



Implementation of Digital Networks in Information Management in the Hotel Sector of La Candelaria, Bogotá, Colombia: A Hierarchical Analysis

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Abstract. This study examines the implementation of digital networks in lodging establishments in the 'La Candelaria' area of Bogotá, Colombia, through a descriptive multicriteria approach using the Analytic Hierarchy Process (AHP), integrating dimensions of digital marketing, technology management, information management, business performance, and territorial sustainability. A sample of 56 lodging establishments was assessed through structured observation, selected on the basis of verifiable digital visibility, alongside a panel of expert judges who prioritized the evaluation criteria. The results revealed a presence on platforms such as Facebook, Google Business, Booking, Instagram, and TripAdvisor, with notable shortcomings in the use of metrics, digital analytics, and the technological integration of organizational processes. The AHP analysis identified digital marketing and information management as the highest-priority criteria for advancing from an operational digital presence toward strategic management supported by data analytics. These results should be interpreted with caution given the discretionary nature of the sample; nonetheless, they offer a foundational roadmap for the digital growth of the lodging sector in ancestral tourism territories.

Keywords: digital networks, Analytic Hierarchy Process (AHP), digital marketing, information management, hotel sector.

1 Introduction

The digital era has transformed competitiveness in the economic sector of tourism and its services, particularly with regard to the lodging component (hotels), given that web presence, digital validity, and the use of real-time information are essential and guiding factors for achieving market positioning among lodging establishments [1, 2]. In urban tourism destinations with substantial historical content, such as the "La Candelaria" area in Bogotá, lodging establishments—hotels in particular—face the challenge of adapting to the new global digital ecosystem without departing from the cultural and heritage identity of the territory [3, 4].

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In Colombia, access to information technologies, including the use of artificial intelligence, continues to grow; however, several tourism services still show limited adoption of digital tools in strategic organizational processes, particularly among micro, small, and medium-sized enterprises (MSMEs) [5, 6]. In some organizations, digital visibility is limited to operational activities involving images or general communication, without systemic synergy among analysis, learning, and managerial decision-making [7, 8]. This is even more evident in the lodging sector, given that tourists' decisions today are influenced by reviews, social media chat, comments on booking platforms, and digital reputation [9, 10].

Therefore, this study focuses on analyzing the extent to which digital networks are used by lodging establishments in the "La Candelaria" area—not merely as a promotional channel, but as a contributor to the strategic management of information. To this end, the descriptive characterization of digital visibility is integrated with a multicriteria prioritization tool using AHP, which enables the organization and ranking of heterogeneous factors within a complex decision-making context [11, 12, 13].

This research makes two contributions: first, it reveals the degree of digital maturity among lodging establishments located near a historical and cultural heritage environment with more than three decades of existence; and second, it generates a hierarchy of criteria that supports the prioritization of organizational processes in relation to digital marketing, technology management, business performance, information management, and territorial sustainability. The descriptive multicriteria scope does not generalize statistical results across all tourism services, particularly lodging establishments; rather, it allows for the identification of patterns and prioritization criteria that support strategic decision-making.

2 Theoretical Framework

2.1 Digital Networks, Marketing, and Hotel Competitiveness

Digital networks have brought about a shift in the forms of intermediation within the tourism sector, moving away from traditional physical travel agencies toward a new digital ecosystem supported by websites, guest reviews, and direct communication with tourists [14, 15]. As a result, the competitiveness of the sector becomes less dependent on location, physical structure, or pricing, and shifts instead toward the capacity to operate within the digital environment through up-to-date visibility, increasing virality, the credibility of opinions, and the management of tourists' interactions and unique experiences [16, 17].

Furthermore, digital marketing functions as a system that integrates value, visibility, engagement, and adaptability within the sector to create value that encompasses both the functional and semiotic attributes of the services offered. Visibility relates to web search engines, social media, and tourism operation platforms centered on the lodging establishment's own platform; engagement involves interaction, trust, and joint co-creation between the receiver (lodging establishment) and the sender (tourist); and adaptability entails continuously updating platform content and providing timely, ongoing

feedback to tourists [18, 19, 20, 21]. In recent years, research findings have shown how brand interaction and digital marketing strategies influence tourist customer satisfaction and engagement [22, 23].

2.2 Information Management and Digital Maturity

Simply maintaining a presence on digital networks over time should not be equated with achieving digital maturity, since the latter requires collecting, organizing, analyzing, and integrating the data generated by posts, comments, reviews, searches, and bookings into strategic decision-making. If platforms are not connected to internal organizational processes, the resulting data remains scattered and underutilized, and networks and platforms end up functioning merely as a traditional promotional medium. Conversely, effective digital information management serves as a critical input for strategic mission-related, commercial, and communication decisions [1, 8].

This gap between visibility and strategic digital support is even more pronounced among micro and small lodging establishments, largely due to organizational culture constraints such as limited human talent, minimal use of data analytics, low investment in technology, and poor platform integration [7, 24]. This underscores the need to assess lodging establishments' degree of digital presence, as well as how the resulting data is used to support effective information management and strengthen organizational performance.

2.3 Territory, Sustainability, and Social Innovation

The "La Candelaria" area is a heritage tourism site where national history and culture converge for both domestic and international visitors, alongside substantial formal and informal business activity as well as social and community activism. In sites of this kind, the competitiveness of lodging establishments must integrate territorial identity, sustainability, and the tourist's cultural experience [25, 26]. Moreover, the high concentration of lodging establishments in the area intensifies competition, making digital differentiation a key strategic factor [27].

Additionally, social innovation is incorporated into the study as a contextual dimension rather than a central measurement variable, with the aim of understanding how digitalization fosters connections among tourism services, visitors, and the community—provided that it is oriented toward the generation of shared value rather than commercial efficiency alone [28, 29].

2.4 AHP as a Multicriteria Tool

Measuring the implementation of digital networks within a sector requires accounting for a range of heterogeneous factors, including visibility, reputation, usage metrics, level of automation, technology integration, business performance, and territorial sustainability. To analyze these factors, the AHP tool enables the decision to be broken down into hierarchical levels of objectives, criteria, and subcriteria, after which a panel of experts assigns priorities through pairwise comparisons [11, 12].

The AHP tool is widely used in studies of competitiveness, sustainability, tourism planning, and strategic marketing evaluation, as it allows for the integration of measurable, verifiable data with structured qualitative judgments [30, 31, 32, 33]. Accordingly, it is applied here for the prioritization of factors divided into criteria and subcriteria that complement the descriptive observation of lodging establishments' digital platforms, resulting in a structured model of critical factors.

3 Methodology

This study follows the methodological design of the positivist school in order to produce replicable results based on statistical data, employing a mixed-methods approach with a non-experimental design—since the variables under analysis are neither controlled nor intended to establish causal relationships—a cross-sectional design given the heterogeneity of lodging types, and a descriptive multicriteria scope aimed at showing how digital networks are used in practice, in order to prioritize them using AHP. Data were collected during the first half of 2025, once post-pandemic market stabilization had been achieved, followed by an analytical synthesis of the collected and categorized information during the second half of the year.

The study universe was defined as the total number of lodging establishments in the city of Bogotá, which as of 2025 comprised 13,900 providers registered with the National Tourism Registry (RNT), yielding a population of 350 actors in the "La Candelaria" locality or zone, classified into 100 traditional establishments (with a full organizational structure) and 250 non-traditional establishments (managed solely through digital platforms). From this population, a sample of 56 lodging establishments was drawn, comprising hotels, hostels, guesthouses, and small lodging units that met the selection criterion of maintaining a presence on digital networks with a minimum traffic level of 3 days and 10 views, using purposive non-probability sampling [34]. Selection also required a presence on at least one digital social network and the availability of public information, with establishments providing insufficient information being excluded.

Data were collected through a digital documentary review involving non-participant direct observation of the digital networks used by the sample's lodging establishments, using an Excel-based application in which a 5-point Likert scale assessment was applied, where 1 represents minimal use and 5 represents effective use. This allowed the public information available on digital networks to be converted into comparable data across establishments, as shown in Table 1, where trained marketing assistants provided the corresponding assessment based on the 4Vs of digital marketing.

Table 1. 4V Marketing Observation Tool for Lodging Establishments

Analysis Variables							
Content Variety (Action plan to create visibility and integration across social media platforms, generate content, and establish communication.)	DIGITAL NETWORKS					Company Average	
	Facebook	Twitter	Instagram	Youtube	Linkedin		
	3	4	2	1	4	2,86	% CONTENT VARIETY
News (timeliness, quality, relevance)	2	1	1	1	3	32%	
Images (products, human resources, physical resources)	3	3	3	3	3	60%	
Videos (products, human resources, physical resources)	4	1	1	2	1	36%	
Infographics (products, human resources, physical resources, academic)	5	1	1	1	1	36%	
Reports and Studies (internal, external, proprietary, third-party)	3	1	3	1	3	44%	
Interviews (internal, external, proprietary, third-party)	1	1	1	2	1	24%	
Recommendations (service, usage)	3	1	2	1	1	32%	
Entertainment (additional content)	3	1	1	1	1	28%	
Webinars (internal, external, proprietary, third-party)	4	2	1	2	1	40%	
Rankings (local, regional, national, international)	1	1	3	1	3	36%	
Tutorials (improvements in the use of similar products)	4	1	3	1	1	40%	
Sales Promotions (quality, quantity, timing, level)	5	4	1	2	3	60%	
Positive Comments (quantity, quality, brand)	1	1	1	1	1	20%	
Negative Comments (quantity, quality, brand)	1	1	1	1	1	20%	
% DIGITAL NETWORK USAGE	57%	80%	40%	29%	80%	57%	% OVERALL SOCIAL MEDIA ASSESSMENT
Regarding content variety, this information is used to create the first part of the analysis.							

4V marketing		
Traditional	Digital	
Product	Value	What is offered and how it is presented
Price	Virality	Assessment of economic value, quality, service, and time
Place	Virtuality	Interaction between the company and its followers (likes)
Promotion	Validez	Company rating and comments received

Based on the results obtained for the sample's lodging establishments, the AHP was applied to assess the level of implementation of digital networks in information management and organizational performance, using the criteria of digital marketing elements, technology management, information management, business performance, and territorial sustainability. From the factors observed, the following subcriteria were defined: visibility, interaction, reputation, use of metrics, updates, technological integration, automation, and data utilization, as described in Table 2.

Table 2. Summary Operationalization of the Variable

Code	Dimension	Key Indicators	Source
CR 1	Digital marketing practices	Visibility, publication frequency, content, engagement, and reputation	Digital observation technique
CR 2	Technology management	Digital tools, automation, system integration, and booking channels	Observation / Expert assessment
CR 3	Information management	Metrics, review analysis, and data-driven decision-making	Observation / expert assessment
CR 4	Business performance	Market positioning, presence on Online Travel Agencies (OTAs), and demand visibility	Digital observation technique
CR 5	Territorial sustainability	Relationship of content to culture, heritage, and the destination	Observation / document review

For the analysis of the variables and the definition of the criteria and their corresponding weightings, expert judgment was used. The experts were characterized by meeting the

following requirements: excellence, understood as a high level of academic training or extensive experience in the field; and professionalism, understood as recognition within the organization or context as an expert, or as someone with substantial knowledge of the topic under study. These experts were able to complete the survey and were required to be classified according to the following levels, indicating in the corresponding space the expert collaborator involved in the observation and assessment of the AHP matrices. As explained in Table 3, their selection was intentional and based on a minimum of five years of experience in the sector, thematic relevance, territorial rootedness, and the absence of conflicts of interest.

Table 3. Types of Experts

Experts	
Economic	Official: Secretariat of Finance
	Empirical: tour operator, hotel manager
	Formal: tours and restaurants
Social	Official: Secretariat for Social Integration
	Empirical: community leader
	Formal: foundation or non-governmental organization
Digital	Official: Secretariat for Information and Communication Technologies
	Empirical: programmers and community managers
	Formal: digital travel agents
Tourism	Official: Secretariat of Tourism
	Empirical: business unit or informal tourism agency
	Formal: hotel manager

Comparisons of the factors were carried out using Saaty's fundamental scale from 1 to 9. Judgment aggregation was performed using the geometric mean when consolidating group ratings to determine the priority vectors, verifying the consistency of judgments through the consistency index and consistency ratio, reporting the actual CR value; values below 0.10 were considered acceptable [12]. The normalized matrix is calculated from the vertical sum of the values of each column of the previous matrix, and the result is divided by the value of the total sum of its respective column (see Table 4).

Table 4. Normalized Matrix of Digital Marketing Criteria

Criteria	Criterion 1.1	Criterion 1.2	Criterion 1.3	Criterion 1.4	Criterion 1.5
Criterion 1.1	0.38	0.44	0.36	0.39	0.18
Criterion 1.2	0.19	0.22	0.12	0.04	0.44
Criterion 1.3	0.13	0.22	0.12	0.04	0.26
Criterion 1.4	0.13	0.07	0.36	0.13	0.03
Criterion 1.5	0.19	0.04	0.04	0.39	0.09

Each row of the normalized matrix was summed to estimate participation through the priority vector, yielding the relative importance of each criterion within the subsystem (see Table 5).

Table 5. Priority Vector Derived from the Normalized Digital Marketing Matrix

Criteria	Cr. 1.1	Cr. 1.2	Cr. 1.3	Cr. 1.4	Cr. 1.5	Sum	Priority vector
Cr. 1.1	0.38	0.44	0.36	0.39	0.18	1.74	0.35
Cr. 1.2	0.19	0.22	0.12	0.04	0.44	1.01	0.20
Cr. 1.3	0.13	0.22	0.12	0.04	0.26	0.77	0.15
Cr. 1.4	0.13	0.07	0.36	0.13	0.03	0.72	0.14

Criteria	Cr. 1.1	Cr. 1.2	Cr. 1.3	Cr. 1.4	Cr. 1.5	Sum	Priority vector
Cr. 1.5	0.19	0.04	0.04	0.39	0.09	0.75	0.15
Cr. Criterion						5.00	1.00

Finally, the priorities were validated by calculating the consistency ratio (RC), shown in Eq. (1), which measures the dispersion of the expert group's judgments in the initial pairwise comparison matrix.

$$RC = IC / AI \quad (1)$$

RC denotes the consistency ratio, IC the consistency index, and AI the random consistency index. The consistency index is determined by Eq. (2).

$$IC = (\lambda_{\max} - n) / (n - 1) \quad (2)$$

Here, $\lambda_{\max}$ is the maximum eigenvalue of the initial pairwise matrix and n is the matrix size.

$$IC = (\lambda_{\max} - n) / (n - 1) = (5.22 - 5) / (5 - 1) = 0.054$$

Accordingly, for $n = 5$, the AI is 1.11, yielding the following RC value:

$$RC = IC / AI = 0.054 / 1.11 = 0.049$$

RC values above 0.10 indicate inconsistent judgments. Therefore, the RC of 0.049 for the digital marketing subsystem indicates a reasonable level of consistency in the pairwise comparisons.

4 Results and Analysis

These results are presented at two levels: a descriptive characterization of digital visibility and a multicriteria prioritization using AHP (Analytic Hierarchy Process). The percentage values describe the factors observed in the sample, while the AHP weights show the relative priority assigned to the factors once converted into criteria based on expert judgment.

The Excel application used for the observation revealed a high presence of accommodations on digital networks, identifying the type of networks as shown in Table 6.

Table 6. Digital Presence of the Observed Lodging Establishments

Platform	Presence
Facebook	92 %
Google Business	90 %
Booking.com and other OTAs	88 %
Instagram	85 %
TripAdvisor	76 %
Official website	54 %

The table shows a strong dependence on external platforms for visibility, intermediation, and reputation. Regarding strategic use, the findings indicate that 60% publish content irregularly, 25% maintain a consistent updating strategy, and less than 20%

show evidence of using automation or digital analytics revealing a gap that suggests digital visibility does not translate into proper strategic information management.

Table 7 describes information management, which is identified as the weakest factor. The results show that digital networks are used primarily as operational channels rather than as a system of organizational intelligence or strategic management, reflecting a lack of training in the use of data to convert it into information relevant to accommodations.

Table 7. Information Management Based on Digital Networks

Indicator	Result
Basic promotion of services	70 %
Publication of images or offers	65 %
Response to comments or reviews	45 %
Analysis of digital metrics	18 %
Use of data for decision-making	12 %
Integration with internal systems	< 10 %

The prioritized factors for implementing digital networks are presented in Table 8. The results indicate that the digital competitiveness of lodging establishments depends on the subcriteria reported in Table 9, particularly visibility and data use.

Table 8. Relative Weights of the Prioritized Criteria

Criterion	Relative weight
Digital marketing	0.38
Information management	0.27
Business performance	0.20
Technology management	0.15
Consistency ratio	0.049

Table 9 indicates that visibility, interaction, and data use are the most relevant subcriteria for marketing decision-making, whereas automation, technological integration, and advanced data use remain limited among lodging establishments.

Table 9. Prioritized Subcriteria and Digital Maturity Levels

Subcriterion / Level	Result
Digital visibility	0.22
Online interaction and reputation	0.18
Use of digital metrics	0.15
Update frequency	0.12
Operational level	Basic presence and limited use of data
Tactical level	Limited interaction and metrics
Strategic level	Data integration and information-based decision-making

In the overall combined analysis, it can be described that the accommodations in the "La Candelaria" area are positioned between the operational and tactical levels with respect to digital maturity, while the strategic level remains at a desirable stage without being widespread. Given the above, the main challenge lies not simply in increasing digital visibility, but in converting the data obtained through digital networks into effective knowledge management for the information management of accommodations.

5 Discussion of Results

The results reveal a marked difference between digital visibility and digital maturity. Among the accommodations in "La Candelaria," progress is evident in basic visibility and interaction, but weaknesses persist in metrics analytics, technological integration, and strategic decision-making based on information management. This finding is consistent with other studies that identify barriers to digital adoption among MSMEs, as well as a failure to employ digital tools in support of overall organizational capabilities [7, 24].

Therefore, priority should be given to digital marketing, since the AHP analysis identifies visibility, online reputation, and interaction on tourism digital platforms as essential sub-criteria [9, 16]. However, the values obtained for information management highlight that competitive advantage is not achieved merely by having a presence on digital networks, but rather by interpreting and using data to support commercial and operational decision-making [1, 2].

Finally, the findings of this study do not establish causality between digital activity and economic performance, owing to the non-probabilistic nature of the sample and the absence of management indicators for the accommodations such as occupancy levels, percentage of income, or profitability. Consequently, the relationships identified reflect descriptive trends and AHP priorities rather than causal effects. For this reason, digital analytics and intelligence tools, together with each of their respective phases, may help mitigate the limitations identified; however, this should be understood as a prospective recommendation rather than as a finding established by the study [28, 35, 36, 37, 38].

6 Conclusions and Recommendations

Based on the selected sample and the instruments applied, the study showed a broad presence of accommodations across digital networks, search engines, tourism operation platforms, and review sites, demonstrating that this visibility is directed primarily toward promotion, presence, and basic interaction functions. Therefore, the gap identified between the purely operational use of digital networks must be addressed by migrating toward knowledge management aligned with effective information management. Furthermore, digital visibility is currently a key parameter for measuring competitiveness, together with improved use of information and the effective integration of the current 4Vs of digital marketing, supported by continuous monitoring that assists and guides organizational decision-making.

The study recommends strengthening training in digital analytics, metrics management, and online reputation improvement through the integration of reviews, thereby gradually incorporating digital networks into the measurement processes of management systems, while reinforcing the cultural, heritage, and historical identity of the "La Candelaria" area. Additionally, the study should be expanded to other tourist areas of the city of Bogotá, incorporating internal tourism performance indicators, in order to develop a comparative and longitudinal analysis of the digital maturity of accommodations.

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AI use statement. Claude [39] was used as a support tool for style correction, linguistic editing, and translation of the manuscript.

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