Risk management and resilience in tourist destinations : a quantitative analysis using structural equations

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Abstract :

In a context where the global tourism sector is frequently exposed to multiple crises, such as pandemics, natural disasters, and economic instability, this study focuses on the resilience of tourist destinations in the face of disruptions. The central issue examines the ability of destinations to adapt and maintain their attractiveness by relying on effective risk management practices. To address this issue, a hypothetico-deductive approach was adopted, with the collection and analysis of quantitative data using the structural equation modeling (PLS) method.

The main findings reveal that technological innovation and the promotion of sustainability have a significant effect on the resilience of tourist destinations, confirming their crucial role in adaptation and transformation in the face of crises. However, the study did not validate the impact of managers' profiles or strategic communication, suggesting variable effectiveness depending on the context.

Keywords: Resilience, Risk, Sustainability, Communication, Innovation

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Introduction

The concept of risk is central to many fields, including economics, health, safety and the environment. Risk can be defined as a combination of the probability of an undesirable event and its potential consequences. It is a concept intrinsically linked to uncertainty and vulnerability, implying outcomes that are not entirely predictable.

Historically speaking, risk management has evolved with scientific and social progress. In pre-industrial times, risks were mainly related to natural disasters and disease, often perceived as inevitable. With industrialization, new types of risk emerged, such as industrial accidents and economic crises. Today, in a globalized, technological world, systemic risks such as cyber-attacks and climate change are taking on increasing importance.

Peter Bernstein, in *Against the Gods: The Remarkable Story of Risk* (1996), points out that the perception of risk changed radically during the Renaissance. figures like Pascal and Fermat, risk evolved from an abstract notion linked to fate or divine will to a scientific notion based on principles of probability. This evolution laid the foundations for modern disciplines such as insurance, financial management and economics.

In the 20th century, researchers emphasized the negative dimension of risk. It is often defined as an obstacle to the achievement of objectives, or as a threat that could lead to financial, human or environmental losses. For example, in the ISO 31000 standards on risk management, risk is described as the effect uncertainty on objectives.

Risk can be perceived as an intermediate situation between a state of security and possible destruction. This ambivalent position prompts reflection on the actions and decisions needed to mitigate its effects or take advantage of it (Hudon, 2006). However, risk is more than just a threat: it can also represent an opportunity to

change, adaptation and progress, leading to results that are sometimes different from those initially expected (Blach, 2010).

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In this context, risk can be defined as a combination of uncertainties, threats or opportunities that the organization must anticipate, analyze and manage. This management aims to protect its resources, preserve its value and achieve the objectives set out in its overall strategy (Desroches et al., 2003). Thus, risk lies at the crossroads of potential losses and opportunities, with consequences that can be both negative and positive.

The main aim of risk management is not to eliminate risk, but to take a strategic approach to risk-taking opportunities. This proactive approach generates value and strengthens an organization's resilience and competitiveness.

Literature Review

Risk can simply be defined as the possibility of an event affecting the achievement of set objectives. Some risks may have positive impacts, others negative. Two key indicators are used to assess risk:

1. **Probability**, which reflects the chance or uncertainty of the event occurring. This mathematical and rational approach considers risk as an event probability can be estimated and whose impact can be measured. Probability and statistical tools are used assess the frequency and severity of potential events. For example, in finance, Value at Risk (VaR) measures the maximum potential loss of a portfolio for a given period, with a fixed level of confidence.

2. **Severity**, which measures the extent of the consequences of the event. This approach emphasizes the unpredictable and uncertain nature of events. Risks are thus perceived as complex phenomena, sometimes beyond the scope of modeling and anticipation. The economist Frank Knight (1921) drew a distinction between **measurable risk**, linked to known probabilities, and **true uncertainty**, where probabilities are unknown or inestimable.

The product of these two indicators gives a measure of risk acuity, often used to classify and prioritize risks according to their criticality. This classification helps define risk zones and prioritize management actions accordingly.

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Although traditionally perceived as a threat, risk can also represent an **opportunity**. In this context, risk is a catalyst change and innovation, particularly sectors such as entrepreneurship and technology. This dual vision is common in approaches such as **risk– based thinking** or the **risk–reward trade–off**.

Table 1: **Definition of risk** (Chemlal al. 2017)

Author	**Definition**
(Gourc, 2006)	The possibility of an event occurring occurrence would have consequences (positive or negative) on progress of the project.
International Organisation for Standardisation (ISO - Guide 73)	Risk is the effect of uncertainty on the achievement of objectives.
(Daniel Bernoulli, 1738)	The risk 1s the mathematical expectation of afunction of probability events.
Desroches et al.	Risk is an uncertainty, threat or opportunity that the business needs to anticipate, understand and manage in order to protect its assets and value, and achieve the objectives define in the framework strategy.

In short, risk is a complex, polymorphous and constantly evolving concept. It can be considered from two main angles: a quantitative approach, based on probability and the analysis of expected values, and a qualitative approach, focused on uncertainty and the unpredictability of consequences. Whether perceived as a threat or an opportunityrisk remains an essential component of decision-making and strategic processes in all areas of modern society.

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1. Risk classification and typology

According to Bernard Barthélémy and Jacques Quibel, risks can be grouped into five main categories:

1. **Frequency risks**: These risks occur frequently, but their impact is generally low.

2. **Serious risks**: Although rare, these events have serious consequences. when they occur.

3. **Negligible risks**: With a low probability and severity, these risks do not require any special management.

4. **Intolerable risks**: These combine both a high probability of occurrence and serious consequences, making their management a priority.

5. **Moderate risks**: These are risks of moderate frequency and severity. They make up the majority of cases dealt with by risk management, requiring attention and adapted strategies.

To better understand the notion of risk, several classifications have been developed. These typologies enable risk management to be structured according to origin, impact or sector.

Natural hazards

Natural hazards include geophysical and meteorological phenomena such as earthquakes, hurricanes, floods and volcanic eruptions. They are often exacerbated human activities such as urbanization in high-risk areas or climate change.

Technological hazards

These risks result from the use of technology and industrialization. They include industrial accidents (explosions, chemical leaks), infrastructure failures and risks associated with nuclear energy. The management of these risks relies on prevention and control measures, as well as strict regulation.

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- Health risks

Health risks are threats to public health, such as epidemics, pandemics (like COVID-19), or exposure to toxic substances. Their management includes epidemiological surveillance, prevention and the implementation of resilient health systems.

- Economic risks

Economic risks include financial crises, market volatility, corporate failures and tensions in global supply chains. They are often systemic in nature, affecting several sectors and countries simultaneously.

- Social and political risks

These risks include armed conflict, social unrest, civil unrest and terrorist threats. They are often exacerbated by economic inequalities, migratory crises or institutional dysfunction.

- Environmental risks

They are closely linked to human activities, and include phenomena such as deforestation, loss of biodiversity, soil and water pollution, and global warming. Managing them requires a collective, intergenerational approach.

- Systemic risks

These risks concern events whose impacts spread across complex, interdependent systems, such as financial networks, supply chains or digital systems. For example, a major cyber attack can affect several critical infrastructures in a cascade.

2. Risk Management: Definition, Objectives and Steps

Risk management is based on a structured cycle involving identification, assessment, prioritization and implementation of corrective measures. Several tools are used to analyze risks, including :

- **Quantitative analysis**, which measures probabilities and impacts in

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numerical terms.

- **Qualitative analysis**, which identifies risk factors through expert assessments.
- **Business continuity plans**, which enable essential operations to be maintained in the event of a crisis.

Corporate risk management is a structured process designed to identify, assess and deal with risks in order to limit their impact and better control them. This process is based on the development and implementation of appropriate action plans to reduce the probability of risk occurrence or mitigate its consequences. Several reference frameworks and standards have been developed to guide these approaches, including ISO 31000 and the Enterprise Risk Management (ERM) framework of the Committee of Sponsoring Organizations of the Treadway Commission (COSO), which are among the most widely used.

According to Olajide Solomon Fadun (2013), the aim of risk management is not to avoid or eliminate risks, but to manage them strategically within the framework of the company's activities. It helps reduce threats while optimizing opportunities, thus contributing to better in face of uncertainty. Risk management is therefore an essential lever for navigating an uncertain and complex environment[1] (FATOUH & MOUTAHADDIB 2023).

Dionne (2013) shares this vision, stating that the main objective of risk management is to provide companies with a structured and effective framework. This framework enables them to cope with risk and uncertainty, while protecting their strategic and operational objectives. Together, these approaches emphasize that risk management is not about removing uncertainty, but exploiting it to create value and strengthen organizational resilience (Ref).

Objectives ISO 31000 and the COSO ERM framework

Although developed independently, ISO 31000 and the ERM framework share the same objective: to provide organizations with tools and methods for integrating

[1] Cited in : FATOUH, K., & MOUTAHADDIB, A. (2023). Theoretical approach to risk management. International Journal of Accounting, Finance, Auditing, Management and Economics, 4(6-1), 150-165. https://doi.org/10.5281/zenodo.10252978

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risk management into their decision-making processes. These approaches seek to strengthen the ability of organizations to assess, treat and monitor risks from a strategic perspective while promoting informed, proactive decision-making.

Complementary approaches

There is no one-size-fits-all approach to risk management, as each organization must adapt its practices to suit its environment, objectives and structure. ISO 31000 and the ERM framework are not mutually exclusive. On the contrary, they can be used in complementary ways to enrich an organization's risk management systems.

The application of either framework depends on the specific needs of the organization. For example:

- As an international standard, ISO 31000 offers a general approach that can be adapted to any organization, whatever its sector.
- The COSO ERM framework, on the other hand, focuses more on integrating risk into governance and financial performance, making it particularly relevant for companies and institutions with complex processes.

In short, choosing between ISO 31000 and the COSO framework is not a question of exclusivity, but rather of complementarity. Organizations can take advantage of the strengths of each to develop an appropriate, robust and effective risk management system.

Here is a summary table showing different definitions of risk management according to various authors and organizations:

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Table 2: Definition of risk

Author/Organization	Defining risk management	Source/Year
ISO 31000	Coordinated process for directing and controlling an organization with regard to risk.	ISO 31000:2018
COSO (ERM)	Processes implemented by the Board of Directors, management and other stakeholders to identify, assess, manage and monitor risks within the framework of strategic objectives.	COSO ERM: 2017
Hopkin (2017)	Activity aimed at identifying, assessing and dealing with uncertainties that could have a positive or negative impact on organizational objectives.	Hopkin, *Fundamentals of Risk Management,* 2017
Harrington & Niehaus (2004)	The process of identifying, measunng and managmg risks m order to mm1m1ze potential losses while maximizing organizational performance.	Harrington & Niehaus, *Risk Management and Insurance*

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Bernstein (1996)	Proactive management of hazards and uncertainties to better understand their potential impacts and design appropriate responses within a strategic framework.	Bernstein, *Against the Gods,* 1996
Aven (2011)	Combination of activities and methods for identifying, assessing, communicating and treating risks with the aim of protecting and optimizing the organizational performance.	Aven, *Risk Analysis,* 2011
PMBOK Guide (Project Management)	Systematic process for identifying, analyzing and responding to project risks, to max1m1ze opportunities and minimize threats.	PMl, PMBOK Guide, 2021
Kaplan & Garrick (1981)	Process for answenng the question, "What events can occur, how likely are they, and what are their consequences?"	Kaplan & Garrick, 1981

According to ISO 31000 (2009), risk management is a structured, iterative process that generally comprises the following stages:

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✓ Setting the context

This stage involves defining the framework within which the risk management process will be applied. involves identifying the objectives, stakeholders, available resources and criteria assessing risk. The aim is to ensure that risk analysis is aligned with the organization's strategic objectives.

✓ Identifying risks

Identify events, situations or circumstances that could have an impact on the organization's objectives. This stage involves an in-depth analysis of risk sources, potential events and their causes.

✓ Risk analysis

Assess the characteristics of the risks identified, in particular their probability of occurrence and the severity of their impact. This includes modeling risk scenarios and examining the interdependencies between them.

✓ Risk assessment

Compare the results of the risk analysis with the criteria established when the context was set. Risks are ranked in order of criticality (low, moderate, high) to prioritize actions.

✓ Risk management

Develop and implement action to address risks. Several strategies can be adopted:

- Avoid the risk.
- Reduce probability or impact.
- Transfer risk (insurance, subcontracting).
- Accept the risk (with a contingency plan).

✓ Monitoring and review

Regular monitoring of risks, measures taken and their effectiveness. This step also enables new risks to be detected, or existing risks to be reassessed in light of changes in the environment.

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Communication and consultation

For information on the process, it is essential to involve stakeholders and share the necessary information. Communication ensures transparency and fosters collaboration in risk management.

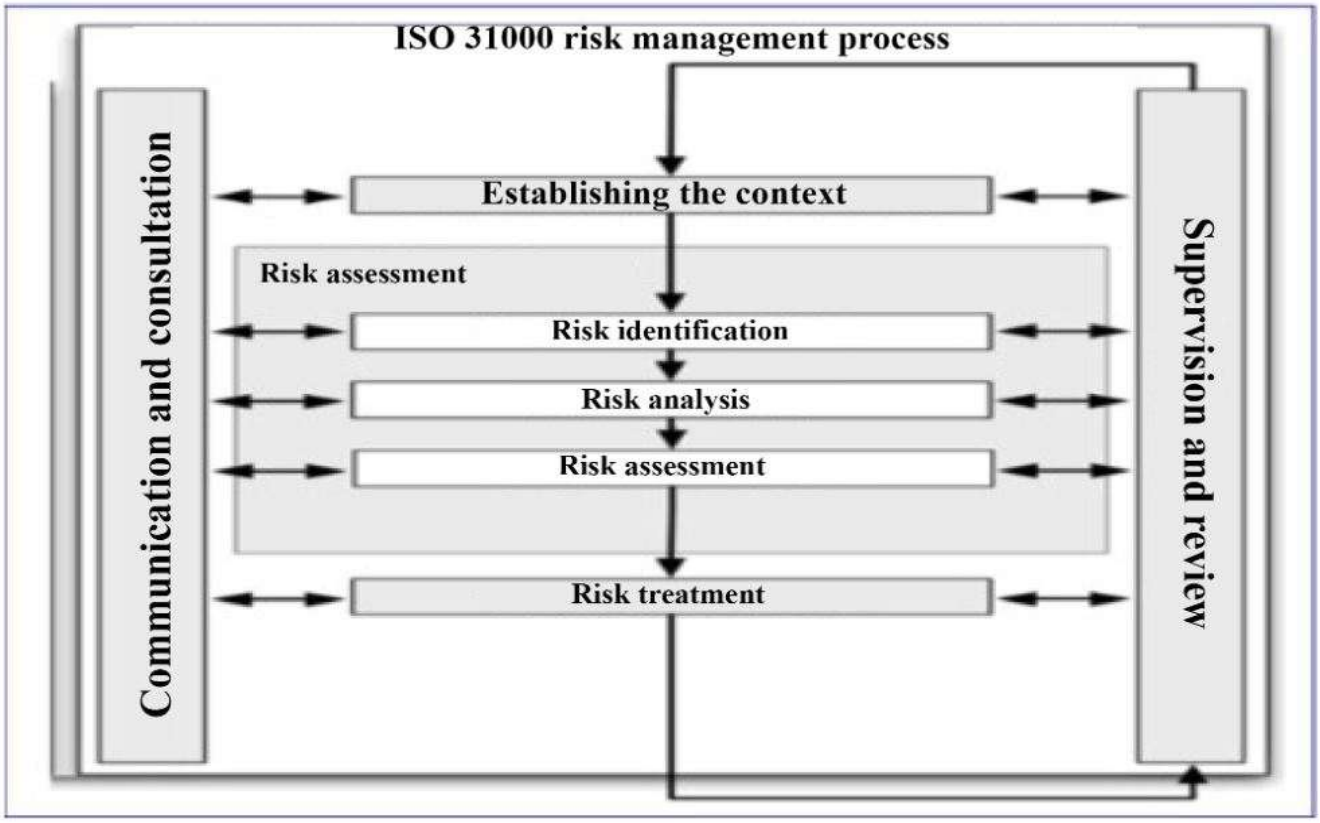

Figure 1: Definition of risk (ISO 31000, 2009 version)

3. The pillars of risk management to strengthen resilience

3.1. Definition and scope of the concept of resilience

Resilience is a fundamental concept in psychology, sociology and even management science. Derived from the Latin resilire, meaning "to bounce back", the term is used to describe the ability of an individual, group or system to overcome adversity and rebuild itself in the face of disruption. Across disciplines, it embodies an essential idea

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that of transformation and adaptation in the face of adversity.

Introduced to the human sciences in the 1970s, resilience first made its mark in the field of psychology, thanks to the work of researchers such as Boris Cyrulnik. Cyrulnik defines resilience as a dynamic process whereby a person overcomes trauma by integrating painful events into his or her life course. In his view, resilience is not about erasing wounds, but transforming them into a source of inner strength and creativity (Cyrulnik, 1999).

At the same time, the concept has broadened to include collective and systemic approaches. In the social sciences, resilience is associated with the way in which communities, after natural disasters or social crises, reorganize and reinvent themselves to survive and prosper. In ecology, it refers to the ability of ecosystems to absorb shocks (such as fire or pollution) while maintaining their functional structure (Holling, 1973).

The notion of resilience has broadened to include collective and systemic dimensions, revealing its interdisciplinary nature. In the social sciences, it is associated with the ability of communities to reorganize after major crises, such as natural disasters or social upheaval. For example, the rebuilding of infrastructures and the maintenance of a strong social fabric after a disaster testify to collective resilience.

In the field of ecology, resilience refers to the ability of ecosystems to absorb disturbances without losing their functionality. This concept was formalized by C.S. Holling in 1973, who highlighted way in which natural systems can adapt to shocks, such as forest fires or pollution, while retaining their fundamental structures and biological diversity. This ecological perspective underlines the importance of adaptation and regeneration mechanisms in environments faced with rapid and often unpredictable change.

Whether individual, community or environmental, resilience is a universal capacity to face challenges, adapt and, above all, to rise again after adversity.

Resilience is a concept that cannot be fully understood without taking into

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account the contexts and specificities of the phenomenon under study. According to Hillmann and Guenther (2021), any effective definition of resilience must combine common aspects with elements specific to each situation. Indeed, resilience does not manifest itself uniformly, but varies according to the nature of the changes faced. This variability implies a contextual approach: to understand a specific type of resilience, it's essential to ask the fundamental question: resilience to what? (Martin-Breen & Anderies, 2011).

The study of resilience in the face of risk poses the challenge of interpreting and comparing results between different research studies. The risks studied can range from economic crises to natural disasters to personal trauma. This wide range makes it difficult to achieve a universal understanding of the concept. Furthermore, as Masten (2001) points out, resilience can only be assessed in the presence of significant adversities, current or past, that seriously threaten the development an individual or organization. However, this perspective raises a crucial question: should resilience be limited to a reaction to a crisis, or can it also be seen as a proactive, adaptable capacity in stable environments?

In short, resilience is a complex dynamic that expresses itself differently according to risks and circumstances. It requires a detailed understanding of the contexts and underlying mechanisms that enable individuals and systems to adapt, transform and thrive in the face of life's challenges.

3.2. Resilience in the tourism sector

The tourism sector is particularly vulnerable to crises because of its dependence passenger flows, infrastructure and the perceived safety of destinations. Resilience in the tourism sector refers to the ability of tourism-related destinations, businesses and communities to adapt and overcome disruption while maintaining or rebuilding their attractiveness.

Main threats to the tourism sector

- **Health crises**: As illustrated by the COVID-19 pandemic, global tourism can be brutally paralyzed by health crises, with immediate impacts on international

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travel, the hotel industry and related services.

- **Natural disasters**: earthquakes, hurricanes, forest fires and tsunamis can destroy infrastructure and tarnish the image of affected destinations.

- **Climate change**: Rising sea levels, ecosystem degradation and heat waves are affecting destinations that depend on natural resources, such as beaches and ski resorts.

- **Geopolitical and security instability**: Conflicts, terrorist attacks and political

unrest discourage tourists from visiting certain regions.

- **Economic fluctuations**: Dependence on travelers' purchasing power exposes the sector to economic slowdowns or currency fluctuations.

3.3. Levers of resilience in the tourism sector

To meet these challenges, Orchiston et al (2016) argue that the tourism sector relies on several key resilience strategies:

✓ **Adaptation of business models**: In the face of shocks, tourism companies often diversify their offerings to attract new types of customers or to adapt to new market trends.

reposition themselves on domestic markets. For example, in times of international restrictions, many destinations have focused their efforts on local or regional tourism.

✓ **Technological innovation**: Resilience also requires the adoption of technologies to better manage crises. Reservation platforms

flexible, virtual reality for immersive remote visits, and real-time tourism flow management applications are just a few examples.

✓ **Local capacity building**: Local communities play a key role in

tourism resilience. By supporting community initiatives and strengthening local involvement, destinations can better rebuild after a crisis, while promoting

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sustainable tourism.

✓ **Promoting sustainability**: The transition to sustainable tourism is essential to building resilience. This includes reducing dependence on

tourism, preserving natural resources and promoting eco-responsible practices.

✓ **Strategic and transparent communication**: Crisis management in the tourism sector relies heavily on effective communication. In the aftermath of a crisis

It is crucial to restore travelers' confidence by promoting reassuring messages and safety measures.

3.4. Elements of good risk management

Risk management is an essential approach to anticipating, mitigating and responding effectively to disruptions, while strengthening the adaptive capacity of individuals, organizations or systems. When well-structured, it provides a foundation for resilience, enabling not only to overcome crises, but also to capitalize on the learning they generate. Here are the main pillars of risk management that contribute to greater resilience.

To improve risk management and strengthen its resilience, the tourism sector relies on the following pillars:

- **Prevention and preparedness**: Implementing preventive measures (e.g. resilient infrastructures, staff training) reduces vulnerabilities and enables a more effective response in the event of a crisis.
- **Response and recovery planning**: Well-defined crisis management plans, including emergency response and communication scenarios, enable destinations to react quickly and limit damage.
- **Communication and transparency**: Risk management requires open and transparent communication with stakeholders (governments, local communities, businesses) and visitors to maintain trust and a sense of security.
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3.5. Choice of study site

Methodology

Study area

The choice of field of study is a crucial step in any scientific research, as it determines the relevance, reliability and scope of the results obtained. For the purposes of this article, tourist destinations have been selected as the field of study for a number of methodological, conceptual and practical reasons.

Indeed, tourist destinations are at the crossroads of numerous economic, social and environmental dynamics, making them particularly vulnerable to a variety of risks, whether natural, health-related, political, economic or technological. These places, often perceived as spaces for relaxation and recreation, face specific pressures due to their high exposure:

- **Natural hazards**: Natural disasters (earthquakes, tsunamis, floods, hurricanes, etc.) frequently affect popular destinations such as coastal areas, tropical islands or mountainous regions.
- **Health risks**: Global health crises, such as the COVID-19 pandemic, have highlighted the fragility of tourism ecosystems in the face of global disturbances.
- **Socio-economic and political risks**: Political conflicts, economic instability or risks linked to overtourism can lead to a rapid decline in tourist appeal.

In this way, the study of tourist destinations enables us to understand how these places, as complex and vulnerable systems, can adapt and strengthen their resilience in face of various disturbances.

Furthermore, tourist destinations offer a diversity of geographical, cultural and socio- economic contexts, making them natural laboratories for studying risk management and resilience.

3.6. Research methodology

In our research, we have adopted a positivist philosophical approach, based on a

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hypothetico-deductive approach. This approach is distinguished by its methodological rigor, enabling hypotheses to be formulated on the basis of a pre-established theoretical framework, then tested empirically using quantitative data. This approach is particularly appropriate when the research problem is explanatory, aiming to establish causal relationships between variables.

The positivist tradition emphasizes scientificity and objectivity, where observable, measurable facts form the basis for conclusions. By adopting this approach, our aim is to test hypotheses systematically and produce generalizable results, which is essential for a causal explanatory problem.

In conclusion, the use of a hypothetico-deductive approach and a quantitative method fits in perfectly with our positivist approach. It enables us test our hypotheses rigorously and provide reliable, empirically validated answers to our research problem. This approach guarantees a low margin of error and enables us to draw generalizable conclusions, thus contributing to a better understanding of the phenomena studied.

3.7. Research model and hypotheses

This study explores the links between risk management and resilience in tourism destinations, using a hypothetico-deductive model. The model aims to explain how the fundamental pillars of risk management contribute to building resilience to the crises and disruptions that tourism destinations frequently face.

research model is based on two main variables:

Risk management, represented by its main pillars:

- Prevention and preparation.
- Response and recovery planning.
- Communication and transparency.
- Technological innovation.

Tourism destination resilience, defined as a destination's ability to adapt to disruption, reduce its impact and recover quickly, while maintaining or improving

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its appeal.

These variables are integrated into a theoretical framework that examines the causal relationships between the pillars of risk management and the dimensions of resilience.

Hypotheses are formulated to test the effects of the different pillars of risk management on the resilience of tourist destinations:

- **H1**: the profile of the manager would have a positive impact on the resilience of tourist destinations.
- **H2**: Technological innovation has a significant effect on the resilience of tourist destinations.
- **H2**: promoting sustainability strengthens the resilience of tourist destinations.
- **H3**: Transparent communication during crises enhances the perception of safety and stakeholder confidence, strengthening the resilience of tourist destinations.

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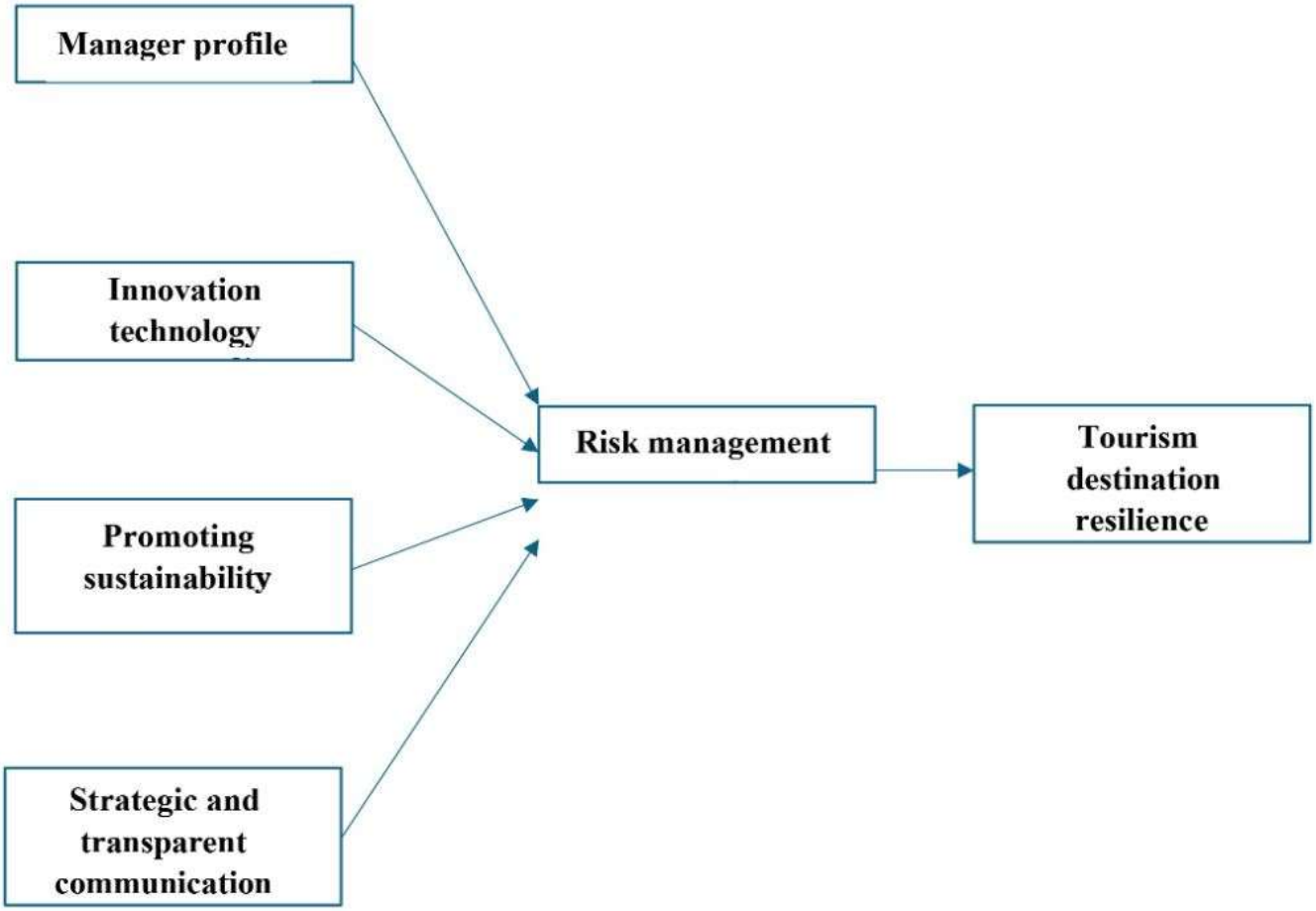

Figure 2: Conceptual research model

4. Presentation of study results

In this section, we detail the results obtained by applying the **Partial Least Squares** (**PLS**) method. This method was used to test the various research hypotheses formulated.

4.1. Measurement model test

In order to study measurement models, a review of the literature suggests that three criteria should be used to assess the quality of measurement models: reliability, convergent validity and discriminant validity of measurement scales.

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A– Testing the reliability of measurement scales

A first stage of analysis involved examining the loadings of each item to assess their individual contribution to the latent variables. This was followed an assessment of the overall reliability of the measurement scales. Traditionally, scale reliability is assessed using Cronbach's alpha coefficient, which is widely used by researchers. A value of 0.70 or more is generally considered acceptable to indicate that a scale is reliable. However, Cronbach's alpha is based on the restrictive assumption that all items are equally important, which limits its usefulness in certain contexts.

In the PLS approach, the reliability of indicators is assessed through their standardized loadings. According to Chin (1998), loadings above 0.70 are required to ensure that the variance shared between an item and its theoretical construct is significant and slightly greater than that attributable to error (Carmines and Zeller, 1979). When recently developed scales are used, however, their relevance may be called into question. In such cases, items with external loadings below 0.70 should not automatically be deleted. It is essential to consider the impact of their deletion on composite reliability and construct content validity (Hulland, 1999).

In general, indicators with correlations between 0.40 and 0.70 should only be removed if their removal significantly improves composite reliability or Average Variance Extracted (AVE) above the recommended thresholds. Another approach is to assess the impact of their removal on the overall representativeness of the construct content. Sometimes, items with low correlations are retained to preserve content validity. However, items with external loadings below 0.40 should be systematically eliminated (Hair, Ringle and Sarstedt, 2011).

In this study, as shown in the following table, the majority of items analyzed had acceptable correlations, ranging from 0.50 to 0.92, and almost always exceeded the tolerance threshold of 0.40 recommended by Evrard et al. (2003). Items deemed unrepresentative were removed from the model, while those retained are illustrated in the graph below. These adjustments ensure optimal validity and reliability of the final analytical model.

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Table 3: Loadings under PLS

Built	Items	Loading	Alpha Cronbach
Manager profile	Profile 1	**0,902**	**0,964**
	Profile 2	**0,944**	
	Profile 3	**0,941**	
	Profile _ 4	**0,960**	
	Profile 5	**0,931**	
	Profile 6	**0,848**	
	Profile 7	**0,871**	
Technological innovation	Innov 1	**0,841**	**0,805**
	Innov 2	**0,773**	
	Innov 3	**0,765**	
	Innov 4	**0,720**	
	Innov 5	**0,747**	
	Innov 6	**0,880**	
	Innov_ 7	**0,801**	
Promoting sustainability	Appro.Ri_1	**0,883**	**0,913**
	Appro.Ri 2	**0,895**	
	Appro.Ri 3	**0,894**	
	Appro.Ri 4	**0,897**	
	Appro.Ri 5	**0,758**	
	Appro.Ri 6	**0,783**	
Strategic communication	Appro.PD 4	**0,750**	**0,794**
	Appro.PD 5	**0,761**	
	Appro.PD 6	**0,793**	
Risk management	Gest.Risq_3	**0,778**	**0,927**
	Risk Management 4	**0,896**	

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	Risk Management 5	**0,931**	
	Risk Management 6	**0,928**	
	Risk Management 7	**0,866**	
Resilience	RES 2	**0,909**	**0,932**
	RES 3	**0,883**	
	RES 4	**0,911**	
	RES 5	**0,770**	
	RES 6	**0,880**	
	RES 7	**0,803**	

Source: Smart PLS software output

4.2. Convergent validity test

According to Fornell and Larcker (1981), the **convergent validity** of a measurement model is assessed by calculating the Average Variance **Extracted** (**AVE**) between a latent

variable and its items. This measure reflects the proportion of item variance explained by their respective latent variable, which is a key indication of the quality of the measurement scales.

In PLS methods, two main indicators are used to assess convergence: **Cronbach's alpha coefficient** and **internal consistency** (often measured by composite reliability). These indicators assess the extent to which items associated with the same latent variable are consistent and measure a common concept.

Nunnally (1978) considers that a threshold of **0.70** for composite reliability represents a "modest" but acceptable level, particularly in the early stages of

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exploratory research. This threshold guarantees a sufficient degree of reliability, while leaving room for adjustments in subsequent iterations.

Thus, the combination of AVE, Cronbach's alpha and composite reliability provides a rigorous assessment of the convergence and consistency of the scales used, reinforcing the validity of the analyses carried out.

Table 4: Significance and Composite Reliability (p) by construct

Latent variables	Cronbach's alpha	Composite reliability (rho a)	Composite reliability (rho c)
Manager profile	0,934	1,010	0,951
Technological innovation	0,907	0,914	0,925
Promoting sustainability	0,894	0,998	0,931
Strategic communication	0,968	0,982	0,974
Risk management	0,933	1,086	0,941
Resilience	0,905	0,924	0,900

***Source**: Smart PLS software output. V4*

4.3. Discriminant validity test

The **discriminant validity** of a measurement model is an essential criterion for ensuring that each latent variable is distinct from the others and measures a

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unique concept. According to Fornell and Larcker (1981), this validity is demonstrated when the **Average** Variance Extracted (**AVE**) of a variable with its own items is greater than the variance it shares with other variables (measured by the squared correlations between the variables).

In the context of the **PLS** approach, this principle is translated into a specific criterion: a construct must share **more variance** with its own items (AVE) than with any other item.

construct of the model. This means that the square root of a construct's AVE must be

higher than its correlations with the other constructs.

This rule ensures that each latent variable is clearly differentiated from the others thus avoiding conceptual overlaps. In practice, this validation reinforces the model's robustness by ensuring that the measurement scales assigned to each construct are not influenced by irrelevant relationships with other variables.

In short, verifying discriminant validity is a crucial step in establishing the credibility of a PLS model, and relies on a clear distinction between a construct's internal shared variance and that shared with other constructs

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Table 5: Discriminant validity test

	Manager profile	Innovation technology	Promoting sustainability	Strategic communication	Risk management	Resilience of tourist destination
Manager profile	0,909					
Innovation technology	0,600	0,818				
romoting sustainability	0,566	0,477	0,852			
Communication strategic	0,560	0,598	0,486	0,801		
Risk management	0,606	0,456	0,522	0,618	0,841	
Resilience of tourist destination	0,752	0,628	0,622	0,135	0,897	0,802

Source: Results obtained .from Smart-PIS V4 calculations.

4.4. Overall model quality: the goodness-of-fit test (GoF)

Assessing the quality of a measurement model is generally based on its ability to explain and account for the phenomena observed. This assessment is made in particular through the coefficient of determination (RA2) of the endogenous variables.

Unlike structural equation modeling based on the maximum likelihood method (SEM− ML), PLS modeling does not optimize any function.scalar, resulting in a natural lack of a global index that can offer full model validation (Tenenhaus et al., 2005).

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To remedy this shortcoming, Tenenhaus et al (2005) propose the use of GoF (Global goodness-of-fit) as a solution. This goodness-of-fit index is calculated based on the average of various measures such as explained variance, R^2redundancy index, and communality. Note for exogenous variables, redundancy and R^2 are not calculated.

The GoF[1] index can be obtained using the following formula:

$$\boldsymbol{GoF} = \sqrt{(\boldsymbol{Moyenne}\ (\boldsymbol{R^2}))\ (\boldsymbol{Moyenne}\ (\boldsymbol{Communality}))}$$

GoF[2] index value must be greater than 0.30 (recommended threshold).

[1] Tenenhaus M. (2004), A global goodness-of-fit index for PLS structural equation modelling.
[2] Global goodness-of-fit.

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Table 6: Explained variance (R2), "communality", "redundancy" and GoF index of the model

Built	R^2 (variance explained)	Redundancy	Communality
Manager profile		**0,95325006**	**0,95125007**
Technological innovation		**0,95539621**	**0,95539621**
Promoting sustainability		**0,93066236**	**0,93066236**
Strategic communication		**0,97364555**	**0,97364555**
Risk management		**0,94133742**	**0,94133742**
Tourism destination resilience	**0,32526444**	**0,28078502**	**0,28078502**
Total	0,880		
Average	0,440		0,940
GoF		**0,645**	

Source: Smart PLS software output

4.5. Evaluation of results based on hypotheses

To test our hypotheses, we will proceed in two stages. First, we will examine the degree of significance of the regression coefficients between the latent variables. Secondly, we will use a bootstrap simulation on a sample of 500 individuals, as recommended by Chin (1998). This will enable us test the

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statistical significance of each coefficient. The table below shows our assumptions, the regression coefficients( ) and Student's t values.

Table 7: Bootstrap estimation of causal model parameters

Assumptions	*B* (*Coff Correl.*)	P–T–Student values (Bootstrap) (<0.05)		Meaning.
H_1 : Manager profile Dest. resilience tourist	**0,085**	0,924	0,345	**Not validated**
H_2: technological innovation Resilience tourist destination	**0,429**	**4,632**	0,000	**Validated**
H_3: promoting sustainability Resilience of tourist destination	**0,199**	**2,224**	0,034	**Validated**
H_4: communication transparent Tourist destination resilience	**–0,033**	0,836	0,525	**Not validated**

Source: *designed by us based on Smart PLS4 software output.*

Interpretation and validation of hypotheses

For Hypothesis H_l: Executive profile–Tourism destination resilience

Hypothesis H_l, which postulates a relationship between analysis of the relationship between executive profile and tourism destination resilience, is not validated according to the results obtained. The estimates reveal a positive correlation between these two variables, with a coefficient of 0.085. However, the value of the t–Student statistic is 0.924, which is less than 1.96 (a threshold often used to determine significance), indicating a non–significant relationship between the two variables. Consequently, we conclude that hypothesis H_l **is not confirmed**.

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Hypothesis H_2: technological innovation– Destination resilience tourism

The results of the analysis show that the relationship between technological innovation and tourism destination resilience is validated according to the results obtained. Indeed, the correlation between these two variables is positive (β = 0.199). This correlation is significant at the threshold, meaning that it is probable and not due to chance. The t- Student value is above the significance threshold (4.632> 1.96), confirming that the relationship between these two variables is significant. Hence, hypothesis (H_2) is **validated**.

➤ For Hypothesis H_3: Promoting sustainability → Resilience in tourist destinations

Hypothesis H_3 proposes that promoting sustainability strengthens the resilience of tourism destinations. However, the correlation coefficient (β = 0.004) is very low and close to zero, suggesting that there is virtually no relationship between these two variables. The T-Statistic of The T-Statistic of 2.224 is also high, indicating that this relationship is statistically highly significant. Consequently, this hypothesis is **validated**. This means that, in this specific context, the development of sustainable tourism and the promotion of sustainable practices significantly influence the resilience of tourism destinations.

➤ Hypothesis H_4 : Strategic and transparent communication → Resilience of tourist destinations

The results obtained do not confirm hypothesis H_4, which assumes a relationship between Strategic and Transparent Communication and the resilience of tourism destinations. The estimates highlight a positive correlation between these two variables, characterized by a β coefficient of **–0.033**. However, examination of the t-Student statistic reveals a value of 0.868, below the 1.96 threshold commonly used to determine significance. This finding indicates a lack of significant relationship between strategic and transparent communication and tourism destination resilience, and therefore this hypothesis **is not validated** in the context of our study.

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Conclusion

The aim of this study was to examine the links between risk management and the resilience of tourism destinations, a crucial topic in a world where health crises, natural disasters and economic upheavals regularly put this vulnerable sector to the test. The central issue was the ability of tourist destinations to overcome these

challenges by drawing on specific risk management pillars and resilience practices.

The theoretical framework laid the necessary conceptual foundations, defining risk management as a structured process involving prevention, preparation, innovation and strategic communication. At the same time, resilience was conceptualized as the ability of destinations to adapt, transform and maintain their attractiveness in the face of disruption. This framework has led to the formulation of several hypotheses testing the impact key elements of risk management on tourism resilience.

The empirical results obtained using the structural equation method revealed nuanced conclusions. Technological innovation and the promotion of sustainability were found to have a significant effect on the resilience of tourist destinations, confirming their central role in companies' ability to adapt to crises. On the other hand, the postulated relationships between management profile and strategic communication, on the one hand, and resilience, on the, were not validated in this context. This underlines the need for a more targeted approach, tailored to the specific characteristics of each destination.

These results have important practical implications. They highlight the importance of investing in innovative technologies and promoting sustainable tourism as levers of long-term resilience. In addition, they invite managers and decision-makers to reassess the impact of strategic communication and leadership skills, into account the contextual and cultural variations specific to each destination.

In conclusion, while this research has provided valuable insights, it also calls for further analysis. Future studies could explore the interactions between the different pillars of risk management and their combined effects on resilience. In addition, broadening the scope of the study to other types of crisis or geographical contexts would further diversify the lessons learned and strengthen the scope of recommendations for a more resilient and adaptable tourism sector.

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