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MANAGEMENT MODELS AND VISIBILITY OF SCIENTIFIC PRODUCTION: A SYSTEMATIC REVIEW FROM AN INTERDISCIPLINARY APPROACH

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ABSTRACT

This article aims to analyze management models and the visibility of scientific production in private universities with an interdisciplinary and Latin American perspective. It explores how productivity and visibility management impact these institutions' international positioning. A systematic literature review was conducted following PRISMA guidelines, selecting studies published between 2010 and 2023 from databases such as Scopus and Web of Science. The selected studies examine the relationship between scientific productivity, visibility, and global positioning in private universities, focusing on interdisciplinary contexts. The findings confirm that Productivity (PR) and Scientific Production (PC) are critical factors for enhancing Visibility (VPC) and, consequently, International Positioning (PI). Effective management models integrate interdisciplinary approaches adapted to institutional contexts, significantly improving both visibility and global recognition. However, many private universities face challenges in integrating strategies and adapting them to local contexts, especially in social sciences and humanities. The study emphasizes the need for flexible and adaptive management models that prioritize visibility within a broader knowledge management system. Discipline-specific strategies and strengthened institutional capacities for managing global scientific visibility are crucial. These conclusions provide valuable insights for designing more effective management strategies in private universities, enhancing their competitiveness and relevance in the international academic landscape.

1. INTRODUCTION

In the last decade, the visibility of scientific production has gained strategic importance for universities, especially in their quest to improve their positioning in international rankings and increase their relevance in the global scientific community (Aguillo, 2019; Albornoz, 2017; Alperin & Rozemblum, 2017). In this context, the management of scientific visibility has become a priority for private universities, which face specific challenges due to their organizational structure and limited resources compared to public universities (Cervantes, 2018; Torres-Samuel et al., 2019). According to the OECD, one of the key challenges for higher education institutions is to strengthen institutional evaluation to improve efficiency and increase their impact on scientific and technological development (Aguinis et al., 2020; Heitor, 2016; Unger & Polt, 2017).

In Colombia, scientific productivity has experienced notable growth in recent years, reflected in the increase of publications indexed in databases such as Scopus and Web of Science (Alma et al., 2016; DANE, 2023; Alvarado-Laguna et al., 2015). This increase responds to governmental policies aimed at promoting research and innovation, but it also reveals a trend towards the dispersion of visibility strategies, which limits the impact and effective transfer of knowledge at both national and international levels (Alarcón-Ruiz et al., 2019; Aguinis et al., 2020). In this sense, private universities have shown significant progress in terms of the number of publications, although their impact remains modest, underscoring the need for more effective management models that link productivity with scientific visibility (Pérez and González, 2019).

The literature on the management of scientific visibility emphasizes that there is no single model applicable to all institutions. Instead, the effectiveness of management models depends on factors such as the regional ecosystem, the organizational structure of the universities, and the integration of interdisciplinary approaches (Aguillo, 2010; Cervantes, 2018). This is particularly relevant for private universities in Colombia, which operate in a highly competitive environment and must balance academic excellence with financial sustainability (Salinas and Tamayo, 2018; Álvarez-Muñoz & Pérez-Montoro, 2016). Recent studies indicate that the scientific production of these universities remains limited in terms of international visibility, reinforcing the need to design more articulated and coherent strategies with the global dynamics of science and technology (King-Domínguez et al., 2020; Baller et al., 2016).

This article aims to conduct a systematic review of the management models of scientific visibility, from an interdisciplinary perspective, analyzing their applicability in Colombian private universities. This interdisciplinary approach allows for consideration of the contextual and organizational particularities of the institutions, integrating elements of strategic management, scientific communication, and academic productivity (Batool et al., 2018; Amayo et al., 2014). The review will focus on identifying the most effective strategies for managing scientific visibility, considering both the theoretical literature and case studies applied in different contexts.

The structure of the article is organized into three main sections. First, a review of the key concepts related to scientific visibility and existing management models is conducted. Second, the interdisciplinary literature on visibility management is synthesized, highlighting its relevance for private universities (Arencibia, 2010; Arenas, 2019). Finally, the practical implications of these models for the Colombian context are discussed, with a focus on improving the international positioning of private institutions through more efficient management of their scientific production.

In conclusion, this study aims to provide a comprehensive analysis of how interdisciplinary management models can enhance the visibility of scientific production in Colombian private universities. Through a rigorous analysis of the existing literature, it seeks to contribute new perspectives that allow these institutions to strengthen their presence in the global academic arena and contribute more effectively to the scientific and technological advancement of the country (Casanova & Rodríguez, 2014; Beigel, 2013).

2. LITERATURE REVIEW: CONCEPTUAL AND THEORETICAL FRAMEWORK

Universities play a leading role in the global competitiveness environment. This competitiveness was initially associated with the industrial sector and its growth. While competitiveness was initially related to the industrial sector, it is now recognized that public policies and institutions have a positive effect on macroeconomic factors, including universities and their knowledge production (Gaitán-Angulo et al., 2019; García et al., 2017; González & Espinoza, n.d.). Knowledge production requires efficient evaluation indicators to ensure impactful results and to be part of the scientific policy strategy. These aspects are currently being discussed in Latin America, both by researchers and scientific policy regulators, especially in countries like Ecuador and Colombia (Álvarez-Muñoz & Pérez-Montoro,

2016; Casanova & Rodríguez, 2014; Cervantes, 2018).

Colombia stands out because since 2012 it has maintained an annual percentage investment in higher education of 0.96% of GDP. This translates into a commitment by governments to invest in their higher education institutions in a sustained manner (Molina-Molina & De-Montoya-Anegón, 2013; UNESCO, 2020). Universities are traditionally classified into public or private management and administration, and the role of their management is key to achieving the required productivity and quality standards. Currently, private universities are growing in incidence and importance, as financial pressures have led to the search for diversification of income compatible with traditional institutions (Salinas & Tamayo, 2018; Alma et al., 2016).

According to Alvarado-Laguna et al. (2015), students of private universities study and work simultaneously and have a positive perception of the quality dimensions provided by their institutions. This approach is relevant when examining management and scientific visibility models, as it reflects an environment where academic productivity and adaptation to labor market demands are essential to achieve greater competitiveness.

The following theoretical elements are presented upon which the process of managing and enhancing the visibility of scientific production in universities is integrated, considering the challenges and opportunities faced by both public and private institutions.

Management of Scientific Visibility: The management of scientific visibility is a central concept in the current context of higher education and academic research. This concept encompasses everything from strategies to increase the accessibility of scientific production to models that enable universities to position themselves on a global level. Authors such as Alperin and Rozemblum (2017) and Zilles, Cuenca, and Rom (2015) have pointed out that visibility is directly related to the recognition of scientific production and its impact on the academic community. Likewise, Codina (2016) emphasizes that visibility is only effective when it is accompanied by measurable impact, as demonstrated by received citations. In this framework, bibliometric indicators, such as those proposed by Rozemblum et al. (2015), are fundamental tools for evaluating the relevance of scientific production in a competitive environment.

El siguiente cuadro, presenta con autores relevantes, las categorías clave relacionadas con la gestión y visibilidad, y las teorías asociadas a las hipótesis:

Cuadro 1.

Autores (Año)	**Categorías Relevantes**	**Contexto de trabajo**	**Gestión**	**Visibilidad**	**H1**	**H2**	**H3**	**H4**
Alperin & Rozemblum (2017)	Visibilidad científica, accesibilidad	Estrategias de difusión y acceso abierto.		X	Estrategias de visibilidad	Impacto en el posicionamiento	Difusión científica como mediador	Producción científica accesible
Zilles, Cuenca & Rom (2015)	Reconocimiento institucional, indicadores	Evaluación mediante métricas comparativas; posicionamiento académico.		X	Impacto directo de la gestión	Importancia del reconocimiento	Mecanismos de visibilidad como mediadores	Mejora de la visibilidad como factor clave
Codina (2016)	Citas recibidas, impacto y visibilidad	Relación entre visibilidad y número de citas; importancia de los indicadores bibliométricos.		X	Indicadores para medir productividad	Visibilidad científica influenciada	Gestión de citas como factor mediador	Impacto en el posicionamiento académico
Rozemblum et al. (2015)	Bases de datos, evaluación bibliométrica	Importancia de Scopus y Web of Science en la medición de visibilidad.	x	X	Herramientas para mejorar la visibilidad	Evaluación basada en indicadores	Bibliometría como intermediario	Producción científica y visibilidad
Portuguez Castro et al. (2019)	Estrategias de visibilidad, redes de colaboración	Estrategias colaborativas para aumentar la visibilidad y el impacto.		X	Redes y colaboración como impulsores	Posicionamiento internacional a partir de redes	Redes de colaboración como mediadores	Integración de estrategias de visibilidad
Alarcón-Ruiz et al.	Productividad, impacto académico	Relación entre productividad e impacto; incremento de	X		Productividad como motor de visibilidad	Impacto positivo en el posicionamie	Productividad como factor	Mejora de la producción como clave de

(2019)		publicaciones.				nto	indirecto	visibilidad
Cervantes (2018)	Evaluación institucional, gestión de visibilidad	Evaluación de modelos de visibilidad científica en contextos institucionales.	X	X	Modelos estratégicos para mejorar productividad	Impacto en la visibilidad científica	Enfoque interdisciplinario como mediador	Aumento de la visibilidad científica
Lolas (2006)	Modelos de gestión, control estratégico	Control de procesos y objetivos estratégicos para la visibilidad.	X		Gestión productiva como impulsor	Importancia de la gestión estratégica	Modelos de control como mediadores	Mejora de la visibilidad mediante la gestión
Piedra & Martínez (2007)	Productividad científica, cantidad de publicaciones	Medición de productividad basada en publicaciones; impacto de la visibilidad.	X	X	Productividad como clave para la visibilidad	Producción académica en la visibilidad	Gestión científica como mediador	Impacto positivo en el posicionamiento

Management Models in Scientific Production: The management of scientific production has evolved towards models that not only focus on increasing the quantity of publications but also on improving their visibility and impact on a global level (Cervantes, 2018; Tomás et al., 2015). Current management models integrate operational efficiency with strategies aimed at maximizing the dissemination and visibility of scientific results (Crissien et al., 2020). According to Piedra and Martínez (2007), scientific productivity cannot be evaluated solely by the number of publications but also by their relevance and visibility within the academic community.

The following table presents, with relevant authors, the key categories related to management and visibility, and the theories associated with the hypotheses:

Cuadro 2.

Autores (Año)	**Categorías Relevantes**	**Contexto de trabajo**	**Gestión**	**Visibilidad**	**H1**	**H2**	**H3**	**H4**
Cervantes (2018)	Evaluación institucional, gestión estratégica	Modelos adaptados a contextos regionales e institucionales.	X	X	Evaluación de la productividad	Impacto en el posicionamiento institucional	Adaptación de modelos como mediador	Mejora de la visibilidad mediante la gestión
Lolas (2006)	Control de procesos, objetivos estratégicos	Eficiencia en la producción científica mediante control estratégico.	X		Productividad como impulsor	Impacto positivo en la visibilidad	Control estratégico como mediador	Mejora de la visibilidad mediante la gestión
Piedra & Martínez (2007)	Productividad científica, cantidad de publicaciones	Relación entre cantidad de publicaciones y visibilidad global.	X	X	Productividad como clave para la visibilidad	Producción académica en la visibilidad	Gestión científica como mediador	Impacto positivo en el posicionamiento
Tomás et al. (2015)	Administración de recursos, maximización	Administración eficiente de recursos para optimizar la producción científica.	X		Eficiencia en la gestión como impulsor	Gestión orientada al posicionamiento	Administración de recursos como mediador	Mejora en la producción científica
Gangas (2017)	Perspectiva interdisciplinaria, análisis holístico	Integración interdisciplinaria en la gestión de la visibilidad.	X		Perspectivas múltiples para mejorar la visibilidad	Enfoques interdisciplinares en la visibilidad	Análisis holístico como mediador	Impacto positivo en el posicionamiento
Castillo-Ramírez et al. (2017)	Brechas en la literatura, contexto latinoamericano	Limitaciones en la gestión de visibilidad en universidades latinoamericanas.	X		Falta de estrategias como limitantes	Mejora en el posicionamiento regional	Brechas de visibilidad como mediadores	Producción científica limitada
Gama (2017)	Diferencias institucionales, modelos de gestión	Diferencias en modelos de gestión según contexto institucional (público vs. privado).	X		Adaptación de modelos como impulsor	Impacto diferencial en la visibilidad	Diferencias contextuales como mediador	Mejora de la visibilidad según contexto
Salinas & Tamayo (2018)	Productividad académica, sostenibilidad financiera	Productividad como factor clave en la sostenibilidad y visibilidad.	X		Productividad como base de la visibilidad	Impacto en la visibilidad y sostenibilidad	Productividad financiera como mediador	Mejora en la gestión de la visibilidad
Torres-Samuel et al. (2019)	Posicionamiento académico, impacto en rankings	Impacto directo de la visibilidad en el posicionamiento global de las universidades.		X	Visibilidad como impulso para el posicionamiento	Relevancia en el posicionamiento global	Impacto de la visibilidad en la gestión	Mejora en la visibilidad académica

Fuente: elaboración propia, 2024

Interdisciplinary Perspective in the Management of Visibility: The management of scientific visibility in the current context requires an interdisciplinary approach that encompasses various theoretical and methodological perspectives. This approach allows for a more holistic understanding of the factors influencing visibility and scientific productivity. Authors such as Gangas (2017) and Cervantes (2018) argue that the integration of multiple disciplines is key to developing management models that are adaptable and effective in different institutional contexts. Interdisciplinarity not only enriches the management of visibility but also facilitates the transfer of knowledge between different fields, resulting in greater academic and social impact.

Furthermore, Alperin and Rozemblum (2017) contend that an interdisciplinary approach allows for addressing the complex challenges associated with the dissemination and accessibility of scientific production. According to Crissien et al., (2020), the management of visibility must integrate efficiency and effectiveness criteria from various disciplines, enabling a comprehensive analysis of processes and outcomes. In this sense, interdisciplinarity becomes a crucial component for building strategies that optimize both the productivity and visibility of research.

The following table presents, with relevant authors, the key categories related to management and visibility, and the theories associated with the hypotheses:

Cuadro 3.

Autores (Año)	Categorías Relevantes	Contexto de trabajo	Gestión	Visibilidad	H1	H2	H3	H4
Gangas (2017)	Perspectiva interdisciplinaria, análisis holístico	Enfoque multidisciplinario para integrar modelos de gestión y visibilidad.	X		Interdisciplinariedad como factor clave	Análisis holístico como mejora en la visibilidad	Modelos interdisciplinarios como mediadores	Mejora en la visibilidad mediante integración
Cervantes (2018)	Adaptación de modelos, evaluación interdisciplinaria	Necesidad de adaptar los modelos de gestión a contextos regionales e institucionales.	X	X	Adaptación como clave para la visibilidad	Impacto positivo en la visibilidad global	Modelos interdisciplinarios como mediadores	Mejora de la visibilidad científica
Alperin & Rozemblum (2017)	Accesibilidad, difusión interdisciplinaria	Estrategias de acceso abierto y visibilidad desde una perspectiva interdisciplinaria.		X	Estrategias de difusión integradas	Impacto directo en el posicionamiento	Difusión como mediador en la gestión de la visibilidad	Mejora de la visibilidad mediante acceso
Zilles, Cuenca & Rom (2015)	Reconocimiento institucional, métricas interdisciplinarias	Evaluación de la visibilidad a través de métricas y herramientas interdisciplinarias.		X	Impacto directo de la interdisciplinariedad	Relevancia de las métricas en el posicionamiento	Evaluación interdisciplinaria como mediadora	Mejora de la visibilidad mediante evaluación
Torres-Samuel et al. (2019)	Posicionamiento académico, impacto interdisciplinario	Impacto de la interdisciplinariedad en el posicionamiento global de universidades.		X	Interdisciplinariedad como impulsor del posicionamiento	Mejora en el posicionamiento global	Impacto interdisciplinario como mediador	Mejora de la visibilidad mediante colaboración
Castillo-Ramírez et al. (2017)	Brechas en la literatura, enfoques multidisciplinarios	Limitaciones en la visibilidad debido a la falta de integración interdisciplinaria.	X		Falta de estrategias interdisciplinarias	Mejora en la visibilidad mediante integración	Brechas interdisciplinarias como mediadores	Impacto positivo mediante modelos interdisciplinarios
Gama (2017)	Diferencias institucionales, gestión interdisciplinaria	Adaptación de modelos de gestión interdisciplinarios a contextos específicos.	X		Adaptación como impulsor en la visibilidad	Impacto diferencial en la visibilidad	Interdisciplinariedad como mediador	Mejora en la gestión mediante adaptación
Tomás et al. (2015)	Administración de recursos, integración disciplinaria	Administración de recursos mediante enfoques interdisciplinarios.	X		Gestión eficiente mediante enfoques múltiples	Mejora en el posicionamiento académico	Integración de recursos como mediador	Impacto positivo en la visibilidad científica
Piedra & Martínez (2007)	Productividad científica, enfoque interdisciplinario	Relación entre productividad y visibilidad mediante la integración de disciplinas.	X	X	Productividad como clave para la visibilidad	Impacto en la visibilidad interdisciplinaria	Enfoque interdisciplinario como mediador	Mejora del posicionamiento mediante productividad

Fuente: elaboración propia, 2024

Gaps and Challenges in the Literature: Despite the extensive research on the management of scientific visibility, significant gaps and challenges persist, especially in the context of private universities in Latin America. According to Castillo-Ramírez et al. (2017), there is a significant lack of studies that address visibility management from an interdisciplinary perspective in these institutions, which limits the capacity to implement effective models adapted to their needs. This gap in the literature has also been identified by Gama (2017), who argues that the sociocultural and organizational differences between public and private universities require differentiated treatment in terms of management.

Furthermore, authors such as Cervantes (2018) and Crissien et al., (2020) point out that management models developed in other contexts, such as Europe or the United States, are not fully applicable in Latin America due to differences in innovation ecosystems and institutional structures. This challenge underscores the need to develop more contextualized approaches that integrate local and regional particularities. In this sense, the adaptation of management and visibility models must consider both institutional limitations and opportunities for collaboration between universities and other actors in the science and technology system.

The following table presents authors and relevant categories in relation to the hypotheses:

Cuadro 4.

Autores (Año)	Categorías Relevantes	Aspectos Asociados con la Categoría	Gestión	Visibilidad	H1	H2	H3	H4
Castillo-Ramírez et al. (2017)	Brechas en la literatura, gestión en universidades privadas	Carencia de estudios sobre gestión de visibilidad en universidades privadas latinoamericanas	X		Brechas como limitantes en la productividad	Impacto en la visibilidad institucional	Gestión diferenciada como mediador	Mejora en la visibilidad privada
Gama (2017)	Diferencias contextuales, adaptación de modelos	Necesidad de estrategias específicas para universidades privadas según contexto regional.	X		Adaptación contextual como clave de visibilidad	Mejora en la visibilidad regional	Modelos diferenciados como mediador	Incremento de la visibilidad contextual
Cervantes (2018)	Falta de perspectiva interdisciplinaria, modelos globales	Necesidad de enfoques interdisciplinarios en la gestión de la visibilidad científica.	X	X	Interdisciplinariedad como impulsor	Adaptación de la visibilidad por contexto	Modelos globales como mediador	Mejora en la visibilidad mediante gestión
Torres-Samuel et al. (2019)	Impacto global, rankings internacionales	Influencia de la visibilidad en el posicionamiento global; limitaciones en universidades privadas.		X	Impacto global como clave de posicionamiento	Visibilidad y su relación con rankings	Mejora en la visibilidad global	Posicionamiento global basado en visibilidad
Alarcón-Ruiz et al. (2019)	Productividad, impacto académico	Productividad como base para mejorar la visibilidad; brechas en universidades privadas.	X		Productividad como clave de visibilidad	Mejora en la visibilidad institucional	Gestión de recursos como mediador	Mejora en la visibilidad académica
Cervantes (2018)	Modelos regionales, adaptación institucional	Necesidad de adaptar modelos globales a contextos regionales para mejorar la visibilidad.	X	X	Modelos regionales como impulsores	Adaptación de la visibilidad por contexto	Modelos regionales como mediador	Incremento de la visibilidad mediante adaptación
Gangas (2017)	Análisis holístico, integración interdisciplinaria	Perspectiva holística para abordar la gestión de visibilidad desde múltiples disciplinas.	X		Enfoque integrador como clave de visibilidad	Impacto en la visibilidad interdisciplinaria	Interdisciplinariedad como mediador	Mejora en la gestión de la visibilidad
Tomás et al. (2015)	Maximización de recursos, eficiencia operativa	Eficiencia en la gestión de recursos para mejorar la producción y visibilidad científica.	X		Gestión eficiente como clave	Maximización de recursos como impulsor	Eficiencia operativa como mediador	Mejora en la visibilidad institucional
Gama (2017)	Adaptación contextual, diferenciación institucional	Estrategias diferenciadas según el contexto organizacional y sociocultural.	X		Diferenciación como clave de visibilidad	Impacto institucional basado en la visibilidad	Adaptación de modelos como mediador	Mejora en la visibilidad institucional
Salinas & Tamayo (2018)	Productividad académica, sostenibilidad financiera	Productividad como factor clave para la sostenibilidad; importancia de la visibilidad.	X		Productividad como base de visibilidad	Impacto en la visibilidad y sostenibilidad	Productividad como mediador de visibilidad	Mejora en la gestión académica

Fuente: elaboración propia, 2024

3. METHODS

Review Design: The present study follows a methodology based on a systematic review, using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The main objective of the review is to analyze the relationship between scientific visibility management and productivity in private universities, considering its impact on international positioning. The hypotheses proposed in the project guide the analysis: H1 states that productivity has a direct effect on scientific visibility; H2 suggests that visibility impacts international positioning; H3 considers visibility management as a mediator in the relationship between productivity and positioning; and H4 associates international positioning with visibility management.

Study Selection Criteria: Specific inclusion criteria were defined, considering studies published between 2010 and 2023 in Spanish and English. The selected articles had to address topics related to scientific visibility management, academic productivity, and their impact on international positioning, with a focus on private universities and interdisciplinary contexts. Sources were extracted from databases such as Scopus, Web of Science, Google Scholar, and Latindex, prioritizing empirical studies and systematic reviews.

Among the exclusion criteria, studies with non-systematic methodologies, exclusively quantitative analyses without consideration of strategic management, or those focused solely on public institutions were omitted. From an initial total of 400 articles, 75 were selected that met the criteria, aligning with the project hypotheses.

Data Collection Process: The data collection process was carried out in two stages: the first involved a preliminary search using keyword combinations such as "scientific visibility management," "academic productivity," "private universities," and "international positioning." In the second stage, filters were applied to ensure the relevance of the studies to the proposed hypotheses. The selected articles were organized and managed using bibliographic software such as Mendeley to facilitate coding and analysis.

Data Analysis: The analysis was based on a mixed approach, using qualitative and quantitative analysis. Thematic analysis was employed to identify patterns and key categories in the literature, coding studies according to the variables: scientific productivity, academic visibility, management models, and international positioning. NVivo was used to structure the information, enabling a more precise interpretation of the data.

The analysis also evaluated the relationship between the project hypotheses and findings in the literature. H1 was confirmed by studies showing the correlation between productivity and visibility (Alperin & Rozemblum, 2017; Codina, 2016). H2 was supported by research highlighting how visibility influences international positioning (Cervantes, 2018; Gangas, 2017). H3 was backed by studies identifying visibility management as a crucial mediator between productivity and positioning (Crissien et al., (2020), while H4 was confirmed with evidence directly associating visibility with international positioning (Crissien et al., 2020).

4. RESULTS

Analysis of Systematizations and Key Variables

When analyzing the systematizations of the topics addressed by the authors, a consistent pattern is evident in the distribution of categories related to management and visibility in the literature. In general terms, 60% of the authors included in the tables prioritize management as the main category in their research, while the remaining 40% focus on the visibility of scientific production. This difference highlights a preference for discussing strategic, administrative, and operational processes underlying the management of scientific production in private universities, especially in Latin America (Aguillo, 2009; Casete, 2017; Arencibia, 2010).

Among the authors who emphasize management, such as Crissien et al., (2020), Lolas (2006), and Tomás et al. (2015), references to concepts like efficiency, effectiveness, and resource maximization predominate (Pérez et al., 2017). These authors link effective management of scientific production with the ability to improve academic productivity and, consequently, institutional positioning. On the other hand, authors who focus on visibility, such as Alperin and Rozemblum (2017) and Zilles, Cuenca, and Rom (2015), emphasize the importance of dissemination and accessibility of scientific results to ensure their impact and recognition at a global level (Gregorio-Chaviano, 2018; Rozemblum et al., 2015).

The relationship between the variables productivity, visibility of scientific production, and international positioning shows that studies integrating both management and visibility are more effective in explaining the impact on institutional positioning (Casete, 2017). This correlation suggests that a strategy combining a robust approach to

productivity management with tactics to enhance scientific visibility is key for private universities to achieve a significant presence in international rankings (Miguel, 2011; Ríos & Herrero, 2005).

Regarding the proposed hypotheses, most authors agree that productivity acts as a direct catalyst for visibility of scientific production. This is observed in authors such as Piedra and Martínez (2007), who argue that an increase in the number of publications, along with efficient resource management, significantly enhances institutional visibility (Amayo et al., 2014). Similarly, visibility of scientific production has a positive and direct effect on international positioning, as Torres-Samuel et al. (2019) indicate, pointing out that presence in international databases and the number of citations received are key indicators of a university's global positioning (Barra, 2019).

The qualitative analysis also highlights how university management plays a mediating role in the relationship between productivity and international positioning. Authors such as Cervantes (2018) and Lolas (2006) emphasize that a management model adapted to the institutional and regional context allows for maximizing the impact of scientific productivity by integrating it with effective visibility strategies. This approach suggests that management should not only focus on the quantity of publications but also on how they are presented and disseminated globally (Codina, 2016; Gangas, 2017).

Finally, the hypothesis that international positioning is explained through scientific visibility management is supported by studies indicating that management models must consider both productivity and visibility to achieve significant results (Gaitán-Angulo et al., 2019; Gangas, 2017; Cervantes, 2018). Authors such as Gangas (2017) and Cervantes (2018) advocate for an interdisciplinary approach in the design of these models, emphasizing the need to adapt strategies to the specific characteristics and limitations of private universities in Latin America (Gregorio-Chaviano, 2018).

Therefore, the reviewed studies indicate that the integration of management and visibility strategies is essential to improving the positioning of private universities in the international arena. The data suggest that models balancing both aspects while considering the specificities of the academic context are more effective in achieving a sustainable and relevant impact within the global scientific community (Barbon et al., 2019; Fleitas Triana et al., 2017).

On the other hand, when focusing on management models in scientific production, a higher representation of authors emphasizing management (60%) is identified compared to those centered on visibility (40%). This reflects a trend toward discussions on operational efficiency and the strategic design of processes influencing scientific production in universities (Casete, 2017; Crissien et al., 2020). Authors such as Lolas (2006), Crissien et al., (2020), and Tomás et al. (2015) emphasize the need to maximize resources and adopt models that enable effective research management to ensure both productivity and visibility (Torres-Samuel et al., 2020).

In terms of independent and intermediary variables, management models are clearly aligned with productivity and scientific production. These models serve as mechanisms that facilitate the enhancement of scientific production visibility, which in turn positively impacts the international positioning of universities (Rodríguez-García et al., 2015).

A qualitative perspective of this section suggests significant support for H1, which posits that productivity directly affects visibility. Authors such as Piedra and Martínez (2007) and Crissien et al., (2020) argue that efficient management of resources and processes can increase both the quantity and quality of publications, thereby improving their visibility (Rodríguez-Yunta, 2010). H2, which links visibility with international positioning, is also confirmed by these studies, which demonstrate that proper management can amplify the impact of research on a global scale (Crissien et al., 2020).

H3, which proposes visibility management as a mediator between productivity and positioning, is a recurring topic in authors such as Lolas (2006) and Tomás et al. (2015), who suggest that strategic management is crucial in transforming productivity into effective visibility (Crespo-Gascón et al., 2019). H4, which associates international positioning with visibility management, is evidenced in literature that considers visibility a determining factor for universities to achieve greater international relevance (Dhillon et al., 2015).

From an interdisciplinary perspective, visibility management presents an interesting balance between management (50%) and visibility (50%). Authors such as Gangas (2017), Cervantes (2018), and Castillo-Ramírez et al. (2017) agree that an interdisciplinary approach is essential to integrating the different factors that influence both management and scientific visibility (Ruiz-Corbella et al., 2020). This highlights the importance of combining

disciplines and approaches to develop more effective management models that can adapt to specific contexts and enhance institutional visibility (King-Domínguez et al., 2020).

Regarding the variables, authors identify productivity and scientific production as fundamental elements for increasing the visibility of scientific production and, consequently, improving international positioning (Crespo-Gascón et al., 2019; Crissien et al., 2020; Gaitán-Angulo et al., 2019).

From a qualitative approach, hypotheses H1 and H2 are once again confirmed, with particular emphasis on the need to adopt interdisciplinary approaches to effectively manage scientific visibility (Cervantes, 2018; Castillo-Ramírez et al., 2017). H1 is evidenced in studies showing how the integration of different disciplines can optimize productivity and, therefore, visibility (Pérez et al., 2020). H2, which connects visibility with positioning, is particularly relevant in the works of Gangas (2017) and Cervantes (2018), who advocate for management models that adapt visibility strategies to the specific characteristics of each institution (Alperin & Rozemblum, 2017).

H3, which suggests that visibility management is a mediator in the relationship between productivity and positioning, is supported by studies highlighting the importance of an interdisciplinary approach to comprehensively managing visibility (Codina, 2016; Beigel, 2013). Finally, H4, which associates international positioning with visibility management, is confirmed in studies arguing that visibility is the key component for private universities to improve their global positioning (Rozemblum et al., 2015; Gregorio-Chaviano, 2018).

Lastly, regarding the gaps and challenges in the literature, there is a noticeable inclination towards management (60%) compared to visibility (40%). Authors such as Castillo-Ramírez et al. (2017) and Gama (2017) highlight the lack of specific studies on visibility management in private universities in Latin America. This gap limits the ability to design strategies tailored to the particular needs of these institutions (Álvarez-Muñoz & Pérez-Montoro, 2016). On the other hand, authors like Cervantes (2018) emphasize the need to incorporate interdisciplinary approaches that address the inherent complexities of managing scientific visibility (Aguinis et al., 2020).

The independent and intermediate variables in this framework are clearly related to productivity and scientific production, while the visibility of scientific production emerges as a crucial factor in improving international positioning (Torres-Samuel et al., 2019).

From the research's working hypotheses, H1, which proposes that productivity has a direct effect on visibility, and H2, which connects visibility with international positioning, are supported (Lolas, 2006; Piedra & Martínez, 2007). These hypotheses are confirmed by studies highlighting how higher productivity, when properly managed, can increase visibility and, therefore, the global positioning of private universities (Crissien et al., 2020).

H3, which suggests that visibility management is a mediator in the relationship between productivity and positioning, is also relevant in this section, particularly in works advocating for the adaptation of global models to regional contexts (Rodríguez-Ponce et al., 2013). Finally, H4, which associates international positioning with visibility management, is confirmed in studies considering visibility as a determining factor for private universities to achieve greater international relevance (Salgado, 2007).

5. DISCUSSION

The analysis of the results obtained in this study reveals a series of patterns that are consistent with the reviewed literature but also identifies new dimensions that expand the understanding of scientific visibility management in Colombian private universities. In general terms, the findings confirm that productivity and scientific production act as determining factors in enhancing the visibility of scientific production and, ultimately, in the international positioning of universities (Amayo et al., 2014; Alvarado-Laguna et al., 2015; Cervantes, 2018).

Authors such as Cervantes (2018) and Gangas (2017) had already suggested that the management of productivity and visibility should be viewed as an integrative process, where the adaptation of models to specific contexts plays a crucial role (Casete, 2017). This study confirms this hypothesis, showing that models that successfully integrate an interdisciplinary approach, considering organizational and regional particularities, are more effective in improving both visibility and academic positioning (Crissien et al., 2020; Codina, 2016).

However, the results also suggest that in many private universities, current management models still present significant limitations regarding the integration of disciplines and adaptation to local contexts (Alperin & Rozemblum, 2017; Castillo-Ramírez et al., 2017). This is consistent with the observations of Castillo-Ramírez et al. (2017) and Gama (2017), who pointed out that the lack of specific

and differentiated strategies for private universities limits their ability to compete on equal terms with public universities in terms of visibility and international recognition (Beigel, 2013).

Additionally, it was identified that in disciplines such as social sciences and humanities, management models are less effective in improving visibility due to the qualitative and contextualized nature of their research. This contrasts with exact and applied sciences, where quantitative indicators are more easily recognized and used in global rankings (Gregorio-Chaviano, 2018; Codina, 2016). This finding reinforces the need to adapt evaluation metrics and management models to the particularities of each discipline, as argued by authors such as Crissien et al., 2020) and Tomás et al. (2015).

Implications for the Management of Scientific Visibility

The results of this study have significant implications for the management of scientific visibility, particularly in private universities that face specific challenges related to limited resources, more flexible organizational structures, and increasing competition in the global arena (Rodríguez-Ponce et al., 2013; Pérez et al., 2020). First, the need to adopt management models that not only focus on maximizing scientific productivity but also prioritize the integration of visibility strategies from an interdisciplinary perspective is highlighted. This means that visibility should not be an isolated goal but rather a key component within a broader system of knowledge management and academic production (Alperin & Rozemblum, 2017; Cervantes, 2018).

Additionally, these models must be flexible and adaptive, allowing for differentiated implementation depending on disciplinary particularities and institutional contexts (Crissien et al., 2020). For instance, in disciplines such as social sciences and humanities, it is necessary to develop strategies that value both qualitative and quantitative outcomes and facilitate broader dissemination through specialized academic networks and alternative publication platforms. In contrast, in exact and applied sciences, priority should continue to be given to publishing in high-impact journals, while complementing these strategies with open-access initiatives and interdisciplinary collaboration (Gregorio-Chaviano, 2018; Codina, 2016).

Another key implication is the need to strengthen the ability of private universities to manage visibility on a global scale. This includes both training academic and administrative staff in the use of bibliometric tools and scientific dissemination platforms and investing in technological infrastructure and resources that facilitate knowledge transfer through international networks (Rodríguez-García et al., 2015; Pérez et al., 2017). This reinforces the ideas presented by authors such as Alperin and Rozemblum (2017) and Codina (2016), who argue that scientific visibility largely depends on institutional capacity to adapt to the global dynamics of science and technology.

Recommendations: More Effective Approaches to the Management of Scientific Visibility

Based on the results and the reviewed literature, the following recommendations are proposed to improve the management of scientific visibility in private universities:

- Development of interdisciplinary and adaptive management models: Management models should incorporate an interdisciplinary approach that integrates different perspectives and methodologies in scientific production. This is particularly relevant in disciplines where collaboration between fields is key to innovation and global impact. Additionally, models should be adaptable to institutional and regional particularities, allowing for greater flexibility in their implementation.
- Discipline-specific strategies: Universities must tailor their visibility strategies to the needs and characteristics of each discipline. In social sciences and humanities, academic collaboration networks and publication in alternative and specialized media should be encouraged, while in exact and applied sciences, priority should be given to visibility in indexed journals and open-access platforms.
- Strengthening technological infrastructure and training: Universities should invest in technological infrastructure that facilitates the global dissemination of their scientific production. This includes both digital platforms for open access and bibliometric tools to measure and manage visibility. Additionally, it is crucial to train academic and administrative staff in the use of these tools, ensuring more effective and data-driven management.
- Integration of visibility into institutional strategy: Scientific visibility should be a central component of universities' institutional strategies, aligning with their long-term objectives and academic

mission. This means that visibility should not only be measured in terms of citations and publications but also in terms of its social impact and contribution to regional development.

- International collaboration and global networks: Universities should actively participate in international collaboration networks, which not only increase visibility but also facilitate knowledge and resource exchange. Private universities should seek strategic alliances with global institutions that allow them to position themselves in an increasingly competitive academic environment.

Contexts of Application and Management of Scientific Visibility

Management Models in Social Sciences: In the field of social sciences, management models primarily focus on collaborative scientific production and the integration of interdisciplinary networks. Authors such as Gangas (2017) and Cervantes (2018) have highlighted the importance of developing strategies that adapt to the organizational and regional context of universities, emphasizing the flexibility and adaptability of these models.

Effectiveness*: The models applied in social sciences are effective in enhancing visibility within specialized academic networks and indexed publications. However, their application may be limited when greater interoperability with other disciplines is required due to the qualitative nature of many research studies in this field.*

Challenges and Limitations*: The most common challenges include the difficulty in quantifying the results of qualitative research and the lack of technological infrastructure to optimize dissemination in interdisciplinary environments.*

Management Models in Exact Sciences

In exact sciences, management models focus on maximizing productivity and operational efficiency. Authors such as Crissien et al., (2020) and Tomás et al. (2015) suggest that these models prioritize the efficient management of resources and publication in high-impact journals.

Management Models in Applied Sciences and Technologies

In applied sciences and technologies, management models are oriented toward innovation and knowledge transfer, connecting research with the productive sector. Authors such as Alarcón-Ruiz et al. (2019) and Gama (2017) highlight the importance of integrating strategies that combine scientific productivity with social and economic impact.

Effectiveness: These models are effective in technology transfer and patent creation, significantly contributing to the visibility of universities in innovation and development rankings. They also facilitate collaboration between academia and industry.

Challenges and Limitations: The limitations include the difficulty of balancing applied research with basic research and the need for adequate infrastructure and funding to support high-impact technological projects.

6. CONCLUSIONS

Throughout this analysis, the importance of integrating interdisciplinary management models to improve scientific visibility in private universities, particularly in Colombia, has been highlighted. The main findings indicate that productivity and scientific production are critical determinants in increasing the visibility of scientific production and, consequently, in the international positioning of universities. Models that effectively integrate management and visibility while adapting to specific contexts show the best results.

A comparative analysis by disciplines reveals that in social sciences, visibility is achieved through specialized academic networks and qualitative methodologies, although it faces limitations in measuring impact in interdisciplinary contexts. In exact sciences, models based on resource maximization and operational efficiency are highly effective in improving both productivity and visibility, though they present challenges in adapting to interdisciplinary environments. In applied sciences and technologies, knowledge transfer and collaboration with industry are key factors in enhancing visibility and global recognition.

The comparative analysis of management model implementation across different disciplines shows that effectiveness and challenges vary significantly depending on the academic field. While exact sciences tend to be highly productive and visible in terms of quantitative metrics, social sciences face challenges related to interoperability and impact quantification. Meanwhile, applied sciences excel in innovation and technology transfer but require greater investment in infrastructure. Overall, the implementation of interdisciplinary models is limited by a lack of flexibility and adaptation to specific contexts, underscoring the need to develop more integrative and adaptive strategies to improve both management and visibility in complex environments.

Cuadro Comparativo: Clasificación por Disciplinas, Eficacia y Desafíos

Desafíos y Limitaciones	H1: Productividad (PR) → Visibilidad (VPC)	H2: Visibilidad (VPC) → Posicionamiento Internacional (PI)	H3: PR → Gestión (VPC) → PI (Mediador)	H4: PI → PR y Gestión de VPC
Dificultad para cuantificar resultados cualitativos; falta de infraestructura tecnológica	- Colaboración interdisciplinaria. - Estrategias específicas para visibilidad cualitativa.	- Redes académicas especializadas. - Acceso abierto.	- Integración de prácticas cualitativas en la gestión.	- Adaptación de modelos para visibilidad cualitativa.
Enfoque limitado a métricas cuantitativas; baja flexibilidad en contextos interdisciplinarios	- Maximización de recursos y eficiencia operativa. - Publicación en revistas indexadas.	- Citas y métricas bibliométricas robustas. - Impacto en rankings.	- Estrategias de visibilidad centradas en resultados cuantitativos.	- Enfoque en la difusión de alto impacto en bases de datos internacionales.
Dificultad para equilibrar investigación aplicada y básica; necesidad de infraestructura y financiamiento para proyectos de alto impacto	- Transferencia tecnológica como base para la visibilidad. - Innovación y patentes.	- Colaboración con la industria y alianzas estratégicas.	- Transferencia como mediador para la visibilidad global.	- Modelos centrados en la interacción academia-industria para mejorar el posicionamiento.

Fuente: elaboración propia, 2024

Integration of Working Hypotheses with Fundamental Elements of Management and Visibility

H1: Productivity (PR) → Visibility (VPC): In social sciences, productivity depends on interdisciplinary collaboration and specific strategies to highlight qualitative results in specialized academic networks. In exact sciences, productivity is enhanced through resource maximization, focusing on operational efficiency and publication in high-impact journals. In applied sciences and technologies, productivity is geared toward technology transfer and innovation, where patent creation and industry collaboration are key to improving visibility.

H2: Visibility (VPC) → International Positioning (PI): In social sciences, visibility is achieved through specialized academic networks and open access, facilitating participation in global discussions. In exact sciences, bibliometric indicators and robust quantitative metrics are essential to ensuring a strong position in international rankings. In applied sciences and technologies, visibility is centered on industry collaboration and universities' ability to establish strategic alliances that enhance their global recognition.

H3: PR → Management (VPC) → PI (Mediator): In social sciences, visibility management is strengthened by integrating qualitative methodologies and interdisciplinary networks, acting as a key mediator in improving positioning. In exact sciences, efficient visibility management requires strategies based on quantitative results and the dissemination of research on high-impact platforms. In applied sciences and technologies, technology transfer acts as a mediator, allowing universities to better position themselves by integrating academic knowledge with industry.

H4: PI → PR and VPC Management: In social sciences, international positioning is achieved by adapting models that value qualitative visibility and its impact on specialized communities. In exact sciences, positioning relies on dissemination in international databases and inclusion in global rankings, which in turn feeds back into productivity. In applied sciences and technologies, constant interaction with industry and technological innovation are fundamental for universities to maintain and enhance their position in the global academic environment.

These findings emphasize that there is no single universal management model; rather, effectiveness depends on the ability to adapt strategies to disciplinary and contextual particularities. Models must be flexible, integrative, and adaptive, enabling private universities to compete on equal terms with public universities in terms of visibility and international positioning.

Contributions to Knowledge

This article contributes to the existing literature by providing a comprehensive and comparative analysis of scientific visibility management models from an interdisciplinary perspective. By identifying the strengths and weaknesses of different disciplinary approaches, this study offers guidance for private universities seeking to improve their visibility and positioning on a global scale. Additionally, it highlights the importance of considering both quantitative metrics and qualitative approaches in visibility assessment, broadening the debate on the need to develop more inclusive and representative indicators of diverse academic realities.

The study also reinforces the idea that visibility cannot be seen in isolation but as part of a comprehensive management system that includes productivity, knowledge transfer, and adaptation to local and global contexts. By emphasizing the need for interdisciplinary and adaptive models, this article contributes to the design of more effective strategies for managing scientific visibility in universities with limited resources and more flexible organizational structures.

Future Research Lines

Since this study primarily focuses on private universities in Colombia, future research could explore how these models apply in other regional contexts, comparing challenges and opportunities in different settings. Additionally, it would be relevant to develop empirical studies evaluating the effectiveness of interdisciplinary models in visibility management, measuring their impact on international positioning over time.

Another important research line would be the creation of more inclusive indicators that assess both the qualitative and quantitative impact of scientific production, particularly in disciplines such as social sciences and humanities. Furthermore, future research could explore how the adoption of emerging technologies, such as artificial intelligence and big data analysis, can optimize visibility management across disciplines.

Finally, future investigations should focus on developing specific strategies for knowledge transfer in applied sciences and technologies, considering the interaction between academia and industry. This approach would not only improve visibility but also increase the social and economic impact of scientific production in local and global contexts.

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