

A BIBLIOMETRIC ANALYSIS OF HUMBLE LEADERSHIP IN THE AGE OF ARTIFICIAL INTELLIGENCE

UMA ANÁLISE BIBLIOMÉTRICA DA LIDERANÇA HUMILDE NA ERA DA INTELIGÊNCIA ARTIFICIAL

Article received on: 12/16/2025

Article accepted on: 3/17/2026

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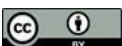
The authors declare that there is no conflict of interest

Abstract

In the context of the Artificial Intelligence (AI) era reshaping organizational structures, humble leadership has become a humane and effective approach to management. This study performs a bibliometric analysis to organize the overall development of humble leadership theory. Data were gathered from two renowned academic databases, Web of Science (WOS) and Scopus, including 333 scientific publications screened according to PRISMA standards. Using the Biblioshiny soft-ware on the RStudio platform, the researcher conducts a scientific mapping to assess publication performance, author collaborations, country contributions, and the main thematic clusters. The findings show that this field is growing rapidly, with an annual growth rate of 23.24%. China and the United States lead in research output, reflecting the influence of traditional cultural values and the pressures of digital transformation on AI superpowers. Keyword co-occurrence network analysis highlights 'Performance' as the core variable, linked through the mechanism of "Psychological safety." The study points out a key research gap: although publication output has surged with the rise of AI, keywords directly related to technology are still scarce in the current network, and further exploration of potential mediating and moderating variables is needed. The study concludes by proposing future directions for incorporating AI as a mediating or moderating factor to help leaders effectively manage human-machine interactions and improve sustainable organizational performance.

Resumo

No contexto da era da Inteligência Artificial (IA), que está remodelando as estruturas organizacionais, a liderança humilde tornou-se uma abordagem humana e eficaz para a gestão. Este estudo realiza uma análise bibliométrica para mapear o desenvolvimento geral da teoria da liderança humilde. Os dados foram coletados a partir de duas renomadas bases de dados acadêmicas, a Web of Science (WOS) e a Scopus, incluindo 333 publicações científicas selecionadas de acordo com os padrões PRISMA. Utilizando o software Biblioshiny na plataforma RStudio, o pesquisador realiza um mapeamento científico para avaliar o desempenho das publicações, as colaborações entre autores, as contribuições por país e os principais clusters temáticos. Os resultados mostram que este campo está crescendo rapidamente, com uma taxa de crescimento anual de 23,24%. A China e os Estados Unidos lideram a produção de pesquisa, refletindo a influência dos valores culturais tradicionais e as pressões da transformação digital sobre as superpotências da IA. A análise da rede de coocorrência de palavras-chave destaca "Desempenho" como a variável central, ligada por meio do mecanismo de "Segurança psicológica". O estudo aponta uma lacuna importante na pesquisa: embora a produção de publicações tenha aumentado com o surgimento da IA, palavras-chave diretamente relacionadas à tecnologia ainda são escassas na rede atual, sendo necessária uma exploração mais aprofundada de possíveis variáveis mediadoras e moderadoras. O estudo conclui propondo direções futuras para incorporar a IA



Keywords: Humble Leadership. Bibliometric Analysis. Artificial Intelligence. Performance. Psychological Safety.

como um fator mediador ou moderador, a fim de ajudar os líderes a gerenciar efetivamente as interações homem-máquina e melhorar o desempenho organizacional sustentável.

Palavras-chave: Liderança Humilde. Análise Bibliométrica. Inteligência Artificial. Desempenho. Segurança Psicológica.

1 INTRODUCTION

In a world that often celebrates pride, ambition, and individual greatness, humility remains a timeless and highly valued virtue. While modern culture often promotes self-assertion and personal achievement, humility remains an important quality recognized across various religious traditions and philosophical schools of thought. Scholars are increasingly viewing humility as a key element of ethical character and effective leadership, balancing the growing emphasis on individualism and competitive success. Despite its traditional roots, humility is now seen as essential for personal growth and organizational success.

Theological perspectives highlight humility as a key virtue across various world religions. In Christianity, humility is closely linked to the self-effacing obedience of Jesus Christ and supports Christian virtues (Austin, 2015; Lewis, 2001; Mahaney, 2008). In Buddhism, humility is considered essential for overcoming ego and attachment, serving as a crucial step toward enlightenment and the cultivation of compassion (Goldstein, 2002; Keown, 2005). Similarly, in Islam, humility is seen as a sign of genuine faith and submission to Allah's will (Al-Ghazzali et al., 2015; Rahman, 2009). In philosophical debates, humility has been promoted by ancient Greek thinkers such as Socrates and Aristotle, who viewed it as vital for self-awareness and moral wisdom (Aristotle, 2006; Plato, 2019). Enlightenment philosophers such as Kant regarded humility as a necessary element in moral reasoning and in understanding human limitations (Kenny, 2004). Existentialist thinkers also contributed to this idea, seeing humility as a way to acknowledge human finitude and live authentically and purposefully (Barrett, 1962; Kierkegaard, 2013; Sartre et al., 2022). Eastern philosophies such as Confucianism and

Daoism also stress the importance of humility in encouraging virtuous living and harmony with nature and society (Tse, 2011; Waley, 2012).

Humility has gained increased attention in leadership studies as a key trait for effective leadership. Defined as a combination of accurate self-assessment, openness to learning, and appreciation for others, humility in leadership encourages trust and collaboration. Collins introduced the concept of Level 5 Leadership, which blends personal humility with strong professional will, highlighting that humble leadership can drive organizational success. Humble leaders are not only more empathetic and self-reflective, but they also foster their teams' growth by emphasizing collaboration over authority. A significant contribution to the discussion of humble leadership comes from Edgar Schein, who proposed it as a relational and collaborative style rooted in mutual dependence and trust. This approach moves away from traditional hierarchical management models to nurture deeper, trust-based relationships that are more human-centered and collaborative.

The paper aims to examine the concept of humble leadership and its growing recognition as a crucial factor in enhancing organizational success. It employs a mixed-methods approach that combines bibliometric analysis. Utilizing advanced tools such as RStudio, specifically the RStudio platform on Biblioshiny, the research seeks to identify key themes in leadership humility and address existing theoretical gaps, offering practical insights to improve humble leadership in the age of artificial intelligence.

2 METHOD

This study selected the Web of Science (WOS) and Scopus databases as data sources, with the retrieval date set to June 15, 2025. The search included the following keywords: “humble leader*,” OR “leader* humility,” OR “leader expressed humility,” OR “CEO humility.” The search results yielded 330 scientific publications. Subsequently, the author used PRISMA, a standardized reporting guideline for systematic reviews and meta-analyses that ensures transparency, completeness, and high quality in synthesizing scientific literature. Based on this process, 333 publications were chosen for analysis using the bibliometric method.e bibliometric method.

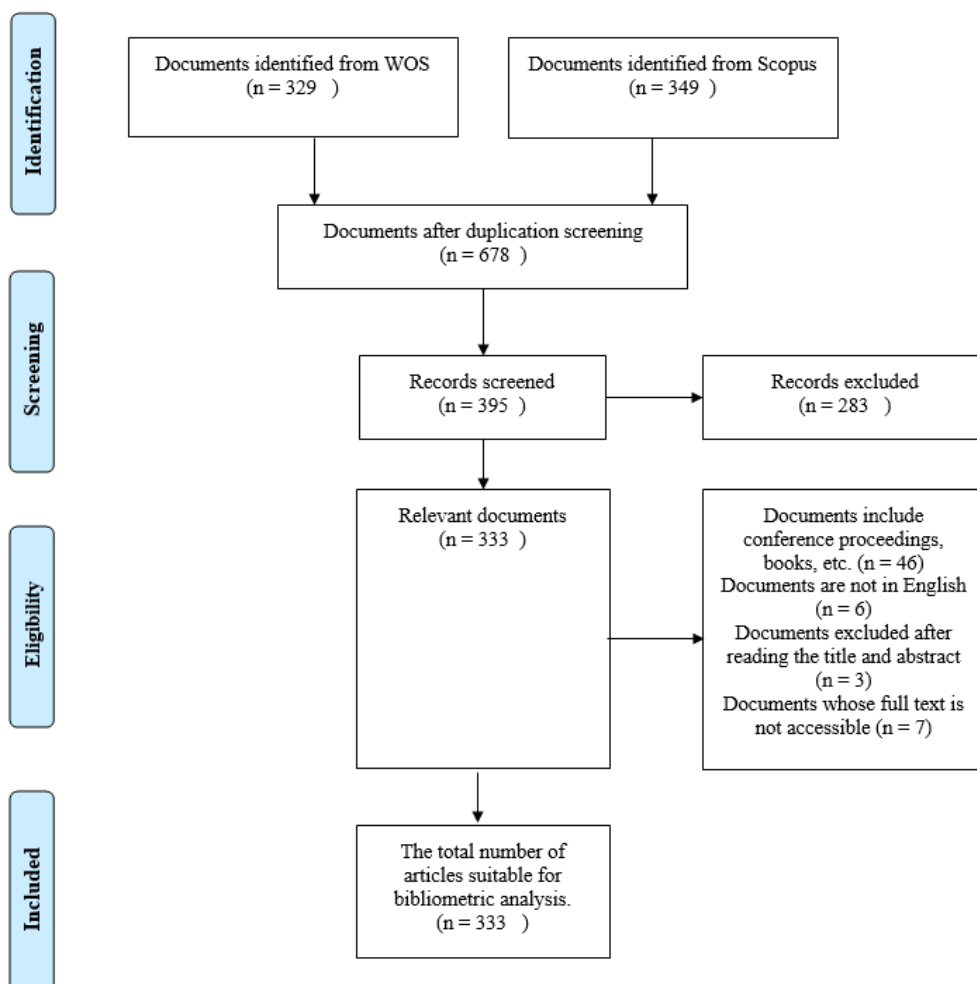
Bibliometrics is a term first introduced by Pritchard. It is a method that uses quantitative techniques to analyze and synthesize information in line with research needs and goals. Using the bibliometric method provides insights into document quality, offers a comprehensive overview of a research field, and highlights the roles and positions of stakeholders such as authors, research institutions, and countries.

The research process was conducted through three main stages:

- Data collection and screening according to PRISMA standards.
- Performance analysis.
- Science mapping.

Figure 1

Prisma



Source: Author's compilation

The study uses the bibliometrix R-package, based on the R programming language, along with the interactive web interface Biblioshiny. This is a powerful tool that combines modern statistical algorithms to analyze bibliographic data. The main analytical techniques include performance analysis, which examines the yearly number of publications, total citations, and the H-index of authors, countries, and journals.

3 RESULTS

3.1 Overview information

Figure 2

Document Overview Information



Source: Analysis results from Biblioshiny

Figure 2 offers a detailed overview of the scale, growth rate, and collaboration features in Humble Leadership research from 2007 to 2025.

- **Data Corpus & Timespan: Research Period:** The data covers the period from 2007 to 2025. This shows that the research topic is not entirely new but has a significant history of academic development. The fact that the data extends to 2025 indicates that this is a highly relevant field that is continually being updated. **Data Scale:** A total of 333 documents were collected from 174 sources. The average number of documents per source is approximately 1.91, indicating that Humble Leadership research is dispersed across many journals rather than concentrated in a few specialized publications.
- **Growth & Impact: Annual Growth Rate:** Reached an impressive 23.24%. This high rate highlights a surge of interest among the academic community in this leadership model, especially amid technological changes such as AI. **Citation**

Coverage: On average, each article receives 26.31 citations, confirming the reference value and academic quality of the publications in the dataset.

Freshness: The average age of the documents is 4.3 years, showing that most of the key and influential studies were published recently, around 2020 or later.

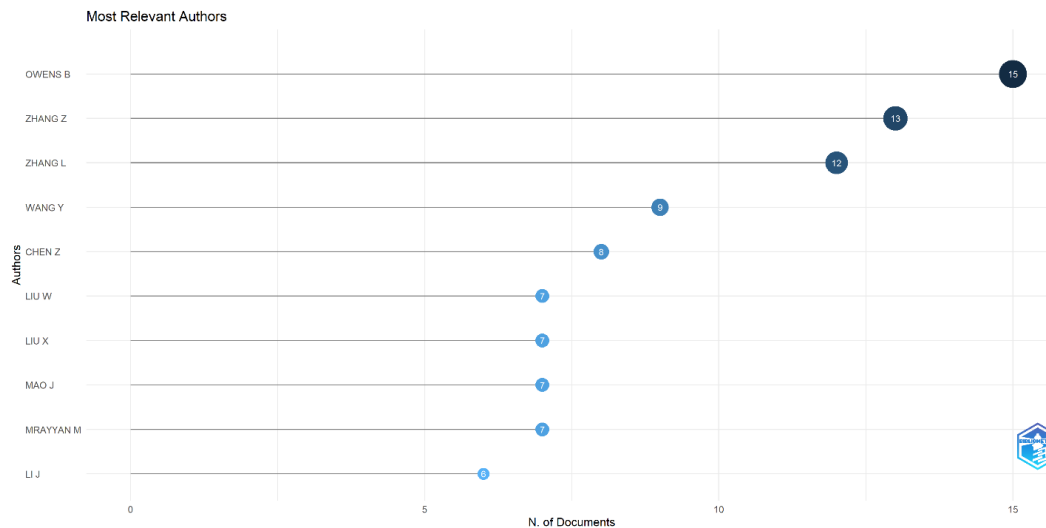
- Authorship & Collaboration: Research Force: A total of 791 authors contributed to 333 documents. Among them, only 23 authors published standalone articles. Collaboration Structure: The average number of co-authors per document is 3.49. The International Co-Authorship Index is 32.43%. This is a notable highlight; nearly one-third of the research involves international collaboration. It indicates that Humble Leadership is a global topic, attracting shared interest from scientists worldwide seeking management models suited to the new context.
- Keywords & References: Content Diversity: With 898 Author's Keywords, nearly three times the number of documents, there is significant diversity in the approaches used. Researchers are linking Humble Leadership to various variables (such as AI, performance, psychology, digitalization, etc.).

In summary, data from Biblioshiny confirm that this study is based on a solid data foundation, with High Topicality: the 23% growth rate indicates a hot trend in management science. International Connectivity: The high international collaboration rate (32%) strengthens the argument that AI era issues are global. Academic Attraction: The citation index of 26.31 indicates that prior studies have established a strong theoretical foundation.

3.2 Analysis of the authors' contributions

Figure 3

Author Statistics



Source: Analysis results from Biblioshiny

Figure 3 presents the list of the top 10 leading authors by the number of published articles in the field of humble leadership. These are the key authors shaping the theoretical framework and the direction of this field.

Leading Group of Authors: Owens B (Bradley Owens): With 15 documents, he is the most influential author in the dataset. Bradley Owens is widely recognized in the academic community as a pioneer in defining and measuring Humble Leadership. His position at the top of the list confirms that the studies in your dataset are closely aligned with the most original and prestigious theoretical foundations. Zhang Z and Zhang L rank second and third, with 13 and 12 documents, respectively. The strong presence of these authors indicates that humble leadership is a topic of particular interest in cultural contexts characterized by collectivism and high hierarchy.

Differences in Productivity: The gap between the leading author (15 articles) and the tenth author (Li J – 6 articles) is not too large. This shows a research field that is actively growing, not dominated by a single person but benefiting from a variety of contributions from many research groups. Most of the top 10 authors have between 7 and

9 publications. This indicates a steady level of productivity, suggesting they have been working on this topic over a long period rather than just publishing a few isolated papers.

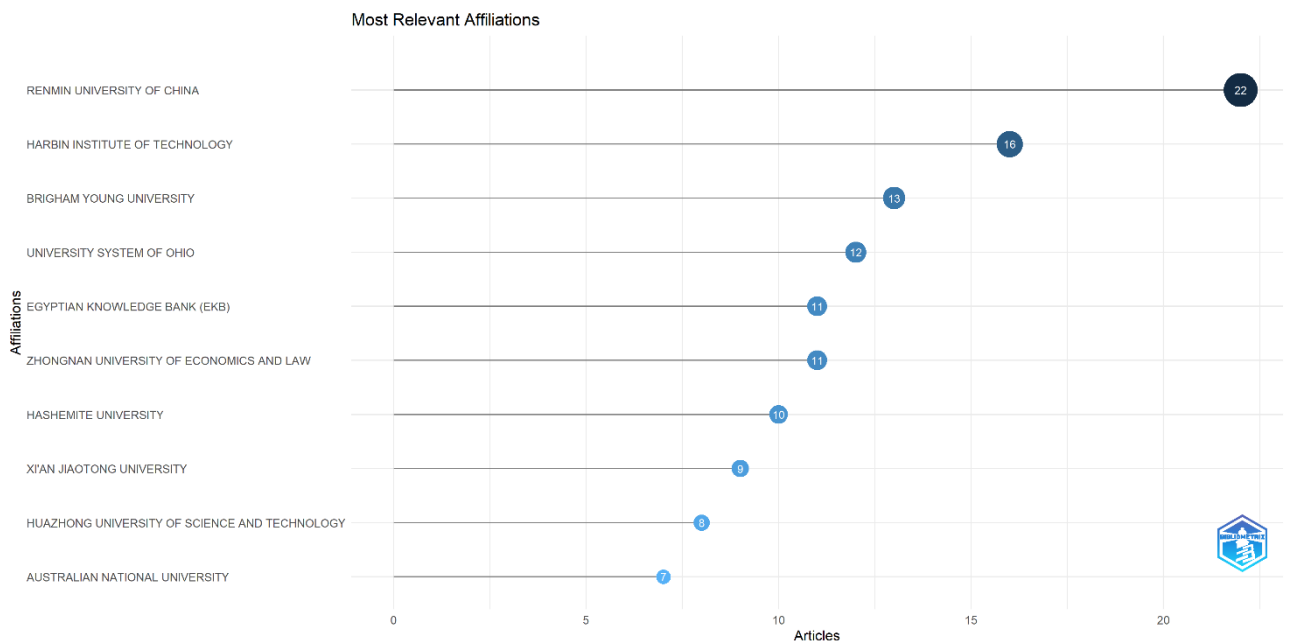
Collaboration Trends and Regional Characteristics: Looking at the list of authors (Wang Y, Chen Z, Liu W, Liu X, Mao J, Li J), there is a clear dominance of researchers from Asia, especially East Asia. In the era of innovation and AI, this has strategic importance, as these countries (such as China) are currently leading the AI competition. The connection between traditional humble leadership culture and modern technological pressures creates a fertile space for researchers to explore.

In summary, this chart helps establish the theoretical foundation by using Owens B's work as the primary framework for defining humility in leadership. Additionally, the contextual analysis explains why many authors from Asia are drawn to this topic, especially in a region experiencing the strong influence of digital transformation and AI in management.

3.3 Analysis for the research unit

Figure 4

Results of the analysis of units with the most publications



Source: Analysis results from Biblioshiny

Figure 4 shows the number of articles published by researchers from different universities and organizations. This is an important indicator for identifying the knowledge centers on Humble Leadership.

The Dominance of Chinese Institutions: Data clearly show the prominence of Chinese universities within this research network. Renmin University of China leads with 22 articles, making it the most influential contributor and highlighting the significant impact of its scholars on modern management theory. Harbin Institute of Technology ranks second with 16 articles. Other notable institutions include Zhongnan University of Economics and Law, Xi'an Jiaotong University, and Huazhong University of Science and Technology, all of which are also top contenders. **Significance:** This indicates a strong research trend in organizational psychology and leadership in rapidly transitioning economies, especially where leading Chinese technological universities are actively integrating AI into management.

Global Distribution and Cultural Diversity: Although China holds the advantage, the chart still shows the presence of other regions: the United States, Brigham Young University (13 articles), and the University System of Ohio (12 articles) represent the West. This is attributed to Bradley Owens (the leading author in humble leadership research) being affiliated with Brigham Young University, explaining the institution's high ranking. **Middle East:** The Egyptian Knowledge Bank (11 articles) and Hashemite University (10 articles) appear prominently. This is an interesting point indicating an interest in humility within leadership culture in the Arab world. **Australia:** Australian National University (7 articles) represents the Oceania region.

The Link Between Technological Strength and Management Science: Notably, institutions such as the Harbin Institute of Technology and Huazhong University of Science and Technology are universities with significant strengths in engineering and information technology. Their inclusion in the top research tier for Humble Leadership provides a strong foundation for research directions concerning humble leadership in the "Age of Artificial Intelligence (AI)." These schools have ample access to data and contexts for the practical application of AI in business.

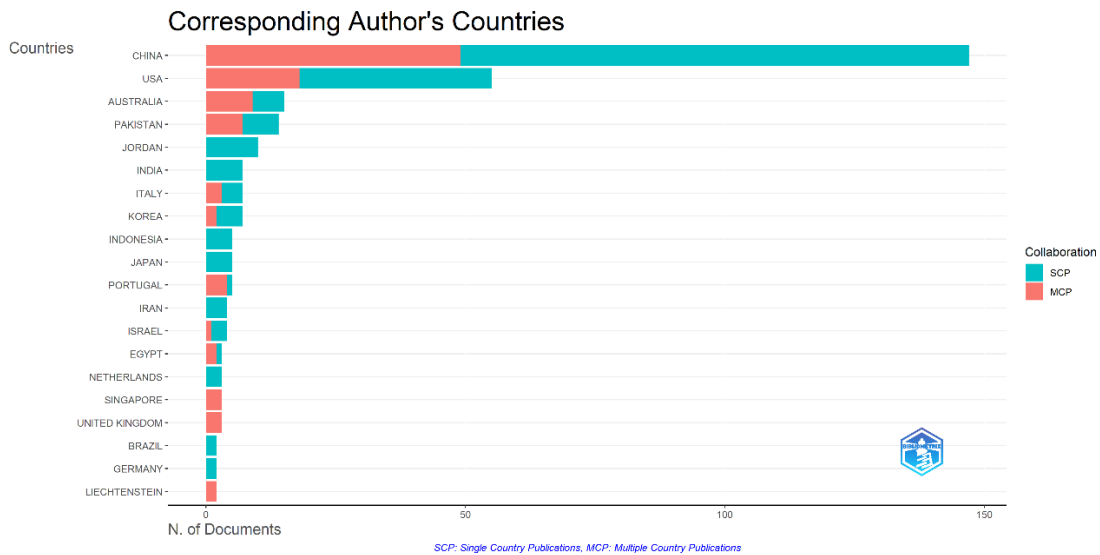
Based on the data above, the study develops the following scientific argument: Research on humble leadership is no longer confined to the West but has grown significantly in emerging economies such as China and the Middle East. This enables a

discussion on how different cultural values influence this leadership style in the digital age. The involvement of technical universities highlights an interdisciplinary trend between Management Science and Technological Science. This provides a crucial basis for the argument that "Humble Leadership" is essential to human resource management in the context of AI's impact.

3.4 Analysis of the contributions of countries and international cooperation

Figure 5

Map of the scientific productivity of countries



Source: Analysis results from Biblioshiny

Table 1

Related Authors by Country

Country	Articles	Articles %	SCP	MCP	MCP %	Country	Articles	Articles %	SCP	MCP	MCP %
CHINA	147	44.1	98	49	33.3	PORTUGAL	5	1.5	1	4	80
USA	55	16.5	37	18	32.7	IRAN	4	1.2	4	0	0
AUSTRALIA	15	4.5	6	9	60	ISRAEL	4	1.2	3	1	25
PAKISTAN	14	4.2	7	7	50	EGYPT	3	0.9	1	2	66.7
JORDAN	10	3	10	0	0	NETHERLANDS	3	0.9	3	0	0
INDIA	7	2.1	7	0	0	SINGAPORE	3	0.9	0	3	100
ITALY	7	2.1	4	3	42.9	UNITED KINGDOM	3	0.9	0	3	100
KOREA	7	2.1	5	2	28.6	BRAZIL	2	0.6	2	0	0
INDONESIA	5	1.5	5	0	0	GERMANY	2	0.6	2	0	0

JAPAN	5	1.5	5	0	0	LIECHTENSTEIN	2	0.6	0	2	100
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Source: Analysis results from Biblioshiny

Statistical data on the corresponding author's country offer important insights into the origins of management ideas and the potential for global connectivity within the field of Humble Leadership.

The dominance of economic and technological superpowers: The figures in Table 1 show a concentration of research resources in the two countries that lead in both the global economy and AI: China ranks first with 147 articles, accounting for an overwhelming 44.1% of the total research sample. This confirms China as the world's largest research hub for Humble Leadership. The USA ranks second with 55 articles (16.5%). The fact that the two leading nations in AI technology also lead in Humble Leadership research suggests a logical link: economies experiencing the most intense digital transformation pressures are actively seeking leadership models that are humane and highly adaptable.

Analysis of Collaboration Structures (SCP vs. MCP): Biblioshiny classifies publications into two groups: SCP (Single Country Publications – domestic) and MCP (Multiple Country Publications – international collaboration). In terms of total numbers, China has the highest count of international collaboration articles (49 MCP), although its MCP percentage is 33.3%. The majority of Chinese research remains domestic, with 98 SCP. Regarding international activity, Australia and Pakistan have very high international collaboration rates of 60% and 50%, respectively. Notably, countries such as Singapore, the United Kingdom, and Liechtenstein have an MCP rate of 100%, meaning all their articles result from international collaboration. The elevated MCP rate in these countries suggests that scholars there act as knowledge bridges, linking multinational research networks to tackle global management issues.

Regional Differentiation and Research Potential: Asia: Beyond China, countries such as Pakistan (14 articles), India (7 articles), and Korea (7 articles) demonstrate a growing Humble Leadership research community in the East. Developing Nations: The emergence of Jordan (10 articles), Indonesia (5 articles), and Egypt (3 articles) shows that this leadership model has broad applicability and is being validated across various cultures, not just confined to developed countries. In summary, the leadership of China

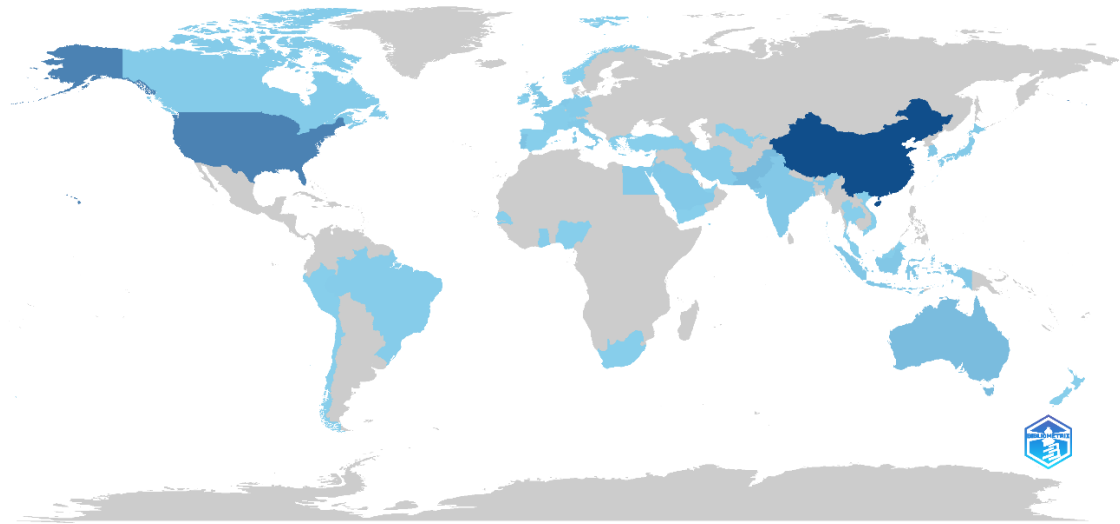
and the US, considered the world's AI pioneers, supports the idea that humble leadership is compatible with technological change. With an average MCP rate among top nations exceeding 30%, research on Humble Leadership in the AI era is becoming a global effort rather than an isolated national phenomenon.

3.5 Analysis of scientific output by country

Figure 6

Scientific thermal productivity map of countries

Country Scientific Production



Source: Analysis results from Biblioshiny

Table 2

Number of scientific outputs of countries

Country	Freq	Country	Freq
CHINA	326	INDONESIA	18
USA	187	SOUTH KOREA	17
PAKISTAN	44	UK	16
AUSTRALIA	43	INDIA	15
PORTUGAL	26	JORDAN	15

Source: Analysis results from Biblioshiny

The geographical distribution of scientific publications on Humble Leadership reflects the regions leading the flow of knowledge and the degree of interest from different economies in this leadership model.

Production Dominance of East Asia and North America: Figure 6 displays a heat map with shades of blue ranging from dark to light, clearly showing differences in publication counts: China is the clear leader with 326 publications. The darkest shade of blue on the map in the China region indicates that this country is the most invested in research on humble leadership. This can be explained by the alignment between the value of humility in Confucian culture and the modern management models currently being applied there. USA: Ranks second with 187 publications. As the birthplace of many management theories, the United States continues to maintain significant influence in validating and developing this leadership style within the context of transforming major technology corporations.

The Rise of Developing Nations and South Asia: Table 2 reveals a notable trend among developing nations: Pakistan ranks third with 44 publications, surpassing even developed nations such as Australia and the United Kingdom. This indicates that humble leadership is a key research topic in South Asia, possibly aimed at addressing challenges in human resource management and organizational psychology in the region. Australia (43 publications) and Portugal (26 publications): Represent groups of countries with stable interest, contributing significantly to diversifying the research context from Oceania to Europe.

Multinational Influence and the AI Context: Other countries in the top 10, such as Indonesia (18), South Korea (17), the UK (16), India (15), and Jordan (15), demonstrate research networks spanning continents. As technology (AI) becomes increasingly critical, the demand for a more humane leadership style, one that is humbler and more attentive, becomes more urgent to maintain balance and foster innovation.

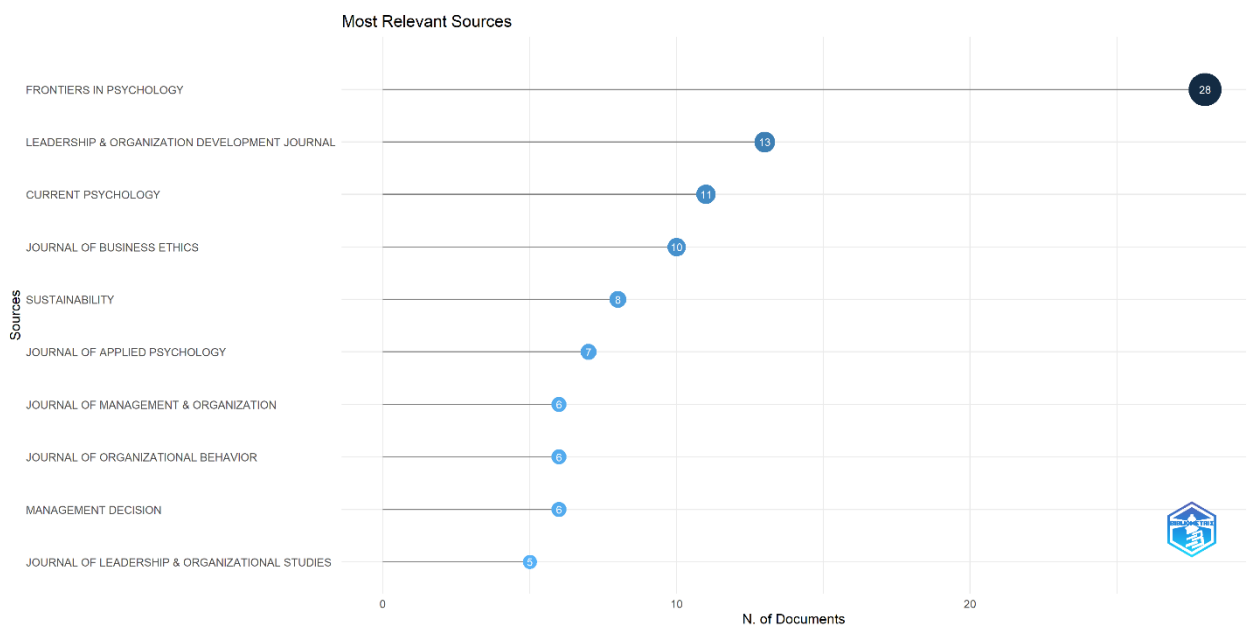
In summary, the data from Figure 6 shows that humble leadership is no longer just a traditional idea but has become a global phenomenon, confirmed across different cultures. China and the United States are the two main research markets. Studies from these countries will provide the most valuable empirical evidence on how humble leadership operates in the current AI era. The high research activity in countries such as

Pakistan and Indonesia indicates opportunities for future comparative studies on how AI affects the role of humble leadership in economies with varying levels of digitalization.

3.6 Analysis of the most prolific publication sources

Figure 7

Sources with the most publications



Source: Analysis results from Biblioshiny

Figure 7 shows the number of articles in scientific journals, helping to identify the most important knowledge distribution channels and the theoretical focus of the research field.

The dominance of psychology and organizational behavior journals shows a clear trend in examining humble leadership from a psychological perspective: *Frontiers in Psychology* leads with 28 articles. This influential journal focuses on complex psychological mechanisms, indicating that humble leadership is being studied in depth in relation to individual psychology and the behavioral interactions between leaders and employees. *Current Psychology*, with 11 articles, further supports the idea that psychological aspects are central to this leadership style.

Specialized Management and Leadership Journals: Journals directly focused on organizational management also contribute significant numbers: Leadership & Organization Development Journal (13 articles): Ranks second, showing a trend toward applying humble leadership in organizational development and team training. Journal of Applied Psychology (7 articles): This is one of the premier journals in the field. Its presence confirms the rigorous academic standards and high practical value of research on humility in management. Journal of Organizational Behavior (6 articles) and Management Decision (6 articles): These show that the topic is recognized as an important component in managerial decision-making and the adjustment of organizational behavior.

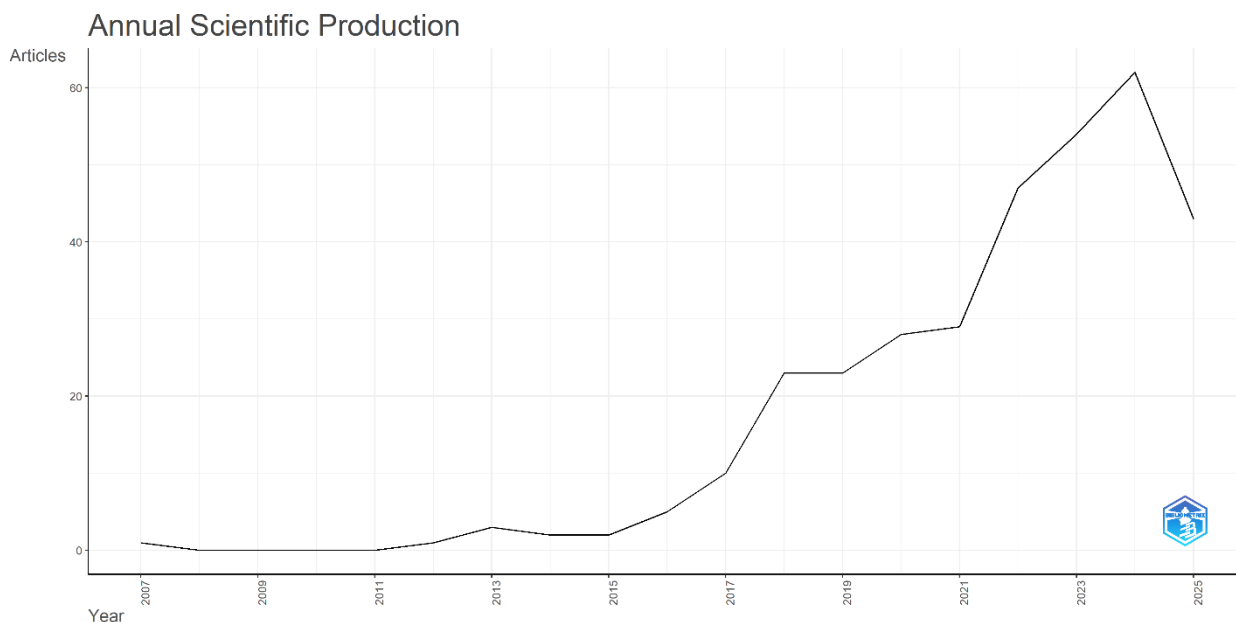
Ethical Aspects and Sustainable Development: Journal of Business Ethics (10 articles): The fourth position of this journal is highly significant. It indicates that humble leadership is not merely a management skill but also an ethical concern in business. Sustainability (8 articles): This journal emphasizes a trend that links leadership behavior to corporate sustainability, particularly as organizations undergo cultural transformations driven by artificial intelligence.

In summary, research on humble leadership extends beyond Business Administration and closely aligns with Psychology and Ethics. In the AI era, upholding ethics and psychological safety are key challenges that humble leadership can help address.

3.7 Annual scientific output

Figure 8

Publications by year



Source: Analysis results from Biblioshiny

Table 3

Year	Articles	Year	Articles	Year	Articles	Year	Articles
		2011	0	2016	5	2021	29
2007	1	2012	1	2017	10	2022	47
2008	0	2013	3	2018	23	2023	54
2009	0	2014	2	2019	23	2024	62
2010	0	2015	2	2020	28	2025	43

Source: Analysis results from Biblioshiny

The scientific research on Humble Leadership has followed a clear developmental path, evolving from an early-stage idea to a rapidly growing research area today.

The Inception and Formation Phase (2007–2016): In the early years, the number of articles was very limited, fluctuating between 0 and 5 papers per year. This was the stage in which the concept of humble leadership began to be defined, and its theoretical foundations were laid, primarily by authors such as Owens and Hekman. During this period, the topic had not yet gained widespread attention from the academic community and was focused mainly on developing measurement scales.

The Acceleration and Transition Phase (2017–2021): Starting in 2017, the number of publications exceeded 10, rising from 10 in 2017 to 29 in 2021. This was the phase when the theory of humility in leadership began to be empirically tested across different countries and organizational types. The growing interest reflected the urgent need for humane leadership styles in an increasingly volatile and complex work environment.

The Explosive and Trending Phase (2022 – Present): Output increased significantly, peaking in 2024 with 62 articles. In just three years (2022, 2023, and 2024), the total number of articles made up a large part of the entire dataset. This clearly shows the topic's explosion. The surge aligns with the time when Artificial Intelligence (AI) and tools like ChatGPT began transforming global management. As AI handles technical and computational tasks, soft skills such as humility, listening, and empathy in leaders become essential for retaining talent and encouraging innovation.

In summary, given the rapid growth in recent years, humble leadership is currently at the 'hotspot' of modern knowledge flows. Conducting a bibliometric analysis now is very suitable for organizing the large volume of emerging research. The coincidence between the peak in output and the development of AI suggests that humility is not just a virtue but an essential management strategy in the digital era. The strong upward trend of the graph indicates that humble leadership will likely remain a key research area for many years, especially as human-machine collaborative management models become more common.

mechanisms: Elements such as "psychological safety" and "psychological empowerment" serve as bridges. Humble leadership not only influences performance directly but also fosters a safe environment where employees feel confident speaking up and being creative. Moderating mechanisms: These indicate that the effectiveness of humble leadership may depend on specific circumstances or individual traits.

Behavioral Outcomes: Besides quantitative performance, studies emphasize "soft" behavioral variables, illustrating that leader humility promotes "creativity" and "innovation". This is especially significant in the era of Artificial Intelligence, where human adaptability and innovative thinking are key competitive advantages. "Work engagement" of employees is another notable positive outcome.

Comparative and Complementary Theories: The prominent appearance of "transformational leadership" indicates a trend of comparing or integrating Humble Leadership with Transformational Leadership. Researchers often contrast humble leadership with other modern leadership models to highlight its advantages. Furthermore, employee "self-efficacy" is strengthened when working with a leader who listens and offers support. Although the keyword "Artificial Intelligence" does not yet appear prominently in the main cluster of the Word Cloud, the data presented in the image provides a solid foundation for further research: **Psychological Safety in the AI Era:** As AI may cause insecurity about job displacement, "psychological safety" provided by a humble leader becomes a key factor in making employees feel secure when collaborating with new technologies. **Fostering Innovation:** Humble leadership can encourage innovation by viewing AI as a tool that requires human creativity to manage. Humble leaders create space for experimentation and acceptance of errors, which are essential in the digital transformation process. **Continuous Learning:** In an era of rapid AI developments, leaders are no longer expected to know everything. The keywords "humility" and "learning" suggest a leadership style that involves learning alongside employees to adapt to new technology.

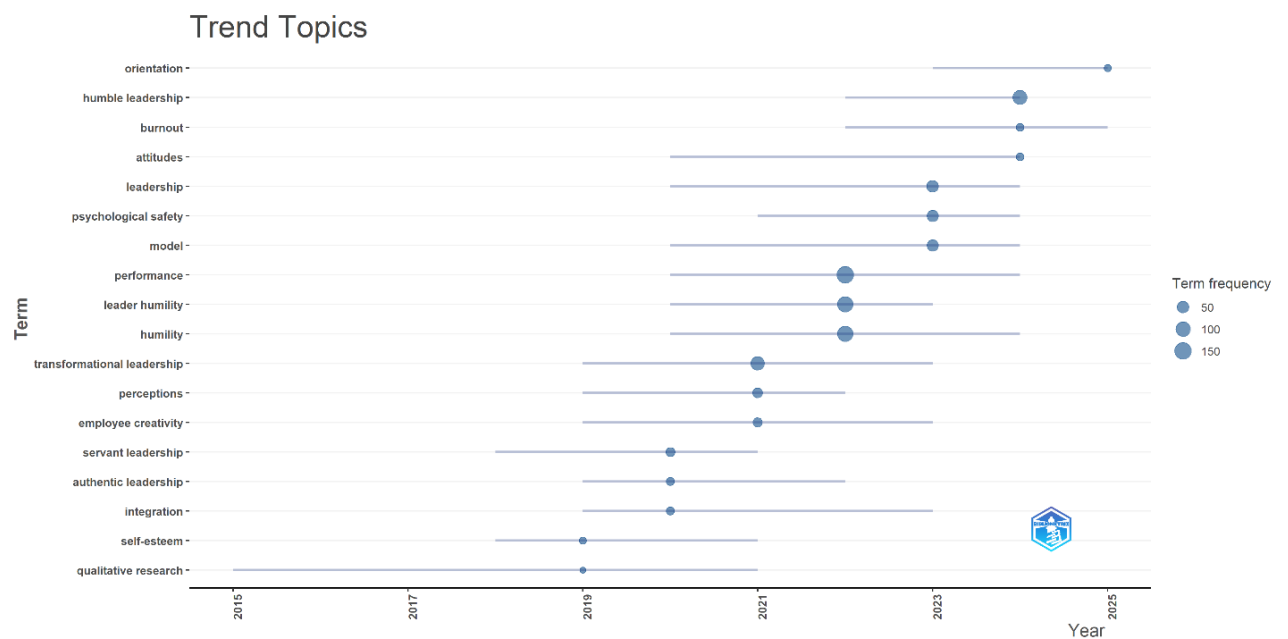
In summary, based on the bibliometric analysis, it can be concluded that research on Humble Leadership is shifting significantly from defining concepts to understanding the methods (behavioral, psychological) and conditions (moderating variables) that enhance organizational performance. In the AI era, variables such as "Psychological

safety" and "Creativity" will serve as strategic keywords that link this leadership style to the sustainable development of enterprises.

3.9 Keyword frequency statistics by year

Figure 10

Results of statistical analysis of keyword frequency by year



Source: Analysis results from Biblioshiny

The thematic trend chart shows the evolutionary stages of terminology over time. The size of the bubbles indicates how often the terms occur, while the horizontal lines mark the periods when they were most common.

The Foundational Phase (2015 – 2019): Key Topics included qualitative research, self-esteem, authentic leadership, and servant leadership. Analysis: During this phase, research on humble leadership was situated alongside related leadership styles, such as servant leadership and authentic leadership. The primary research methodology was qualitative, focusing on the nature of humility and its influence on employee self-esteem.

The Mechanism Development Phase (2020–2022): Key Topics included humility, leader humility, performance, employee creativity, and transformational leadership. Analysis: This was a highly active period in terms of frequency, with the largest bubbles

appearing for these keywords. Researchers started to clearly distinguish between 'humility' as a general trait and 'leader humility' as humility specifically demonstrated by a leader. The research focus during this stage shifted strongly toward concrete outcomes, such as performance and employee creativity.

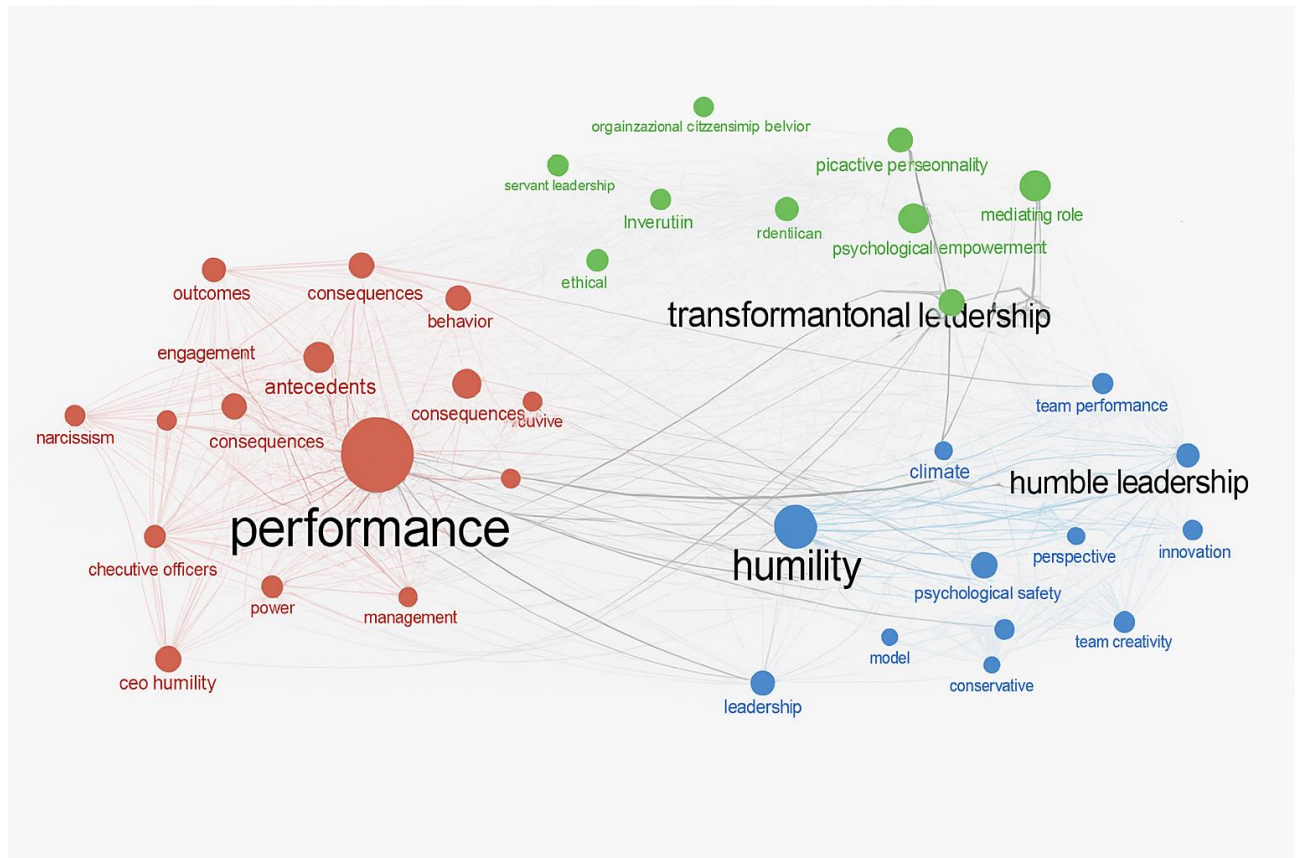
The Modern Phase and Deep Psychological Context (2023–2025): Key Topics include humble leadership, psychological safety, burnout, and orientation. Analysis shows that 'Humble leadership' peaked around 2024, indicating it has become a well-established and independent research area. The recent rise of 'psychological safety' and 'burnout' highlights a research focus on mental health and positive work environments. The term 'orientation' appeared at the start of 2025, suggesting new directions in strategy and development research.

In summary: Combating burnout in the AI era. As work speeds increase, leading to potential exhaustion, the emergence of the keyword 'burnout' suggests that humble leadership is expected to help reduce psychological pressure on employees facing new technologies. Psychological safety as a cornerstone: a critical keyword for 2023–2024. For successful AI implementation, employees need to feel safe to experiment without fear of being replaced. Humble leaders create this environment by acknowledging they are also learning to adapt to AI. From 'Creativity' to 'Orientation': The shift from focusing solely on individual creativity to strategic 'orientation' in 2025 shows that humble leadership is playing a role in guiding organizations through the digital technological revolution.

3.10 Keyword co-occurrence network

Figure 11

Keyword co-occurrence network



Source: Analysis results from Biblioshiny

Table 4

Node	Cluster	Betweenness	Closeness	PageRank
performance	1	131.81	0.02	0.082
leader humility	1	84.121	0.02	0.06
personality	1	17.649	0.02	0.035
antecedents	1	21.173	0.019	0.037
behavior	1	15.036	0.018	0.031
consequences	1	13.743	0.019	0.031
work	1	8.359	0.017	0.028
management	1	7.126	0.016	0.024
teams	1	1.792	0.015	0.015
perceptions	1	2.556	0.015	0.016
trust	1	0.679	0.014	0.012
narcissism	1	0.283	0.013	0.01
self	1	0.092	0.013	0.009
outcomes	1	0.102	0.012	0.009
power	1	0.132	0.013	0.009

chief executive officers	1	0.214	0.012	0.008
shared leadership	1	0.124	0.013	0.008
authentic leadership	1	0.147	0.012	0.008
ceo humility	1	0.025	0.011	0.006
engagement	1	0.089	0.012	0.008
abusive supervision	1	0.152	0.013	0.008
employee voice	1	0	0.012	0.007
humility	2	56.009	0.02	0.059
humble leadership	2	23.364	0.018	0.044
leadership	2	5.002	0.016	0.02
psychological safety	2	8.078	0.017	0.027
model	2	5.053	0.016	0.026
organizations	2	7.088	0.017	0.025
creativity	2	4.474	0.016	0.019
behaviors	2	0.558	0.014	0.015
innovation	2	1.74	0.015	0.015
perspective	2	0.847	0.014	0.014
work engagement	2	0.428	0.014	0.011
employee creativity	2	0.316	0.013	0.012
team creativity	2	0.327	0.013	0.011
team performance	2	0.273	0.013	0.01
conservation	2	0.134	0.013	0.01
humble	2	0.205	0.013	0.01
transformational leadership	3	46.413	0.02	0.048
mediating role	3	5.343	0.016	0.024
moderating role	3	6.079	0.017	0.022
self-efficacy	3	6.871	0.017	0.025
impact	3	1.736	0.015	0.016
psychological empowerment	3	0.719	0.014	0.015
member exchange	3	0.897	0.014	0.014
servant leadership	3	0.424	0.013	0.01
ethical leadership	3	0.492	0.014	0.011
organizational citizenship behavior	3	0.063	0.013	0.009
proactive personality	3	0.327	0.013	0.011
identification	3	0.335	0.013	0.009

Source: Analysis results from Biblioshiny

The research network is divided into three distinct clusters, representing the three main pillars of Humble Leadership theory:

- **Cluster 1 (Red): Consequences and Performance:** This is the largest cluster and plays a central role in the network. Key Nodes: Performance (Betweenness: 131.81, PageRank: 0.082) and Leader Humility (Betweenness: 84.12, PageRank: 0.06). The extremely high Betweenness Centrality of "Performance" shows that it is the most important "bridge" variable. Most studies aim to demonstrate that humble leadership helps improve work outcomes. This cluster also includes variables related to personality (personality, narcissism) and the management

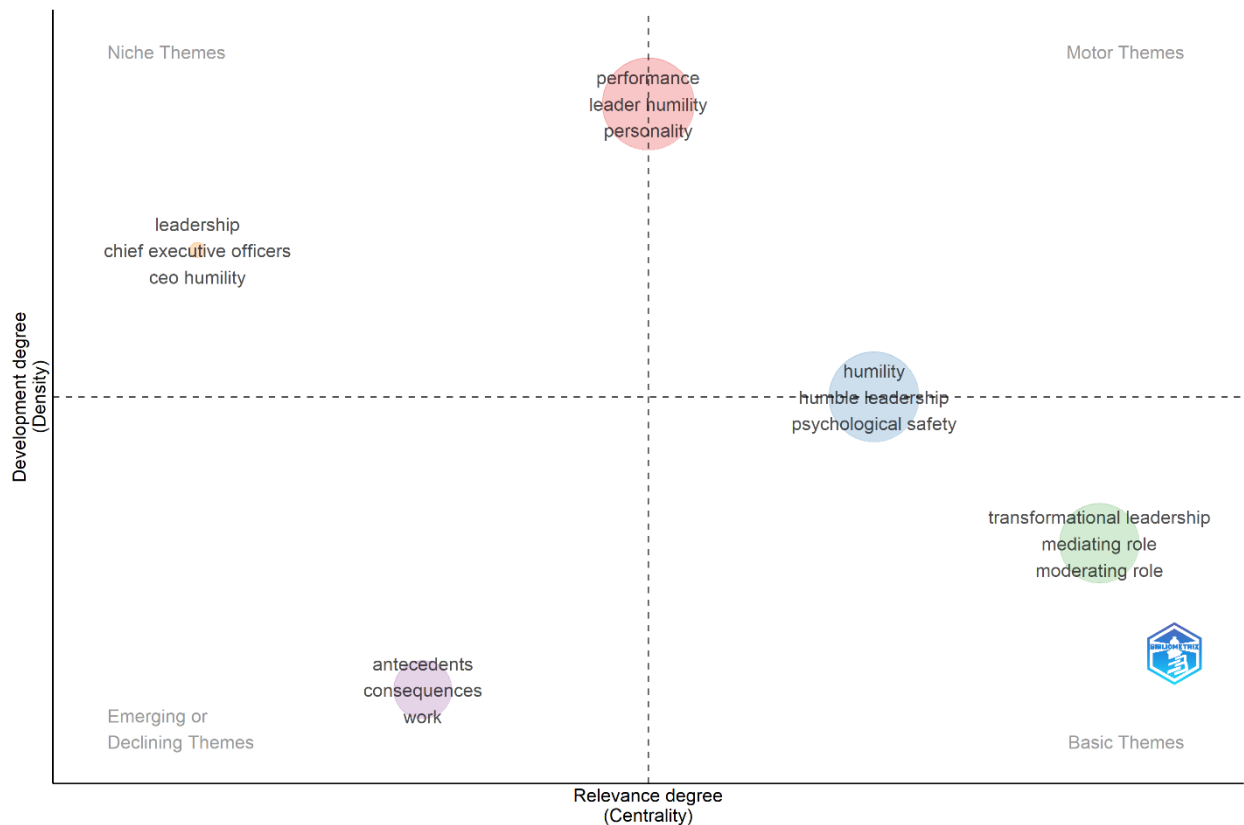
context (management, teams). While technical performance is optimized by machines, "performance" in this cluster can be understood as the combined efficiency of human intelligence and AI tools.

- **Cluster 2 (Blue): Psychological Mechanisms and Innovation:** Key Nodes: Humility (Betweenness: 56.00) and Humble Leadership (Betweenness: 23.36). This cluster emphasizes behavioral and psychological factors such as psychological safety, creativity, and innovation. Leader humility fosters a psychologically safe environment, enabling employees to take risks and experiment with new technologies and AI applications without fear of failure, ultimately promoting organizational innovation.
- **Cluster 3 (Green): Comparative Theories and Moderating Roles:** Key Nodes: Transformational Leadership (Betweenness: 46.41, PageRank: 0.048). This cluster links Humble Leadership with other established theories, like Transformational Leadership and Servant Leadership. Mediating and moderating variables are densely present here, showing a research focus on explaining how and when humble leadership influences outcomes.

3.11 Thematic maps

Figure 12

Thematic map



Source: Analysis results from Biblioshiny

Figure 12. The thematic map classifies topics based on two axes: Centrality (horizontal axis), which indicates the importance or relevance of the topic within the entire network, and Density (vertical axis), which shows the level of internal development or maturity of research within that cluster.

- **Motor Themes:** These are topics with both high density and high centrality, playing a leading role in the research field. Cluster: performance, leader humility, personality. The relationship between personality, leader humility, and job performance is the primary driver of this field. However, the position of this cluster is close to the dividing axis, indicating it is shifting from theoretical development toward becoming a fundamental research standard. While

performance remains the ultimate goal, in the context of AI, the leader's personality variable will be the key factor determining organizational adaptability.

- **Basic Themes:** These are important topics that lack extensive research, serving as the theoretical foundation for the discipline. Cluster 1 includes humility, humble leadership, and psychological safety. Cluster 2 comprises transformational leadership, mediating roles, and moderating roles. It is important to note that Humble Leadership and Psychological Safety are positioned at the center. This indicates that they are foundational concepts, essential when discussing modern management. The lower density of this cluster suggests there is still considerable room to explore new impact mechanisms. Incorporating the AI context to explain mediating and moderating roles will help elevate these basic themes into emerging core themes.
- **Niche Themes:** These topics have high internal research density but little relevance to the rest of the network. Cluster: leadership, chief executive officers, ceo humility. Research focusing specifically on the highest executive level (CEO) has reached a high degree of specialization. However, these studies are highly independent and interact less extensively with psychological variables at the employee level.
- **Emerging or Declining Themes:** Cluster: antecedents, consequences, work. General studies that merely concern "antecedents" and "consequences" are gradually losing their appeal unless placed in a more specific and novel context, especially in the current AI landscape.

In summary, this study focuses on the Basic Themes (Humble Leadership & Psychological Safety) and the Motor Themes (performance, leader humility, personality). These are extremely important topics currently lacking "research density breakthroughs." Integrating the AI factor is the way to increase research density and refresh the theory. The chart reveals a lack of keywords related to "Technology" or "Digital Transformation" in the key clusters. This proves that the research direction of "Humble Leadership in the AI Era" is a pioneering path, helping to fill the gap between traditional leadership theory and the new technological context. Future studies aimed at increasing influence should focus on describing AI as a mediating variable for the relationship between Humble

Leadership and Psychological Safety (Basic Cluster), thereby impacting Performance (Motor Cluster).

4 DISCUSSION

- **The Relationship Between Humble Leadership and Performance:** The results of the keyword co-occurrence network analysis (Figure 11) and the centrality indices (Cluster 1 data table) confirm that "Performance" is the most critical node, possessing the highest Betweenness Centrality (131.81). This demonstrates that the core objective of research on humble leadership over the past two decades has been to establish the practical value of this virtue regarding organizational outcomes. Leader humility is defined by the acknowledgment of personal limitations and the appreciation of subordinates' contributions, mediated by complex psychological mechanisms. Specifically, humble leadership creates an environment of psychological safety, which encourages employees to experiment and innovate. In the digital era, as technical tasks are increasingly automated, "performance" is no longer merely raw productivity but rather the effective integration of human intelligence and technological tools.
- **Research Gap in the AI Era:** Although scientific output peaked in 2024 (62 articles), coinciding with the explosion of Large Language Models (LLMs), the thematic map analysis (Figure 12) identifies significant theoretical gaps:
 - The Scarcity of Technological Keywords: Although humble leadership falls within the "Basic Themes" cluster, keywords directly related to "Artificial Intelligence," "Digital Transformation," or "Technology" have not yet appeared prominently in the current network structure. This indicates a certain delay in management theory's adaptation to the practical technological context.
 - The Shift from Individual to Systemic: Current studies remain deeply focused on personality traits and individual behavior. The gap lies in the lack of research on how humble leadership coordinates the Human-Machine interaction, a vital factor in the AI era.
 - Mechanisms for Addressing Technological Insecurity: AI is raising concerns about job displacement in the workforce. Although the keyword "Burnout" began to emerge in the 2024–2025 period (Figure 10), the use of humble leadership as a

strategy to mitigate psychological risks during digital transformation remains underexplored in research.

- **The Role of Mediating and Moderating Variables:** Network analysis of Cluster 2 (Blue) and Cluster 3 (Green) indicates a research trend delving into explaining *how* and *when* humble leadership exerts its effects through complex mechanisms. Psychological Safety emerges as a pivotal mediating variable. Humble leadership creates an environment where employees feel safe to experiment with new technologies and AI applications without fear of failure, thereby fostering innovation and work engagement. Additionally, psychological empowerment and self-efficacy serve as important bridges leading to high performance. The effectiveness of humble leadership is not uniform but varies depending on the organizational context or individual characteristics (such as personality). In the future, the level of economic digitalization or an organization's AI readiness could be considered a potential moderating variable to validate the adaptability of this leadership style.
- **Future Research Directions:** To fill the identified research gaps, future works should focus on describing AI as a moderating or mediating variable in the relationship between leadership and performance. The leader in the new era is no longer the "all-knowing" figure but must be a co-learner alongside employees to adapt to rapid technological changes. Shifting the focus from "individual creativity" to "digital strategic orientation" will help elevate humble leadership research from a foundational theme to a motor theme, leading the management field in the future.

In summary, the direction of this study is pioneering in connecting traditional leadership theory with the new technological context, helping organizations achieve not only performance but also sustainable and humane development in the era of artificial intelligence.

5 CONCLUSIONS

This study has performed a systematic analysis of the evolution of Humble Leadership theory, with a particular emphasis on its role in the era of Artificial

Intelligence (AI). The quantitative results from the Biblioshiny platform demonstrate the remarkable development of this field, with an annual growth rate of 23.24%, underscoring its topicality in modern management science.

- **Summary of Key Findings:** The Dominance of New Knowledge Centers: The research confirms a shift in focus from the West to East Asia, with China playing an absolute leading role in both publication output and the contributions of academic units from Chinese universities. The Link Between Humble Leadership and Performance: Keyword network analysis confirms that "Performance" is the most critical variable, serving as a bridge across all research structures. Humble leadership not only drives productivity but also plays a key role in activating creativity and innovation through the mediating mechanism of psychological safety. Adaptability in the AI Era: The surge in research coinciding with the period of rapid AI development suggests that humility is no longer merely a moral quality but has become an inevitable management strategy. Humble leaders help mitigate the fear of displacement and create a safe environment in which employees can collaborate effectively with new technologies.
- **Theoretical and Practical Implications:** The research results provide a distinct roadmap of the evolution of research topics, from defining the nature of humility (2015–2019) to decoding deep psychological impact mechanisms and digital strategic orientations (2023–2025). Practically, the study emphasizes that in the AI era, organizations need to prioritize training in a leadership style that listens, acknowledges limitations, and demonstrates a willingness to learn alongside employees to maintain a sustainable competitive advantage.
- **Research Limitations:** Although this study provides an important overview of the evolution of Humble Leadership theory through bibliometric methods, several limitations should be considered: Database Scope: The study is limited to data collection from two databases: Web of Science (WOS) and Scopus. While these are prestigious sources, important publications from other databases such as Google Scholar, as well as dissertations, books, or specialized reports not indexed therein, may have been missed. Document Language: The PRISMA screening process excluded non-English documents. This may introduce a bias, overlooking specific local cultural perspectives (e.g., studies in Chinese or other indigenous

languages) on humility in leadership. **The Gap Between Theory and Technological Reality:** The analysis shows that keywords directly related to technology (such as AI and Digital Transformation) remain scarce in the current network structure. Consequently, arguments regarding the role of humble leadership in the AI era are largely directional propositions grounded in existing theoretical foundations, rather than a substantial body of empirically established data. **Academic Data Lag:** The bibliometric method analyzes already published works; therefore, the results reflect what has occurred in the past and may exhibit a time lag relative to the extremely rapid technological shifts in current business reality. **Lack of In-depth Content Analysis:** The study primarily focuses on the quantitative analysis of metrics (authors, countries, keywords) and has not yet performed an in-depth content analysis of individual articles to evaluate contradictions or differences in empirical research findings.

- **Future Research Directions:** Despite significant progress, the study identifies a major gap regarding the lack of keywords directly related to technology within key thematic clusters. Therefore, future work should directly integrate variables such as "Digital Maturity" or "AI Readiness" as moderating variables to validate the effectiveness of humble leadership. Explore the interactive relationship between "Human and Machine" in greater depth to determine how humble leadership coordinates this collaboration to optimize system performance.

In summary, this study serves as a pioneer in systematizing knowledge on humble leadership while opening new approaches to help organizations develop humanely and sustainably amidst the constant fluctuations of the artificial intelligence era.

FUNDING DECLARATION

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

AUTHORS' CONTRIBUTION

Bui Huy Khoi and Vu Tien Dat drafted the main manuscript. Bui Huy Khoi developed the Methods and Data Mining sections, while Vu Tien Dat wrote the remaining parts. All authors reviewed and approved the final manuscript.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Dat, V. T., & Khoi, B. H. (2026). A BIBLIOMETRIC ANALYSIS OF HUMBLE LEADERSHIP IN THE AGE OF ARTIFICIAL INTELLIGENCE. *Veredas Do Direito*, 23(6), e235812. <https://doi.org/10.18623/rvd.v23.5812>