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Experience in Computerizing the Management of Indicators for a Smart Tourism Destination

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***Abstract* — The indicators allow for measuring, monitoring, and evaluating performance in critical areas, making effective management of these indicators fundamental for the development of an intelligent tourist destination. The research focuses on developing an Indicator Management System that measures the performance of the destination and generates objective, relevant, and timely information for decision-making. Various research methods were employed, including historical-logical analysis, synthesis, induction-deduction, systemic modeling, interviews, document review, direct observation, and expert judgment. This approach enabled the analysis of the evolution of indicator management systems, identification of functional and non-functional requirements of the system, modeling of business processes, and collection of key information about customer needs. The system allows for the registration and tracking of logistical indicators to facilitate decision-making and improve administrative productivity by effectively utilizing the data generated, processed, and stored by the tool. It is based on an MVC architecture and primarily uses open-source technologies such as Laravel, Bootstrap, and PostgreSQL, providing flexibility and low maintenance costs. The key principles that an information system for indicators should have such as systemic character, flexibility, organizational adequacy, continuous improvement, and interactivity are highlighted in the final result.**

***Keywords*: Smart Tourist Destination, Indicator Management, IT Tool, Sustainability, Innovation, Accessibility.**

***Resumen* — Los indicadores permiten medir, monitorear y evaluar el desempeño en áreas críticas, por lo que una gestión eficaz de estos es fundamental para el desarrollo de un destino turístico inteligente. La investigación se centra en el desarrollo de un Sistema de Gestión de Indicadores que permite medir el desempeño del destino y generar información objetiva, relevante y oportuna para la toma de decisiones. Para ello, se emplearon métodos de investigación como el histórico-lógico, análisis y síntesis, inducción-deducción, modelación sistémica, entrevistas, revisión de documentos, observación directa y criterio de expertos lo que permitió analizar la evolución de los sistemas de gestión de indicadores, identificar requerimientos funcionales y no funcionales del sistema, modelar procesos del negocio y recopilar información clave sobre las necesidades del cliente. El sistema permite el registro y seguimiento de indicadores logísticos para facilitar la toma de decisiones y mejorar la productividad administrativa aprovechando eficazmente los datos generados, procesados y almacenados por la herramienta. El sistema se basa en una arquitectura MVC y utiliza principalmente tecnologías de código abierto como Laravel, Bootstrap y PostgresSQL, lo que le aporta flexibilidad y bajo costo de mantenimiento. Los principios clave que debe tener un sistema de información de indicadores, como el carácter sistémico, la flexibilidad, la adecuación organizacional, la mejora continua y el carácter interactivo, se destacan en el resultado final.**

***Palabras Clave:* Destino Turístico Inteligente, Gestión de Indicadores, Herramienta Informática, Sostenibilidad, Innovación Accesibilidad.**

I. INTRODUCTION

THE concept of Smart Tourist Destinations (STD) represents a transformative approach to modern tourism, integrating innovative technologies and sustainable practices to enhance the visitor experience while optimizing resource management. A Smart Tourist Destination relies on advanced information and communication infrastructure to ensure sustainable development, improve decision-making processes, and increase service quality [1]. This paradigm shift towards digitalization has been pioneered by entities such as SEGITTUR in Spain, which established a standardized methodology for implementing Smart Tourist Destinations based on five core axes: governance, accessibility, technology, innovation, and sustainability. These axes are measured through key performance indicators that assess the maturity and effectiveness of the transformation process [2].

In Cuba, tourism is a vital economic sector, contributing significantly to foreign exchange earnings. The Ministry of Tourism (Mintur) has embraced technological innovation to enhance competitiveness in the global market. Holguín, a region with rich cultural, historical, and natural attractions, has been identified as a strategic area for developing a Smart Tourist Destination. Despite its potential, the region faces challen-

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ges related to limited technological infrastructure and outdated data collection methods. Currently, indicator evaluation is conducted using decentralized Excel spreadsheets, resulting in fragmented insights and delayed decision-making [3].

The Holguín destination holds great importance for tourism in northeastern Cuba due to its accessibility, significant cultural, historical, and natural attractions, and the necessary infrastructure for tourism development. Therefore, the development of this territory as a smart tourist destination has been proposed and is being pursued through the Territorial Program of CITMA HOLINSOST: Holguín, a smart and sustainable tourist destination, with projects currently underway in Guardalavaca and Gibara [4].

After an initial assessment, it was concluded that the destination lacks general technological infrastructure, particularly in information systems. Specialists rated the existence and effectiveness of information systems for measuring performance indicators as limited. A detailed analysis of the digital transformation maturity in Guardalavaca revealed that organizations face several limitations in data collection and analysis, restricting their ability to obtain real-time information and respond promptly to market or demand changes [5].

This study addresses the research question of how to effectively manage indicators for a Smart Tourist Destination by proposing an Indicator Management System tailored to the specific needs of Holguín. The goal of this work is to develop a web-based application that streamlines data collection, monitoring, and analysis, enabling real-time insights and informed decision-making. The system integrates the five strategic axes defined by the DTI methodology—Governance, Innovation, Technology, Sustainability, and Accessibility—and incorporates a robust user role structure to ensure secure access and efficient collaboration [6].

Currently, the team responsible for evaluating indicators in tourist destinations works in a decentralized manner using Excel spreadsheets. This lack of a common platform prevents a comprehensive view of information related to each evaluation axis. Evaluations rely on reports from different axis leaders, limiting the ability to gain a broader and coherent data perspective. This decentralized approach hinders timely real-time data updates, affecting the team's capacity to make informed and rapid decisions.

The proposed solution leverages open-source technologies such as Laravel, Bootstrap, and PostgreSQL within an MVC architecture to ensure flexibility, scalability, and cost-effectiveness. The development followed the Extreme Programming (XP) methodology, emphasizing continuous client feedback, iterative development, and adaptability to changing requirements. The system was evaluated from multiple perspectives—administrative, socio-humanistic, environmental, and technological—to ensure long-term sustainability and alignment with local needs.

By addressing current limitations in data management and introducing a centralized platform for indicator tracking, this study contributes to the advancement of Smart Tourist Destination frameworks in emerging markets. The results demonstrate the feasibility of implementing intelligent destination systems in regions with structural constraints, offering a replicable model for sustainable tourism development.

II. MATERIALS AND METHODS

This section presents a detailed description of the procedures, methodologies, tools, and resources used in the research titled "Informatization of the Indicator Management System for the Smart Tourist Destination Holguín." The study aimed to develop an efficient digital solution that supports decision-making through structured indicator evaluation aligned with international standards such as those proposed by SEGITTUR. The complete research and implementation workflow is summarized in Figure 1, which illustrates how theoretical foundations, empirical validation, standardized frameworks, agile development, and open-source technologies were integrated into a cohesive process specifically adapted to the Cuban context in resource-constrained environments like Holguín.

Fig. 1. Research and development workflow for the Indicator Management System in Holguín Smart Tourism Destination.

A. Research Methods

The research process was conducted using a combination of theoretical and empirical methods, iteratively and collaboratively involving key stakeholders responsible for managing indicators in the Holguín tourist destination. These methods were applied systematically to gather insights into current management practices, identify system requirements, design business processes, and validate the proposed solution against user needs.

Theoretical Methods:

- Historical-logical: This method was used to analyze the evolution of indicator management systems within the tourism sector over time. It allowed identifying global trends, best practices, and the maturity of existing models, which informed the development of the proposed system.
- Analysis and Synthesis: Current processes of indicator management in Holguín were analyzed to understand the involved workflows, data sources, and information flows. Based on this analysis, functional and non-functional requirements were defined, including types of indicators, user roles, access profiles, reporting formats, and system scalability.
- Inductive-deductive: Historical data from indicator evaluations was analyzed to induce patterns and trends. These findings were used to deduce rules and algorithms that support automated decision-making and forecast-based planning.
- Systemic Modeling: Business processes related to indicator management were modeled using systemic modeling techniques. This helped define the architecture of the system, identifying software components, interfaces, and information flows necessary for integration and functionality.

Empirical Methods:

- Interview: Conducted with those responsible for indicator management in the tourist destination (managers, analysts, etc.) to understand their needs, challenges, and expectations regarding the system, as well as to identify user profiles and their specific requirements for access, analysis, and decision-making.
- Document Review: Analysis of existing documentation on the indicator management system of the tourist destination, such as manuals, reports, databases, etc.
- Direct Observation: Analyzing the processes of indicator collection, processing, and analysis. Identifying information flows, tools, and systems used, as well as interactions among different actors.
- Expert Judgment: Seeking the opinion of specialists in smart tourist destination management and tourism information systems about best practices, trends, and recommendations for system design.

B. Smart Tourism Destination Methodology

The conceptual foundation of the system is based on the Smart Tourist Destination (STD) model promoted by SEGITTUR, the Spanish agency responsible for implementing standardized methodologies for transforming traditional destinations into smart ones. The methodology is built around five strategic pillars: Governance, Innovation, Technology, Sustainability and Accessibility [7].

Each pillar includes a set of Key Performance Indicators (KPIs) that measure the maturity and effectiveness of a destination's transformation into a smart destination [8].

The SEGITTUR methodology operates through two main cycles [9]:

1. Diagnosis and Incorporation: Destinations are evaluated using KPIs to determine their current level of digital maturity.
2. Monitoring and Renewal: Continuous monitoring ensures that standards are maintained and improvements are implemented regularly.
3. Given the structural limitations of the Cuban context, the standard methodology was adapted to local conditions, ensuring that the system reflects available resources and supports participatory evaluation mechanisms tailored to Holguín's environment.

While international models like CICLOPS DTI—used extensively in Spain—offer centralized, data-driven platforms with potential integration to Big Data sources [10], many regions in Latin America still rely on fragmented or manual processes. For example:

- In Mexico, some destinations have adopted commercial dashboards, but these often lack interoperability and require high licensing costs.
- In Colombia, initiatives such as Medellín Turístico Inteligente use basic reporting tools, yet face challenges in scalability and citizen participation.
- In Ecuador, public institutions apply adaptations of the Balanced Scorecard (BSC) for performance evaluation, though without full alignment to international STD standards.

In contrast, the proposed system for Holguín emphasizes:

Use of open-source technologies (Laravel, Bootstrap, PostgreSQL), minimizing financial barriers.

- Adaptation to limited infrastructure typical of Caribbean and rural contexts.
- Integration of local stakeholder feedback throughout development (via XP methodology).
- Modular design enabling replication across other Cuban provinces or sectors.

Thus, while inspired by global best practices, this work offers a differentiated solution tailored to structural constraints common in developing economies, contributing to regional efforts toward inclusive digital transformation in tourism.

C. XP Development Methodology

The system was developed using the Extreme Programming (XP) agile methodology, known for its emphasis on continuous client interaction, iterative development, and adaptability to changing requirements. XP is particularly suitable for projects with evolving requirements and small development teams [11].
Key Features of XP Applied:

1. Short Iterative Cycles (Sprints): The project was divided into short sprints (1–4 weeks), each producing a working version of the system.
2. Continuous Client Feedback: Stakeholders were actively involved throughout the development process to ensure alignment with real-world needs.
3. Simple Design and Refactoring: The system was designed simply and improved incrementally based on feedback and testing.
4. Test-Driven Development: Functional tests were written and executed after each iteration to validate system behavior and prevent regressions.

XP ensured flexibility, minimized rework, and maximized transparency during the system's implementation.

D. Technologies and Development Tools

All the tools used in this project are open-source technologies that provide a robust and widely recognized foundation for developing modern, scalable web applications.:

The software architecture follows the Model-View-Controller (MVC) design pattern, which separates business logic (Model), user interface (View), and request handling (Controller). This separation improves code organization, facilitates team collaboration, and simplifies maintenance [12].

Programming Language PHP. Framework Laravel 7:

For backend development, PHP was used in conjunction with the Laravel 7 framework. Laravel provides built-in support for authentication, authorization, routing, and database management via Eloquent ORM. Its Blade templating engine enables clean and reusable front-end components [13].

Additionally, Laravel simplifies the implementation of authentication and authorization by providing built-in features to manage users, roles, and permissions, as well as advanced security measures such as protection against SQL injection and secure password storage [14].

Framework Bootstrap 4:

The user interface was developed using Bootstrap 4, ensuring a responsive design that adapts to various screen sizes and devices. This framework accelerated UI development through pre-built components such as forms, buttons, and navigation menus [15].

Data is managed by PostgreSQL 12, a powerful relational database system known for its reliability, advanced query capabilities, and strong security features—including encryption at rest and in transit [16].

The system follows a three-tier deployment architecture (client, application server, and database), as shown in Figure 2. This structure ensures separation of concerns, scalability, and secure data transmission through HTTPS/TLS encryption between layers.

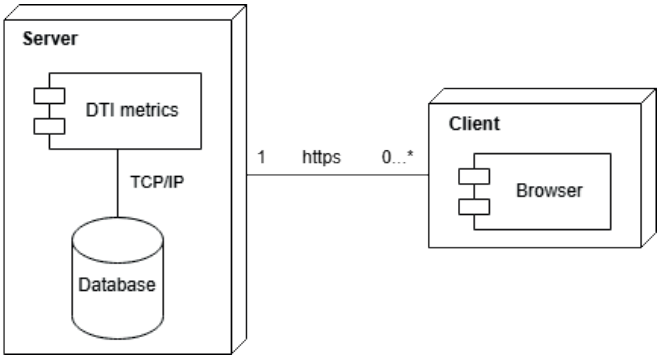

Fig. 2. Deployment architecture of the Indicator Management System.

E. Replicability and Validation

All methods, tools, and procedures described above have been documented to ensure reproducibility and validation. The system can be replicated in other regions or domains by following the same development approach and utilizing the outlined technologies [8].

The system's validation was performed through:

- User Acceptance Testing (UAT): Stakeholders tested the tool to verify it meets their functional and usability expectations.
- Performance Evaluation: The system was monitored under real usage scenarios to assess responsiveness and stability.
- Sustainability Assessment: The system was evaluated from four perspectives—administrative, socio-humanistic, environmental, and technological—to ensure long-term viability.
- UTAUT-Based Survey: End-user acceptance was assessed using the UTAUT model to evaluate perceived usefulness, ease of use, and facilitating conditions.

F. Contextual Adaptation and Sustainability Considerations

The system has been specifically tailored to address the unique challenges faced by Holguín, such as limited technological infrastructure and decentralized data collection methods. Its open-source nature and modular design allow for easy customization and future upgrades.

Moreover, the system contributes to:

- Improved Decision-Making: Through centralized, real-time data visualization.
- Increased Efficiency: By reducing manual effort and errors in indicator tracking.
- Enhanced Collaboration: With role-based access and distributed responsibilities.
- Long-Term Sustainability: By aligning with local resources and capacity.

G. Summary of Implementation Steps

The development was carried out in the following stages:

1. Requirement Gathering: Through interviews, document review, and observation.
2. System Design: Using MVC architecture and UML modeling.
3. Development Cycle: Implemented using XP methodology with regular stakeholder feedback.
4. Testing Phase: Conducted UAT, performance testing, and integration testing.
5. Deployment: Launching a web-based application accessible via modern browsers.
6. Evaluation and Documentation: Final sustainability assessment and creation of technical documentation.

III. RESULTS

A. System Description

As a result of the research and development process, an Indicator Management System was implemented, aimed at the evaluation and continuous improvement of smart tourist destinations, taking Holguín, Cuba, as a case study. The system addresses the challenges identified during the initial diagnosis, particularly the dispersion of information and the lack of a centralized platform for indicator management.

The developed system meets the fundamental requirements defined during the analysis phase, among which the following stand out:

1. Integration of the five strategic axes of the DTI methodology: Governance, Innovation, Technology, Sustainability, and Accessibility according to [7]. Each axis includes the capability to define and manage specific indicators, allowing for precise evaluation aligned with international standards.
2. Robust user and role management, ensuring security and controlled access to information. The system allows the assignment of differentiated permissions according to the user profile, restricting actions and the viewing of sensitive data.
3. Flexible and scalable evaluation of both the destination as a whole and each axis and involved entity. The evaluation scales are user-configurable, facilitating the system's adaptation to the particularities of each territory or project.
4. Generation of visual and intuitive reports on the status of the destination, its axes, and entities, facilitating data interpretation and informed decision-making.

A simple, intuitive graphical user interface was designed, adaptable to different devices and screen resolutions. The predominant color palette is blue, conveying trust and professionalism, and it incorporates the representative colors of the five strategic axes, reinforcing the system's visual identity. The system is fully developed in Spanish, which facilitates its use by local stakeholders. Figure 3 shows how these features were materialized.

The implemented permissions architecture protects the integrity, confidentiality, and availability of the stored data. Thanks to this permissions architecture, unauthorized access to certain sections of the application is prevented, and user actions are restricted, ensuring that only those with the appropriate permissions can access or modify sensitive information. In this way, the system maintains the confidentiality, integrity, and availability of the data, complying with security and information protection standards.

Fig. 3. Example Dashboard Report Generated by the System

The system includes comprehensive documentation that guides users in the use of all available functionalities and options, facilitating the adoption and effective utilization of the tool.

B. Benefits Achieved

During the validation phase, the system was evaluated by tourism management specialists, IT experts, and end users involved in Holguín destination administration. The UTAUT-based acceptance assessment used a 5-point Likert scale (1=strongly disagree, 5=strongly agree) administered to 15 key users after a four-week testing period.

Table I summarizes the mean values and their interpretation for each construct in the UTAUT evaluation, confirming the system's strong acceptance and practical utility in the Holguín context.

TABLE I
USER ACCEPTANCE EVALUATION

Construct	Score (1-5)	Interpretation
Performance Expectancy	4.6	Users perceive the system improves job performance
Effort Expectancy	4.3	System is easy to learn and use
Social Influence	4.1	Support from peers and leadership exists
Facilitating Conditions	4.0	Infrastructure and training support adoption

The mean scores ranged from 4.0 to 4.6, all significantly above the neutral midpoint of 3.0, indicating strong user acceptance across all dimensions. Performance Expectancy scored highest (4.6), reflecting users' recognition that the system improves work efficiency by centralizing previously dispersed data. Effort Expectancy scored 4.3, indicating the system's perceived ease of use despite varying digital literacy levels among users.

Social Influence reached 4.1, indicating institutional support and peer approval of the system's value. Facilitating Conditions scored lowest at 4.0 (though still well above neutral), which can be attributed to users' desire for additional ongoing training and technical support, particularly considering connectivity limitations in some areas. Notably, even this "lowest" score remains high compared to similar implementations in resource-constrained environments.

The centralization of information, along with the automation of evaluation processes, has helped optimize administrative productivity by reducing the time and effort required for data collection and processing. This, in turn, has enabled tourism management officials to make informed decisions in real time, improving their ability to respond to changes or emerging needs of the destination.

The system's architecture, together with the use of open-source technologies such as Laravel, Bootstrap, and PostgreSQL, provides the solution with high flexibility and scalability potential. This allows the system to be easily adapted to other tourist destinations within Cuba by simply adjusting the indicators and parameters specific to each region. Furthermore, the modular structure of the system facilitates its extension to other sectors requiring the management and monitoring of indicators, such as health, education, or environmental management. In this way, the system not only meets the current needs of the pilot destination, but also constitutes a transferable and scalable technological foundation at the national and even international level, contributing to the digital transformation of various fields.

IV. DISCUSSION

The implementation of the Indicator Management System for the Smart Tourist Destination Holguín represents a response to the need for digital transformation in destination management, particularly in regions with limited technological infrastructure. The system addresses key challenges identified during the initial diagnosis, such as the fragmentation of information and the absence of a centralized platform for managing performance indicators. These findings align with similar studies that highlight the importance of integrated systems for data collection, analysis, and visualization in smart tourism destinations [3], [7].

One of the main contributions of this work is the integration of the five strategic axes defined by the DTI methodology—Governance, Innovation, Technology, Sustainability, and Accessibility—into a single digital platform. This structure enables a comprehensive evaluation of the destination's maturity level according to international standards. The inclusion of configurable evaluation scales allows adaptation to different contexts, a feature also emphasized in other studies that advocate for flexible and customizable indicator frameworks [2], [9]. Unlike generic dashboards or Balanced Scorecard imple-

mentations, this system is specifically tailored to the needs of smart tourist destinations, offering a more targeted and context-sensitive solution.

The user role-based access control mechanism ensures data security and process efficiency. This approach is consistent with best practices in information systems design, where differentiated permissions prevent unauthorized access and support hierarchical decision-making structures. Similar functionalities have been reported in CICLOPS DTI, a reference tool used in Spain for monitoring smart destinations [17], but the current system distinguishes itself through its modular architecture and use of open-source technologies, which reduce implementation and maintenance costs.

The graphical interface was designed to be intuitive and responsive across devices, a feature that enhances usability and accessibility. This aspect is critical for adoption, especially in regions where digital literacy may vary among users. The use of color coding aligned with the strategic axes not only reinforces visual identity but also facilitates quick interpretation of results, a consideration supported by human-computer interaction research [15].

From a technical standpoint, the system leverages well-established open-source technologies—Laravel for backend development, Bootstrap for frontend design, and PostgreSQL for database management. These choices ensure scalability, interoperability, and long-term sustainability, factors that are essential for public sector applications where budget constraints often limit the adoption of proprietary software [14], [16]. The MVC architectural pattern further supports maintainability and facilitates future enhancements without disrupting existing functionality.

During validation, stakeholders from the tourism and IT sectors confirmed the system's ability to centralize previously dispersed data, streamline administrative tasks, and enable real-time decision-making. These outcomes corroborate findings from previous implementations in other smart cities and destinations, where digital tools have been shown to enhance operational efficiency and strategic planning [10], [18]. The reduction in manual data processing effort is particularly relevant in resource-constrained environments, such as Cuba, where optimizing available capacities is crucial.

The system's modular structure allows for potential replication beyond the pilot destination. Its adaptability to different regions and sectors—such as education, health, or environmental monitoring—demonstrates the broader applicability of the underlying model. This aligns with trends in smart city development, where cross-sectoral platforms are increasingly favored over isolated solutions [7], [19]. However, successful adaptation would require careful calibration of indicators and workflows to match local conditions, a challenge recognized in other contextualized implementations [5].

In terms of sustainability, the system was evaluated from four perspectives: administrative, socio-humanistic, environmental, and technological. The results indicate that the solution is viable in the medium to long term, provided that ongoing training and institutional support are maintained. This finding is consistent with literature on technology adoption in public administration, where organizational readiness and change management play decisive roles in system longevity [11], [20].

Overall, the study contributes to the growing body of research on smart tourism destinations by demonstrating how standardized methodologies can be adapted to local realities using cost-effective, scalable, and secure technologies. It provides a replicable model for regions facing similar challenges in data management and digital transformation within the tourism sector.

V. CONCLUSIONS

This research addressed the scientific problem related to the inefficient management of indicators within the context of the Smart Tourist Destination Holguín, which limited the ability to make informed and timely decisions. To address this issue, an Indicator Management System was developed based on the five strategic axes defined by the DTI methodology (Governance, Innovation, Technology, Sustainability, and Accessibility), enabling a comprehensive and standardized evaluation of the destination.

The main results obtained were:

- Development of a functional and sustainable web application: The implemented system allows for the centralization of indicator registration, tracking, and analysis, overcoming the limitations of previously used decentralized spreadsheets. This facilitates the generation of visual reports that support strategic decision-making.
- Compliance with functional and non-functional requirements: A robust role- and permission-based architecture was integrated, along with scalable indicator configuration, multiplatform support, and compatibility with mobile devices—all validated during the acceptance phase by key users.
- Use of open-source technologies: The choice of technologies such as Laravel, Bootstrap, and PostgreSQL ensured low maintenance costs, flexibility for future adaptations, and scalability—key factors for adoption in resource-constrained environments.
- Positive sustainability assessment of the system: The system was evaluated from four perspectives: administrative, socio-humanistic, environmental, and technological. In all cases, it proved viable in the long term, contributing to the sustainable development of tourism in Holguín and enabling its replication in other destinations or sectors.
- Validation by specialists: End users positively assessed the usability, utility, and relevance of the system, confirming that it meets initial expectations and significantly improves the efficiency of indicator management.

Therefore, it can be stated that the general objective of the research (to develop a computer system for managing indicators aimed at a smart tourist destination adapted to the conditions of Holguín) was successfully achieved.

VI. RECOMMENDATIONS

Based on the results obtained and considering the needs identified during the development and implementation of the system, the following recommendations are proposed:

- Ongoing user training: It is essential to provide technical training to those responsible for managing the system,

ensuring its correct use, full utilization of its features, and encouraging feedback for continuous improvements.
- Dissemination of results: Promote the sharing of results among managers of the Holguín Intelligent and Sustainable Destination Territorial Program, as well as other institutions interested in developing smart destinations in Cuba.
- Integration with external data systems: Explore the possibility of connecting the system with automated data sources (such as sensors, digital surveys, or tourism mobility APIs) to improve the quality and timeliness of indicator updates.
- Adaptation to other contexts: Study the feasibility of applying the developed model to other Cuban tourist destinations, as well as to sectors such as education, health, or the environment, where indicator management is equally critical.
- Continuity of research: Continue investigating advanced visualization mechanisms, predictive analytics, and AI-based decision-making, with the aim of equipping the system with more sophisticated analytical capabilities.
- Regular system updates: Maintain regular update cycles, incorporating new functionalities, improving security, and adapting to technological and organizational changes.

VII. FUTURE PERSPECTIVES

The developed system represents a key tool for strengthening the Smart Tourist Destination model in Holguín. Its technical and functional characteristics provide a solid foundation for future developments aimed at the full digital transformation of the tourism sector. Additionally, it marks a significant advancement in the application of international standards for smart destination management within a local context, setting precedents for the expansion of such solutions in Cuba and other countries with similar conditions.

In summary, this work not only addresses a specific need for indicator management in Holguín but also contributes to the field of sustainable tourism informatization through a scalable, adaptable solution aligned with global smart destination trends.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ARTIFICIAL INTELLIGENCE STATEMENT

The authors declare that generative artificial intelligence tools were used for the following purposes: to perform grammar and spelling checks. The tool(s) used include: DeepL. The authors take full responsibility for the content of the manuscript.

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