the calculation of a general indicator to measure risk.

To solve the problem identified, a risk management methodology is proposed with a process management approach and the use of fuzzy logic that contributes to the improvement of the company management system and the treatment of uncertain and subjective information in the company risk assessment process. The study of research related to application risk management in Cuba indicates, in a general sense, a gap in the use of methods and tools, constituting elements where studies conducted so far

offer the possibility of exploiting and making it possible to contribute to the design of a methodology for company risk management based on process management and fuzzy logic.

Table 1

Summary of research on company risk management applied in Cuba

Author/Year	Title	Type of research
(Blanco Campins, 2007)	Procedure for the assessment of operational business risks using fuzzy mathematics methods	Thesis presented for the scientific degree of Doctor in Economic Sciences. University of Havana
(Machado Chaviano & Hernández Aro, 2008)	Diagnosis and procedure proposal for the marketing management audit in Cuban tourist bodies	Scientific article
(Rodríguez Milián, 2008)	Proposal and validation of default risk management procedures for Sol Meliá Cuba Hotels	Thesis presented for the scientific degree of Doctor in Economic Sciences; University of Matanzas
(Hernández Meléndrez, 2009)	Systemic internal audit model with risk approach	Thesis presented for the scientific degree of Doctor in Accounting and Financial Sciences; University of Camagüey
(González del Foyo et al., 2011)	Financial risk hedging in the context of globalization of financial markets	Scientific article
(Rodríguez Milián, 2011)	Internal Control, COSO, ERM, and Resolution 60/11 of the Office of the Comptroller General of the Republic of Cuba. A practical case of application in the MINTUR	Conference Paper
(González del Foyo et al., 2012)	Criteria for the establishment of a foreign exchange risk management procedure in the importing company for the supply of goods for Oil (ABAPET)	Scientific article
(Ramos Crespo et al., 2013)	Application of a methodology for financial risk management as part of business management	Scientific article
(Foyo Abreu, 2015)	Methodology for Risk and Insurance Knowledge Management in the Agricultural and Livestock Industry	Thesis presented for the scientific degree of Doctor in Agricultural Sciences. Agrarian University of Havana
(Luna Castellanos & Ramos Dinza, 2019)	Proposed methodology for the implementation of the Risk Management and Prevention component	XIV International Congress CUBAGUA 2019. X International Seminar on Integral Water Use
(Rodríguez Perea et al., 2019)	Model for integrated risk management in Cuba's agricultural production base	Scientific article

(Fonseca Hernández & De La Oliva De Con, 2020)	Methodology for risk management in investment projects of the Cuban nickel industry	Scientific article
(Rodríguez Fajardo, 2020)	Composition of strategic planning and risk management in the Sales Office of Cubana de Aviación S.A. Varadero	Scientific article
(Rodríguez Fajardo, 2021c)	Risks that in 2019 threatened the non-recovery of the financing granted to self-employed activity in BANDEC Matanzas.	Scientific article

Source: Author's own

Results and discussion

Given the above conditions and the results obtained in previous research, the proposed methodology is presented step by step. A series of recommendations are defined, aimed at strengthening risk management practices by training risk managers in organizations to reduce the social impact of business risks:

- Greater priority should be given to technological advances, the exchange and dissemination of scientific information and its practical implementation, which are easily integrated into each entity's policies, regulations, and action plans.
- Consolidate the development of science in public awareness, training all levels of society in global knowledge management and media.
- Develop specific tools to facilitate the development of scientific, technological, and innovative products to guide the formulation of policies and practices.
- Invite public and private companies that may be at risk to be part of the scientific research so that reliable databases can be compiled.

The proposed risk management methodology from a process management approach and the use of fuzzy logic aims to contribute to the improvement of the business management system, decision making and the treatment of uncertain and subjective information in the business risk assessment process while considering two primary objectives in any risk management process: timely identification of the risk and implementation of the action plan to mitigate it.

The first step of the methodology proposes a diagnosis of the entity to identify whether risk management is carried out in the company through an integrated management system by process. The researcher can carry out this step through the application of a survey, with questions that are easy to understand and answer, and the result obtained is whether or not the company identifies risks by process.

It is essential to become familiar with the company's internal business processes, so it is necessary to start by identifying the processes and considering the criteria for selecting the processes described in the literature.

According to ISO 9001 (2015)(p.5), organizations have different strategic, operational, or support processes, which have always existed. This step aims to identify each of these processes, reflect on their level of impact, and select those that are significant and add value to the company so that the process map integrated into the strategic planning of the entity is defined, as presented in Figure 1.

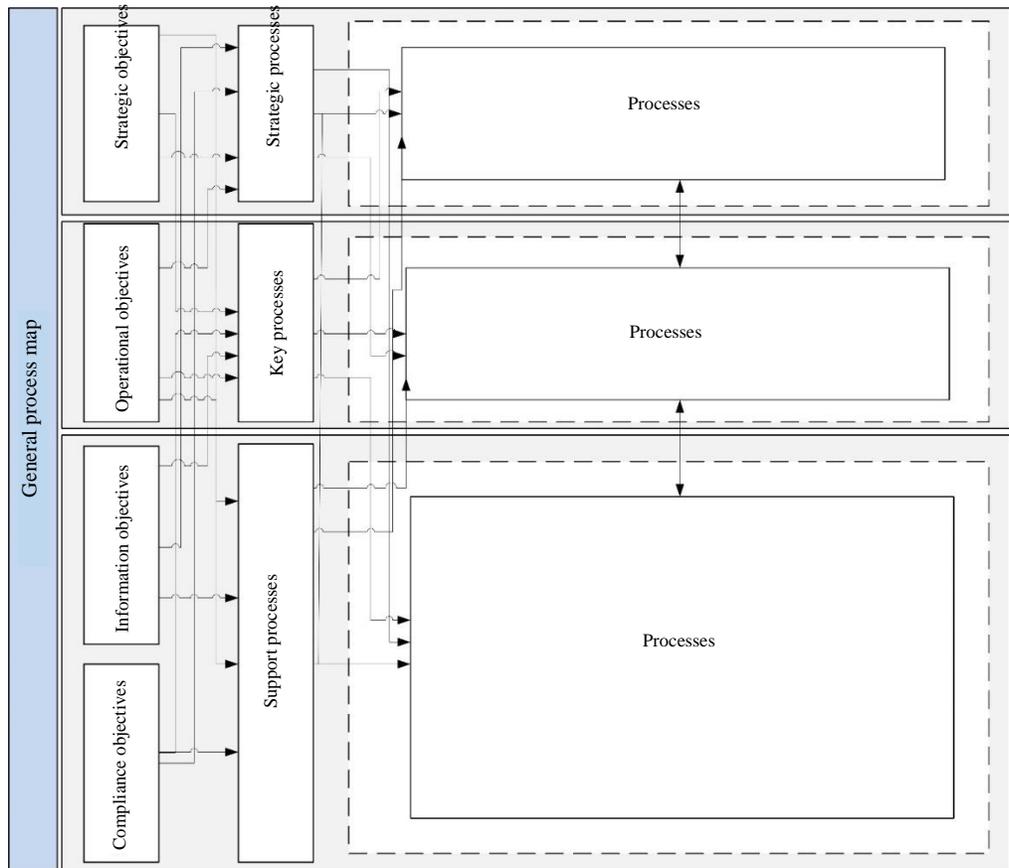


Figure 1. Proposed process map integrated with strategic planning
 Source: Author's own

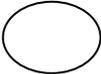
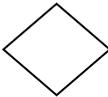
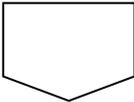
Subsequently, in step three, these processes will be submitted to the judgment of the experts, from which the most important ones for the entity will be defined with the help of the Kendall method. In

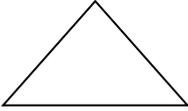
step 4, the processes to be improved will be defined, which will be represented from the flow chart, and the distinctive competencies will be defined, as well as the identification of their risks, their representation in a process card, and the establishment of indicators for their evaluation.

Once the process to be improved has been identified, the indicators to be measured in the process and the strategic, information, compliance, and operational objectives must be defined and aligned with the company's strategic planning, and thence the risks will be identified.

For the creation of the flowchart, it is necessary to define the symbols to be used; for this purpose, those defined by Trischler (2008, cited by Medina León et al., 2017) are taken as presented in Table 2, and for the process card the proposal in Table 3 is used.

Table 2
 Symbols for flowchart realization

Symbol	Meaning	Explanation
	Start and end point of the process	Represents the start of any service process
	Operation type step	Represents any processing task that involves a physical or intellectual action
	Decision step	Represents any decision task; it will always have at least two outputs
	Flow line	Indicates the direction of the process flow and represents the progress of the steps in the sequence.
	Document archive	Used when a document to be archived is generated after an operation. It is placed next to the operation symbol.
	Change page	Used when a page is finished, and the same flow is to be started on another page
	Delay	Used to represent that there is some delay in the process

	Storage step	Corresponds to a process step that places a product, information, or service in a storage area (archive, warehouse, or refrigerator) or position (queue) for later use or service.
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Source: Trischler (2008, cited by Medina León et al., 2017)

Table 3
 Process sheet template

Process Tab (Entity Name)		
Logo	Process name	Person responsible or owner
Type of process		Subprocesses
Clients		Other associated stakeholders
Mission		
Scope:		
Start		
Includes		
End		
Value provided by the process and expected characteristics of the product or service it provides		
Processes to which it relates		
Strategic, reporting, compliance, and operational objectives defining the process		
Activities associated with the process, detailing all the activities that operationalize the process		
Distinctive capability		Computer applications
Description of the process in as much detail as possible		
Date of the next internal audit		Date on which the next process improvement is planned
Prepared by:	Reviewed by:	Modified by:
Date:	Date:	Date:
In case of modification, include a summary of the modification made:		

Source: based on Medina León et al. (2017)

Once the process to be improved has been selected, the identification of risks is a fundamental step in the application of the methodology, starting with the recognition of the activities that comprise the selected process and then identifying each risk by process activity, which in turn is associated with the objectives, which is why the analysis is proposed based on Table 4. It should be specified that an objective may be associated with more than one activity and equally that each activity may be associated with more than one risk.

Table 4

Model for the identification of risks associated with the activities of groups of objectives that define the process

Process name					Risk
Objective	Process	Activity			
1	Process name	Activity 1	associated	with	Risk associated with activity 1
		objective 1			Risk associated with activity 1
		Activity 2	associated	with	Risk associated with activity 2
		objective 2			Risk associated with activity 2
		Activity 3	associated	with	Risk associated with activity 3
		objective 3			
n...n		n...n			n...n

Source: Author's own

Once the risks by activity that affect the process to be improved have been identified, it is necessary to analyze them by considering the probability of occurrence, impact, and measurement. To determine the probability, impact, and risk mean, statistical methods such as Chi-Square and Poisson will be used. This constitutes a way for the statistical calculation when there is information available for them; in the case that statistical information is not available, it is necessary to work with the experts' criteria with the application of the Fuzzy Delphi method, to obtain a forecast from the experts' opinions, but with the condition that they only know their own opinion and the deviation of the same concerning the mean of the group.

In the Fuzzy Delphi, each potential expert self-assesses themselves on Theoretical Knowledge and Practical Knowledge, respectively, using fuzzy triangular numbers (minimum value, maximum presumption value, and maximum value) and using the endecadary scale (Vega Falcón et al., 2018).

The Fuzzy Delphi method uses the same form of communication with experts as the Delphi method. Its application in fuzzy mathematics is justified; as stated by (Blanco Campins, 2007), experts use their knowledge loaded with a high degree of subjectivity. This fact makes it necessary to use the fuzzy instead of the random to deal with this subjectivity. This method proposed by Kaufmann and Gil Aluja, cited by (Blanco Campins, 2007), proposes the following steps:

1. Each expert provides their estimates for the same event. The proposed case refers to the probability and impact that a certain risk would produce.

2. With all the estimations, the triangular fuzzy number bundle is obtained

$$(A_{i1}, B_{i1}, C_{i1}) \quad i=1,2,\dots,n$$

The subscript corresponds to the estimation round, the upper index (i) refers to the number of the expert, and (n) is the number of experts.

3. From the previous bundle, it is possible to calculate the mean triangular fuzzy number: (A_{m1}, B_{m1}, C_{m1}) and for each expert i, the deviations: $A_{i1} - A_{m1}, \dots, n$

4. With the information from the previous step, each expert provides new estimates, obtaining a new set of fuzzy triangular numbers: (Ai2, Bi2, Ci2)

The Fuzzy Delphi method is incorporated into the proposal since experts provide the information for risk identification. It is important to define the scale to work on in applying the method and the number of rounds or stop criteria; the latter is to be decided by the researcher.

The following scale is proposed to determine the impact:

Table 5
Impact scales

Value	Rating	Endecadary Scale
0	Null	0: the event has no impact
1	Mild	0.1: Very little event impact
		0.2: Low event impact
		0.3: Event may impact very rarely
		0.4: the event may impact regularly
5	Moderate	0.5: the event may or may not have an impact
		0.6: the event has a noticeable impact
		0.7: the event has quite a strong impact
10	Strong	0.8: the event has a strong impact
		0.9: the event has a very strong impact
		1: the event has an overwhelming impact

Source: Author's own

The probability is based on an endecadary scale with a confidence interval formulated in values between 0 and 1. The scale will be used with the same number of ranges as the impact assessment scale (Table 6).

Table 6
Frequency evaluation scale

Endecadary Scale	Value	Criteria
0: the event does not include	0	Null
0.1: it is very unlikely that the event will have an influence	1	Mild
0.2: the event is unlikely to have an influence		
0.3: the event can influence very rarely		
0.4: the event can influence regularly		
0.5: the event may or may not have an influence	5	Moderate
0.6: the event has a noticeable influence	10	Strong
0.7: the event has quite a strong influence		
0.8: the event has a strong influence		
0.9: the event has a very strong influence		
1: the event is influential		

Source: based on (Blanco Campins, 2007).

Thus, the survey for the experts would be as follows (Table 7)

Table 7
 Survey for experts to assess impact and risk probability

Identified Risks	Impact		Probability	
	Minimum	Maximum	Minimum	Maximum
Risk 1				
Risk 2				
Risk 3				
...				
Risk...n				

Source: Author's own

The expert must define a maximum and minimum value for each risk based on the values of the endecadary scale, which will make the preparation of the risk prevention matrix, map, and plan possible.

The defined indicators will be considered to model the company risk index, a checklist will be drawn up to evaluate the indicators in the process to be improved, and the identified risks will be considered as variables included in the list, which will also be qualitatively assessed; fuzzy mathematics is used to mathematically model the indicator that makes it possible to include all the variables. All this is done with the help of verbal or conceptual formulations that represent simple and compound predicates integrated into a final compound predicate (Business Risk Index) that translates into the fusion of process management with risk management.

The process variables (indicators and risks) will be simple predicates. From them, the compound predicates will be evaluated, which will be the process to which they belong, which will in turn evaluate the general compound predicate Business Risk Index.

Finally, index modeling is introduced in the Fuzzy Tree Studio software, representing the modeling diagram. The center value (acceptable value from which the simple predicate starts to be true) and the sigma value (value that represents the deviation between the acceptable value and the inadmissible or almost false value) are defined for the simple predicates. Figure 2 presents the structure of the proposed methodology.

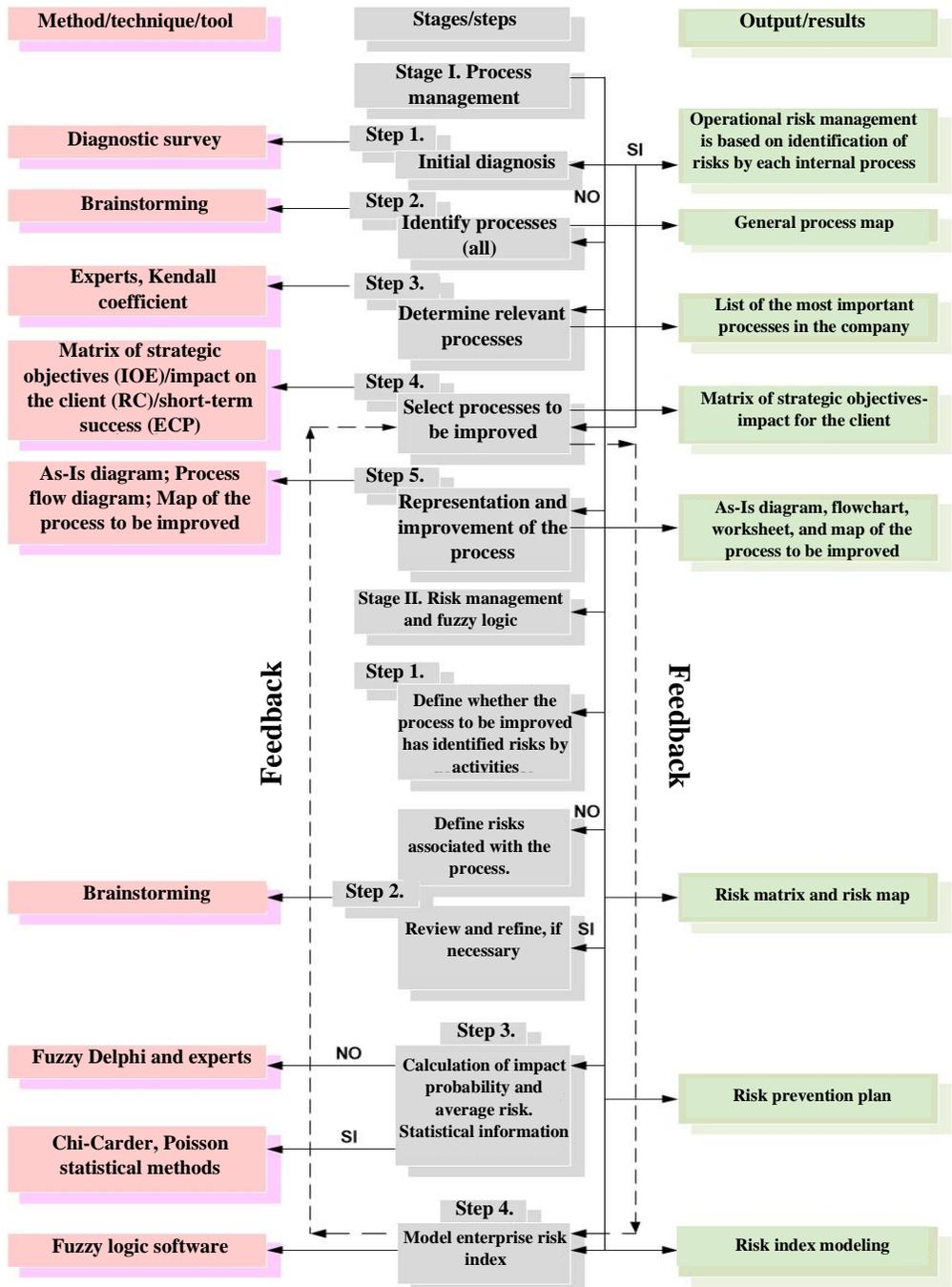


Figure 2. Company risk management methodology by process and fuzzy logic

Conclusions

The research presented here suggests, from a theoretical perspective, a new approach to company risk management based on previously obtained results that present the existing gaps in this area. The work's main contribution lies in the proposal of the methodology adjusted to the needs and deficiencies detected in enterprise risk management in the Cuban tourism sector, offering an integral tool that facilitates risk management by process and fuzzy logic.

Therefore, the proposed methodology contributes to the development of risk management in Cuba by adopting the advances obtained in this field at the international level. Risk management is analyzed using a general approach in Cuban companies to integrate it into strategic planning. Fuzzy logic is adopted as a tool for risk quantification due to the results obtained with the inclusion of this science in finance and business economics. The above is a novelty in risk management in Cuba when it is integrated into the processes of the companies. As it constitutes a theoretical study, it makes it possible to identify future research lines derived from the practical application of the methodology.

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