

Innovation, technologies and barriers in the tourism sector in the north of Caldas, Colombia

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Abstract

The objective of this article is to present the general results of the tourism sector in the northern part of the Department of Caldas and specifically an analysis related to innovation, the use of information technologies and the barriers that are being presented in this sector. Based on a qualitative research, with a descriptive and correlational type of study a multivariate analysis was used and it was possible to consolidate a response base of 68 direct entrepreneurs direct and indirect businessmen of the tourism sector in the municipalities of Neira and Salamina in the Department of Caldas. The results show that, for the companies surveyed, innovation in tourism is fundamental for their growth. and the creation of innovative experiences, as well as the use of social networks as the most effective tools for disseminating new tourism products. It is concluded that the absence of governmental support has a negative impact on the economic growth of both tour operators and companies in the sector.

Resumen

El objetivo del artículo es presentar los resultados generales del sector turístico del norte del Departamento de Caldas y específicamente un análisis relacionado con la innovación, el uso de las tecnologías de información y las barreras que se viene presentando en dicho sector, partiendo de una investigación cualitativa, con un tipo de estudio descriptivo y correlacional, se utilizó un análisis multivariado y se logró consolidar una base de respuesta de 68 empresarios directos e indirectos del sector turístico de los municipios de Neira y Salamina del Departamento de Caldas. Los resultados presentan que, para las empresas encuestadas, la innovación en turismo es fundamental para el crecimiento de ellas y la creación de experiencias innovadoras, así como es de importante el uso de las redes sociales como las herramientas más efectivas de difusión de nuevos productos turísticos. Se concluye que la ausencia de respaldo gubernamental impacta negativamente en el crecimiento económico tanto de los operadores turísticos como de las empresas del sector.

Keywords: innovation, social networks, governmental support, barriers, sustainability.

Palabras clave: innovación, redes sociales, apoyo gubernamental, barreras, sostenibilidad.

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Why was it conducted?:

Tourism plays a valuable role not only in promoting the country internationally, but also in preserving cultural and natural heritage, and its importance includes economic and social dimensions, as it promotes community development and poverty reduction. Despite efforts in state policy in this regard, latent weaknesses are identified in some regions, mainly on the supply side, due to difficulties in accessing and using technologies, resistance to change and the consequent digital gap that potentially separates some from others within the tourism value chains and systems that affect the north of the department of Caldas, specifically the municipalities of Neira and Salamina, a process in which innovation, mainly open innovation, is the protagonist.

What were the most relevant results?

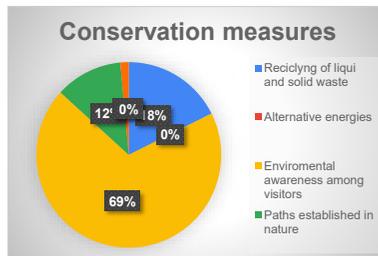
The innovation of tourism products is essential for the growth of companies and the creation of innovative experiences generates greater competitiveness of the destination compared to traditional destinations and experiences, an aspect within which the use of social networks are the most effective tools for the dissemination of new tourism products. A collaborative approach can not only boost innovation, but also improve the sustainability and competitiveness of the offer. It is important to highlight the importance of the lack of government support that is reflected in the economic growth of tour operators and tourism companies, and the lack of financial support from government entities that is reflected in the development of innovation in tourism products.

What do these results contribute?

The call to awareness that the absence of government support negatively impacts the economic growth of both tourism operators and companies in the sector. Thus, the government and stakeholders must adopt strategies that seek to make the tourism sector more attractive, take advantage of the potential of IT and partner with the private sector to develop the attributes of IT that improve tourism, among others, that allow companies to develop a clear smart tourism strategy that connects digital technology with added commercial value. These results also make possible to design of a roadmap to build resilient innovation ecosystems that drive economic prosperity, environmental responsibility and community well-being.

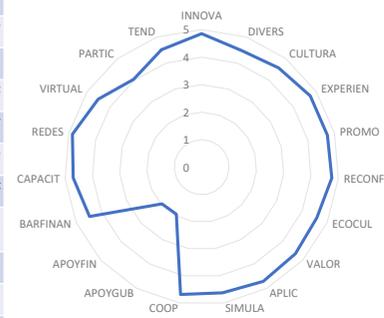
Graphical Abstract

Tourism in the north of Caldas department



Nombre	Descripción
INNOVA	Product innovation in tourism is fundamental for the growth of your company.
DIVERS	Diversification of the municipality's tourism offer contributes to tourist satisfaction.
CULTURA	The reflection of the municipality's culture and history is the main aspect to consider in the development of new tourism products.
EXPERIEN	The creation of innovative experiences generates greater competitiveness of the destination compared to traditional destinations and experiences.
PROMO	The promotion of experiences is aimed at expanding the market of both national and international visitors.
RECONFIG	The reconfiguration of existing tourism products is aimed at attracting different consumers.
ECOCUL	Ecological and cultural tourism should be the main focus in the development of new tourism products in the municipality.
VALOR	Adding attributes that denote added value to tourism products improves the perception of your municipality's brand as an ecological and cultural destination.
APLIC	Destination promotion strategies through technological applications are aimed at consolidating the ecological values and cultural aspects of the municipality.
SIMULA	The representation of the main ecological and cultural tourist attractions through simulation on technological platforms would help tourist accessibility.
COOP	Cooperation among tourism companies fosters the development of new tourism products and the consolidation of existing ones.
APOYGUB	Government support is reflected in the economic growth of operators and tourism companies.
APOYIN	Financial support from government entities is reflected in the development of tourism product innovation.
BARFINAN	One of the main barriers to innovating in tourism sector companies is the lack of liquidity or financing sources.
CAPACIT	Trained human capital is fundamental for the successful implementation of new tourism experiences.
REDES	The use of social networks (e.g., Facebook, Instagram, Twitter, and business apps) represents more effective tools for spreading new tourism products compared to traditional methods (flyers, TV and radio ads, etc.).
VIRTUAL	Promoting your municipality as an ecological and cultural destination through immersive learning virtual environments (analogous technologies of virtual reality or augmented reality) enables tourist loyalty and environmental education.
PARTIC	The development of new products must be carried out with the participation and support of government tourism sector managers in your municipality.
TEND	Knowledge of market trends facilitates the development of experience innovation.

Likert scale, rated from 1 to 5, where 1 indicates totally disagree, 2 disagree, 3 neutral, 4 agree and 5 totally agree.



Recommendations

- 1) Making the tourism sector more attractive
- 2) Harnessing the potential of IT
- 3) Partnering with the private sector
- 4) Subsidizing the cost of Internet connectivity
- 5) Promoting an e-tourism platform

Introduction

Tourism plays a fundamental role in today's world, and its importance spans multiple economic, cultural, and social dimensions. Firstly, tourism is a significant economic engine in numerous countries, generating income, employment, and business opportunities (1). Many nations heavily rely on this industry to maintain sustainable economic growth. Tourism also plays a role in the conservation of cultural and natural heritage. The need to protect tourism resources can lead to the preservation of historical sites and natural environments. Additionally, tourism revenues often reinvest in the restoration and maintenance of these attractions.

Since the second half of the 20th century, tourism has continued to grow, becoming one of the most relevant economic activities globally. In 2019, the tourism industry represented 10.4% of global GDP, underscoring its increasing global significance in the travel sector. This level of tourism growth has brought about a series of economic, social, and environmental challenges, which have fueled scholars' interest in efforts to understand and explain aspects of this remarkable phenomenon (2).

Tourism is considered one of the most dynamic and important industries in many countries, playing a vital role in contributing to the economies of many developing countries. Furthermore, the tourism industry has provided many opportunities for governments to position their countries in the global economic space, thereby stimulating the development of urban and rural economies (3). Tourism has become a significant strategy for communities to achieve economic, social, and ecological benefits, promoting community development and poverty reduction (4).

Background information on the topic presents findings such as those by (5), who explain that tourism offers unprecedented opportunities for management and marketing, as well as immersive interaction with multiple stakeholders. Tourists can preview destinations and tourism services before purchasing, while also complementing real experiences at the destination. Additionally, sustainable growth of tourism activities will positively impact social and economic sectors, but the repercussions on coastal environments can be negative across all levels (pollution, waste, infrastructure, and habitats already under pressure) (6).

The tourism industry is considered a successful wing of the economy. It can generate significant foreign exchange earnings, job creation, improvement of transport infrastructure, globalization of socioeconomic aspects, economic growth, and enhancement of welfare. The direct gross domestic product (GDP) from tourism amounted to \$3.3 trillion in 2023 according to provisional estimates, approximately 3% of global GDP, values similar to those of 2019, driven by strong domestic and international travel (7).

In Colombia, tourism plays a significant role by contributing prominently to the economy, culture, and international promotion of the country. Economically, tourism is an important source of income, employment, and infrastructure development. Colombia boasts a diverse geographical landscape including beaches, tropical jungles, mountains, historic cities, and a rich indigenous culture, making it an attractive destination for travelers.

According to (8), between 2012 and 2019, Colombia experienced growth in key tourism indicators: foreign tourist arrivals increased by 106%, the number of tourism service providers by 124%, foreign exchange generation by 32.8%, and employment in the sector by 9.8%. Consequently, the hotel and restaurant sector's contribution to the country's Gross Domestic Product (GDP) rose from 3.4% in 2012 to 3.9% in 2019, an increase of 0.5 percentage points.

Paraphrasing (9), on a national scale, tourism is observed as a notable contributor to the economy. Despite state efforts to improve policies related to the tourism sector, weaknesses are identified in some regions. Low competitiveness in these areas is attributed to economic resource scarcity, lack of knowledge, and absence of strategies among various stakeholders involved in tourism processes. These aspects become barriers hindering the coordination of these stakeholders, particularly on the supply side, due to difficulties in accessing and utilizing technologies, resistance to change, and the resultant digital gap that potentially are separating different actors within tourism value chains and systems.

Studies like that of (10) demonstrate how, through the measurement of factors such as 1) Nature; 2) Heritage; 3) Infrastructure; 4) Information technologies; 5) Marketing; 6) Mobile applications; 7) Human talent; 8) Quality; 9) Security; 10) Culture; 11) Economy; 12) Sustainability; and 13) Cooperation, it was concluded that 'the country's tourism system faces a significant and imminent risk of impact. This situation implies that the attention and intervention of various social sectors (public, private and community) are crucial to prevent various types of deterioration in the current national tourism system.'

In this vein, (11) argues regarding the importance of knowledge management to jointly offer tourism services, facilitating the construction and implementation of differentiated experiences and exceptional service that translates into memorable tourist experiences. And the study by (12), which in its findings reveals disparities between producers and intermediaries that create asymmetries and diminish negotiating capacity, hindering the acquisition of crop sales contracts in advance at fair prices.

Within this issue, there is a clear need to identify strategies aimed at contributing to the solution. Thus emerges the concept of innovation as a fundamental element to articulate responses aimed at enhancing the competitiveness of tourism enterprises, improving customer experience, promoting sustainability and operational efficiency, and adequately responding to the mandatory adaptation to change.

Finally, from an economic perspective, tourism has provided employment opportunities and economic growth in the northern part of Caldas department, specifically in the municipalities of Neira and Salamina. These municipalities have capitalized on their rich historical heritage and colonial architecture to attract visitors interested in learning about their culture and traditions. Tourism activity has boosted job creation in hospitality, gastronomy, and crafts, benefiting local communities and improving their quality of life.

Therefore, it is justified to address the identification of barriers that hinder the necessary adoption of responsible tourism strategies in this region, highlighting the evident interest and recognition of the role played by Information and Communication Technologies (ICTs) in the current tourism scenario, a process in which innovation, especially open innovation, takes center stage.

Methodology

This research adopted a qualitative approach and was based on various types of studies, including descriptive, correlational and explanatory. Multivariate analysis was used for the latter type of study. Surveys were employed as the working tool, grounded in previous research and a solid theoretical framework; a pilot test was conducted and a group of experts was involved in designing appropriate questions. Based on statistical convenience, given the limited observations that precluded sampling, and through several workshops involving direct and indirect entrepreneurs from the tourism sector in the municipalities of Neira and Salamina, Department of Caldas, a response base of 68 entrepreneurs was consolidated. Additionally, a survey was developed, evaluated by experts, and piloted. Subsequently, the survey instrument was distributed among tourism sector entrepreneurs in Neira and Salamina municipalities from Caldas Department. The survey instrument

included Likert-scale questions rated from 1 to 5, where 1 indicates completely disagree, 2 disagree, 3 neutral, 4 agree, and 5 completely agree. Table 1 details the variables assessed in the study.

The survey results underwent normality analysis using the Kolmogorov-Smirnov test, suitable for small samples. Additionally, Spearman correlation analysis and Cronbach's Alpha analysis were conducted. These tests are crucial for assessing the reliability of the measurement scale used.

Table 1. Variables and description

Name	Description
INNOVA	Product innovation in tourism is fundamental for the growth of your company.
DIVERS	Diversification of the municipality's tourism offer contributes to tourist satisfaction.
CULTURA	The reflection of the municipality's culture and history is the main aspect to consider in the development of new tourism products.
EXPERIEN	The creation of innovative experiences generates greater competitiveness of the destination compared to traditional destinations and experiences.
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APLIC	Destination promotion strategies through technological applications are aimed at consolidating the ecological values and cultural aspects of the municipality.
SIMULA	The representation of the main ecological and cultural tourist attractions through simulation on technological platforms would help tourist accessibility.
COOP	Cooperation among tourism companies fosters the development of new tourism products and the consolidation of existing ones.
APOYGUB	Government support is reflected in the economic growth of operators and tourism companies.
APOYFIN	Financial support from government entities is reflected in the development of tourism product innovation.
BARFINAN	One of the main barriers to innovating in tourism sector companies is the lack of liquidity or financing sources.

Name	Description
CAPACIT	Trained human capital is fundamental for the successful implementation of new tourism experiences.
REDES	The use of social networks (e.g., Facebook, Instagram, Twitter, and business apps) represents more effective tools for spreading new tourism products compared to traditional methods (flyers, TV and radio ads, etc.).
VIRTUAL	Promoting your municipality as an ecological and cultural destination through immersive learning virtual environments (analogous technologies of virtual reality or augmented reality) enables tourist loyalty and environmental education.
PARTIC	The development of new products must be carried out with the participation and support of government tourism sector managers in your municipality.
TEND	Knowledge of market trends facilitates the development of experience innovation.

Results and discussion

In 50% of the surveyed companies, employees are not related to the owners' families, whereas in 15% of these companies, they are. This indicates a significant openness to employee participation beyond family affiliation, focusing on fulfilling a service mission.

The primary tourism offerings of the companies are categorized as 40% cultural tourism, 31% sustainable tourism, and 16% nature tourism. This shows the diversity of approaches being offered by the surveyed companies, with a significant emphasis on recognizing and supporting sustainability.

The supplementary tourism services offered by the companies include 31% accommodation, 16% cultural events, and 12% food services. Considering the diverse needs of clients, especially in terms of accommodation and food services, which together account for more than 50% of the services, this represents a comprehensive view of service provision.

Regarding potential customers, the tourism offerings of both municipalities cater to 56% elderly people, children, pregnant women, individuals with physical disabilities, and members of the LGBTI communities, with 12% offering spaces and services for pets. This could result from demographic changes in the region, recognition of diversity, and the redefinition of families within the social context.

Concerning additional services, 26% of the companies offer activities adapted for inclusion, 19% cater to people with disabilities, and 11% provide specialized guides. These data were obtained from the analysis of the visiting population, among which a significant percentage requires mobility assistance.

Regarding the environment and its protection, 69% of the companies engage in environmental awareness activities with visitors, 18% conduct recycling of liquid and solid waste, and 12% have ecological trails. This represents a social contribution to the need to care for our resources and nature.

Lastly, 84% of the companies see their future threatened due to the potential loss of natural resources in the near future. Phenomena such as climate change and its effects

on the resources of the northern region of the department of Caldas, which are greatly affected by extreme weather, potentially lead to the impossibility of offering services that support the livelihood of families and businesses.

Having carried out the previous descriptive analysis, the second step was to evaluate the defined variables according to the Likert scale, rated from 1 to 5, where 1 indicates totally disagree, 2 disagree, 3 neutral, 4 agree, and 5 totally agree. The companies' assessments and the results can be seen in Figure 1.

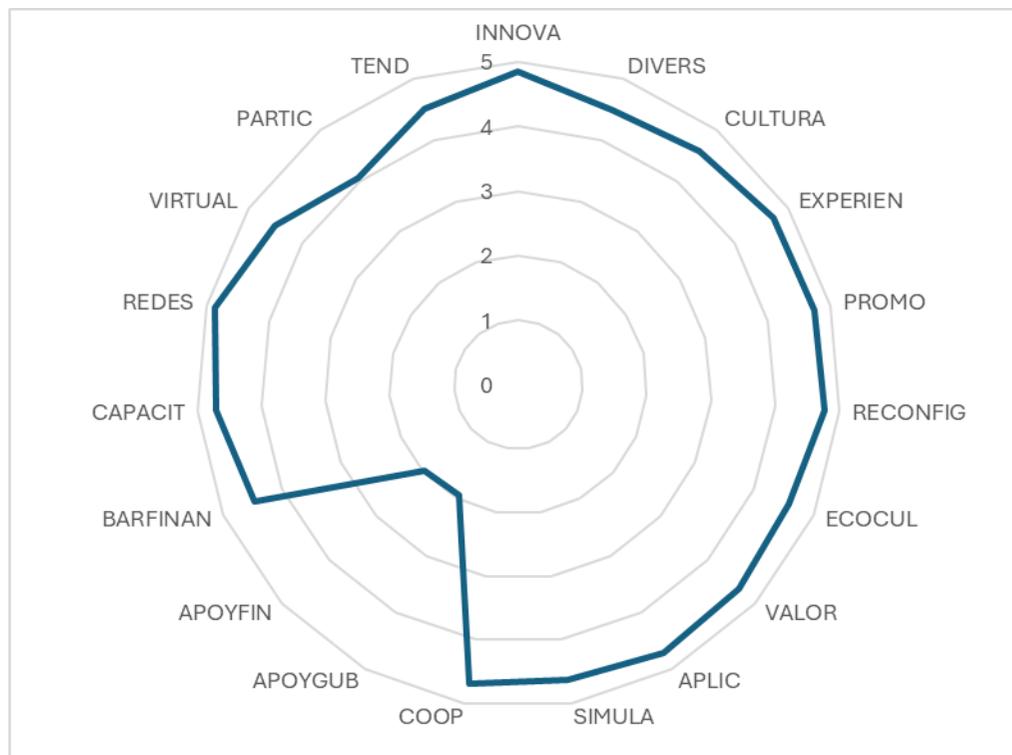


Figure 1. Survey results

Innovation in tourism products is fundamental for the growth of companies, and creating innovative experiences increases the destination's competitiveness compared to traditional destinations and experiences.

In this regard, the fusion of collaboration, innovation, and sustainability has various implications for regions facing similar challenges and opportunities, offering them a roadmap to build resilient innovation ecosystems that drive economic prosperity, environmental responsibility, and community well-being.

For companies in the tourism sector, adopting the principles of innovation can be implemented through strategic partnerships and collaborations. They should actively seek collaboration opportunities, whether with other tourism companies, local suppliers, or startups. This collaborative approach can not only drive innovation but also enhance the sustainability and competitiveness of their offerings (13).

Tourism companies need to adopt the practice of open innovation and collaborate with diverse external partners such as customers, local communities, and other interested entities. This collaboration is crucial for generating new ideas and solutions that can enhance their competitiveness and sustainability. Additionally, it is important for tourism companies to promote a culture of innovation and creativity among their employees, encouraging them to think innovatively and experiment with new ideas and technologies.

Implementing open innovation can significantly contribute to the development of more sustainable tourism practices through collaboration with environmental organizations, government authorities, and other relevant stakeholders in the tourism sector (14).

The results illustrate that, in the rural context, tourism SMEs are interested and motivated to innovate not only for their own benefit but also to contribute to the overall destination community. This motivation stems from the particular characteristics of the rural context, such as local roots, strong local ties, concern for the community's social and cultural well-being, and the willingness to help each other. They also invite other community stakeholders (e.g., public organizations, industry agents, cultural management organizations, external professionals, local citizens, and family members) to participate (15). Thus, innovation arises from the generation and application of knowledge, highlighting its exchange within organizations as a driver for creating new innovative solutions. Consequently, this exchange becomes crucial in the tourism sector (16).

Regarding social media, its use represents one of the most effective tools for disseminating new tourism products compared to traditional methods, as destination promotion strategies through technological applications are aimed at consolidating the ecological values and cultural aspects of the municipalities.

Companies should develop a clear smart tourism strategy that connects digital technology with added business value. This can be achieved by creating defined corporate objectives, instituting performance reviews, and building platforms for collaboration. Meanwhile, staff training should be improved to better understand the relationship between technology and business (17). The Internet and information technologies are crucial at all operational, structural, marketing, and strategic levels to facilitate global communication between suppliers, consumers, and intermediaries (18).

ICT are necessary to support the integrated services of tourism providers. Besides treatment and care services, ICT plays an important role in business operations, serving as a source of information, simplifying payment processes, facilitating logistics, and other administrative processes (19).

While most of the evaluated variables have high ratings, the lowest ratings also stand out. For example, the lack of government support is reflected in the economic growth of tourism operators and companies, and the lack of financial support from government entities is reflected in the development of innovation in tourism products.

These results align with those found by (20), who explain that it is necessary to focus on developing strategies to promote sustainable tourism, given the perceived lack of awareness in key areas such as social, rural, and environmental preservation. Additionally, there is a lack of government support in this regard.

Similarly, the findings of (21) resonate, who argue in a study on the tourism sector that there is a lack of government support in terms of budget, logistics, and overall assistance for tourism. This financial precariousness translates into a lack of resources and liquidity, especially to address the necessary technical requirements. Moreover, there is weak identification and classification of the tourism offer, with many activities presenting few available products. This is exacerbated by the lack of dissemination, promotion, and marketing of cultural, artistic, and heritage programs, leading to a general lack of awareness of the available offerings.

According to (22) in their study on the management of regional tourism resources, several factors hinder the widespread adoption of responsible tourism programs in emerging economies. Among these factors, the cost associated with responsible tourism practices, competition in the sector, and the lack of government support stand out. These elements



act as barriers that impede the active dissemination of responsible tourism programs in these economies.

Now, having presented the descriptive analyses and the evaluation of the most prominent variables, the next step was to determine the behavior of the variables. For this purpose, a correlation analysis was conducted, which can be observed in Table 2.

Table 2. Correlation analysis

	INNO	DIVERS	CULT	EXP	REC	ECO	VALOR	APLIC	SIMULA	COOP	APGUB	APFIN	BARFIN	CAP	RED	VIRT	PART	TEND	
INNO	1	,783**	,713**	,970**	,805**	,721**	,789**	,866**	,866**	,844**	,576**	-0,091	0,066	,769**	,782**	,720**	,778**	,549**	,705**
	,783**	1	,936**	,838**	,901**	,939**	,709**	,758**	,758**	,676**	,472**	-0,194	0,043	,566**	,634**	,414*	,582**	,425*	,504**
CULT	,713**	,936**	1	,738**	,824**	,911**	,684**	,779**	,779**	,661**	,555**	-0,081	0,097	,542**	,734**	,520**	,592**	,458*	,538**
EXP	,970**	,838**	,738**	1	,853**	,791**	,780**	,870**	,870**	,843**	,585**	-0,134	0,057	,737**	,766**	,600**	,742**	,464*	,677**
PROM	,805**	,901**	,824**	,853**	1	,901**	,529**	,650**	,650**	,677**	,420*	-0,164	0,047	,590**	,565**	,468*	,523**	0,251	,503**
REC	,721**	,939**	,911**	,791**	,901**	1	,710**	,770**	,770**	,669**	,511**	-0,229	0,000	,544**	,664**	,393*	,584**	0,323	,511**
ECO	,789**	,709**	,684**	,780**	,529**	,710**	1	,952**	,952**	,727**	,655**	-0,108	0,024	,606**	,845**	,517**	,799**	,637**	,643**
	,866**	,758**	,779**	,870**	,650**	,770**	,952**	1	1,000**	,819**	,743**	-0,037	0,085	,677**	,943**	,630**	,832**	,600**	,726**
APLIC	,866**	,758**	,779**	,870**	,650**	,770**	,952**	1,000**	1	,819**	,743**	-0,037	0,085	,677**	,943**	,630**	,832**	,600**	,726**
	,844**	,676**	,661**	,843**	,677**	,669**	,727**	,819**	,819**	1	,552**	-0,041	0,147	,696**	,756**	,787**	,883**	,401*	,812**
COOP	,576**	,472**	,555**	,585**	,420*	,511**	,655**	,743**	,743**	,552**	1	0,191	-0,112	,415*	,793**	,463*	,553**	0,356	,503**
	-0,09	-0,19	-0,08	-0,13	-0,16	-0,22	-0,10	-0,037	-0,037	-0,041	0,191	1	,567**	-0,321	0,120	0,128	0,048	0,175	0,081
APFIN	0,066	0,043	0,097	0,057	0,047	0,000	0,024	0,085	0,085	0,147	-0,112	,567**	1	-0,085	0,179	0,168	0,206	0,268	0,227
	,769**	,566**	,542**	,737**	,590**	,544**	,606**	,677**	,677**	,696**	,415*	-0,321	-0,085	1	,612**	,583**	,621**	,481**	,634**
CAP	,782**	,634**	,734**	,766**	,565**	,664**	,845**	,943**	,943**	,756**	,793**	0,120	0,179	,612**	1	,670**	,772**	,549**	,704**
RED	,720**	,414*	,520**	,600**	,468*	,393*	,517**	,630**	,630**	,787**	,463*	0,128	0,168	,583**	,670**	1	,768**	,467*	,652**
VIRT	,778**	,582**	,592**	,742**	,523**	,584**	,799**	,832**	,832**	,883**	,553**	0,048	0,206	,621**	,772**	,768**	1	,590**	,732**
PART	,549**	,425*	,458*	,464*	0,251	0,323	,637**	,600**	,600**	,401*	0,356	0,175	0,268	,481**	,549**	,467*	,590**	1	,409*
TEND	,705**	,504**	,538**	,677**	,503**	,511**	,643**	,726**	,726**	,812**	,503**	0,081	0,227	,634**	,704**	,652**	,732**	,409*	1

** Correlation is significant at the 0.01 level (bilateral).

* Correlation is significant at the 0.05 level (bilateral).

The values marked in red, which account for 38% of the total correlation, indicate a positive and significant correlation among the variables with the highest statistical significance. These include innovation, diversification of the tourism offer, culture, innovative experiences, ecological and cultural tourism, and attributes that denote added value to tourism products.

Based on the above, we agree with (23) in recommending that the government and stakeholders adopt strategies such as:

Making the tourism sector more attractive to increase tourist arrivals and revenue.

Leveraging the potential of ICT for economic growth, especially regarding mobile phone subscription and usage.

Partnering with the private sector to develop ICT attributes that enhance tourism.

Subsidizing the cost of internet connectivity, without which the growth-enhancing effect of ICT is substantially reduced.

Promoting an e-tourism platform so that the benefits of tourism have far-reaching multiplier effects on economic growth.

Additionally, it is noted that tourism professionals and policymakers need to monitor emerging trends and issues in open innovation, tourism, and sustainability to stay updated on the latest advancements and opportunities.

Conclusions

Innovation processes encompassing the conception, development, and implementation of tourism products are fundamental to business growth and the creation of innovative experiences. These processes enhance the competitiveness of destinations compared to those that rely on traditional experiences, thus playing a crucial role in the development and expansion of companies in the sector.

Innovation arises from the generation and application of knowledge, highlighting its exchange within and between organizations as a driving force for the creation of new solutions. Therefore, this exchange becomes crucial in the tourism field, emphasizing the role of open innovation within these processes.

The creation of innovative experiences not only enriches the tourism offer but also boosts the competitiveness of the destination. These initiatives allow destinations to differentiate themselves and stand out from the competition, offering travelers unique and memorable experiences. In an increasingly saturated market, the ability to innovate becomes a determining factor for success and sustainable growth in the tourism industry.

The use of social networks stands out as a highly effective tool for disseminating new tourism products, surpassing traditional promotion methods. In addition, destination promotion strategies through technological applications are aimed at consolidating the ecological values and cultural aspects of municipalities. This combination of technological and values-based approaches contributes to more effective and attractive promotion of the tourist destination, generating greater interest and commitment from travelers.

The lack of government support negatively impacts the economic growth of both tourism operators and companies in the sector, being one of the main identified barriers. This deficiency is particularly evident in the lack of financial support from government entities for the development and innovation of tourism products. This situation represents a significant obstacle to the progress and competitiveness of the tourism industry, limiting its capacity to offer renewed and attractive experiences that can meet the changing demands of tourists and maintain relevance in the market.

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References

1. Condori Chura D, Flores-Vargas SA. Impactos económicos del turismo en proveedores de servicios turísticos a nivel mundial: Una revisión sistemática. Puriq [Internet]. 2023; 5:e540. Disponible en: <http://revistas.unah.edu.pe/index.php/puriq/article/view/540>
2. Coll Ramis MA. Tourism education in Spain's secondary schools: The curriculums' perspective. J Hosp Leis Sport Amp Tour Educ [Internet]. 2020; 100292. Disponible en: <https://doi.org/10.1016/j.jhlste.2020.100292>.



3. OMT - International tourism highlights [Internet]. Informe de turismo 2019. OMT - International tourism highlights; 2024. Disponible en: <https://www.e-unwto.org/doi/pdf/10.18111/9789284421152>
4. Akbar I, Yang Z, Mazbayev O, Seken A, Udahogora M. Local residents' participation in tourism at a world heritage site and limitations: a case of Aksu-Jabagly natural world heritage site, Kazakhstan. *Geoj Tour Geosites* [Internet]. 2020; 28(1):35-51. Disponible en: <https://doi.org/10.30892/gtg.28103-450>
5. Buhalis D, Leung D, Lin M. Metaverse as a disruptive technology revolutionising tourism management and marketing. *Tour Manag* [Internet]. 2023; 97:104724. Disponible en: <https://doi.org/10.1016/j.tourman.2023.104724>.
6. Mejjad N, Rossi A, Pavel AB. The coastal tourism industry in the Mediterranean: A critical review of the socio-economic and environmental pressures & impacts. *Tour Manag Perspect* [Internet]. 2022 ; 44:101007. Disponible en: <https://doi.org/10.1016/j.tmp.2022.101007>.
7. World Tourism Barometer [Internet]. Informes de turismo 2024. Disponible en: <https://webunwto.s3.eu-west-1.amazonaws.com/s3fs-public/2024-01/barometer-turism-data-ppt-jan24.pdf?VersionId=ua6xuwZCeveZWEzblFVP5eXUmGszXhXs>
8. MINCIT - Ministerio de Comercio, Industria y Turismo [Internet]. Informes de turismo 2020| MINCIT - Ministerio de Comercio, Industria y Turismo; 2024. Disponible en: <https://www.mincit.gov.co/estudios-economicos/estadisticas-e-informes/informes-de-turismo>.
9. Serrano A, Montoya L, Amado N. La competitividad turística. Una aproximación desde el Departamento de Boyacá Colombia, *Tendencias*, [Internet]. 2024; 22(1): 226-253. Disponible en: <https://revistas.udenar.edu.co/index.php/rtend/article/view/6184>
10. Garavito L, Rozo E, Mojica F. ¿Puede el turismo liderar el desarrollo competitivo y sostenible en el presente y el futuro próximo en Colombia? *Via Tour Rev* [Internet]. 2019; (15). Disponible en: <https://doi.org/10.4000/viatourism.3522>.
11. Marulanda C, López M, Suárez M. Gestión del conocimiento y procesos en las empresas del sector turístico del departamento de Caldas (Colombia). *Pensamiento & Gestión*, [Internet]. 2022; 52):2. Disponible en: <https://rcientificas.uninorte.edu.co/index.php/pensamiento/article/view/13454>.
12. Soto L, Cardona L. Asociatividad rural. en los sectores agrarios, turismo-artesanal y medio ambiente en: Manizales, Villamaría, Riosucio y Aguadas. (Caldas) *Retos* [Internet]. 2019; 7(1), 45-63. Disponible en: <https://revistas.sena.edu.co/index.php/RETO/article/view/2519>.
13. Chu AC, Liao CH, Xu R, Chen PH. Dynamic effects of tourism shocks on innovation in an open-economy Schumpeterian growth model. *Econ Model* [Internet]. 2023 :106619. Disponible en: <https://doi.org/10.1016/j.econmod.2023.106619>.
14. Mota B, Rua OL, Neira-Gómez I. New advances in science mapping and performance analysis of the open innovation and tourism relationship. *J Open Innov* [Internet]. 2023 :100154. Disponible en: <https://doi.org/10.1016/j.joitmc.2023.100154>
15. Maziliauske E. Innovation for sustainability through co-creation by small and medium-sized tourism enterprises (SMEs): Socio-cultural sustainability benefits to rural destinations. *Tour Manag Perspect* [Internet]. 2024; 50:101201. Disponible en: <https://doi.org/10.1016/j.tmp.2023.101201>
16. Yati Y. Idea generation techniques in pop-up tourism labs. *Ann Tour Res Empir Insights* [Internet]. 2023; 4(1):100096. Disponible en: <https://doi.org/10.1016/j.annale.2023.100096>
17. Liu Q, Gao J, Li S. The innovation model and upgrade path of digitalization driven tourism industry: Longitudinal case study of OCT. *Technol Forecast Soc Chang* [Internet]. 2024; 200:123127. Disponible en: <https://doi.org/10.1016/j.techfore.2023.123127>.
18. Ping L, Ying Z, Huang S. Role of information technology in the development of e-tourism marketing: A contextual suggestion. *Econ Anal Policy* [Internet]. 2023. Disponible en: <https://doi.org/10.1016/j.eap.2023.03.010>.
19. Ayuningtyas D, Ariwibowo DA. The strategic role of information communication technology in succeeding medical tourism. *Enfermeria Clin* [Internet]. 2020; 30:170-3. Disponible en: <https://doi.org/10.1016/j.enfcli.2020.06.039>.



20. León Gómez A, Saavedra Camargo JA, García Revilla R, Mora Forero JA. Percepción de los estudiantes de turismo sobre el desarrollo turístico sostenible en Bogotá. *Turismo Soc* [Internet]. 2023; 33:231-54. Disponible en: <https://doi.org/10.18601/01207555.n33.10>.
21. Guzmán BE, Parra R, Tarapuez EI. Integración productiva y desarrollo del turismo cultural. *Espacios* [Internet]. 2020; 41(49):292-304. Disponible en: <https://doi.org/10.48082/espacios-a20v41n49p25>
22. Rodríguez G, Martínez C. Turismo responsable: propuesta para gestionar destinos turísticos regionales en la etapa post-covid-19. *Revista Universidad y Sociedad*, [Internet]. 2024; (14)1:128-136. Disponible en: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S2218-36202022000100128&lng=es&nrm=iso
23. Adeleye BN. Re-examining the tourism-led growth nexus and the role of information and communication technology in East Asia and the Pacific. *Heliyon* [Internet]. 2023; 9(2):e13505. Disponible en: <http://dx.doi.org/10.1016/j.heliyon.2023.e13505>