



Navigating Digital Business Performance : A Bibliometric Exploration and Integrated Evaluation Framework

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ABSTRACT

In order to capture the complex dynamics of platform ecosystems, digital transformation necessitates advanced performance measurements; nevertheless, Indonesia still relies on antiquated traditional measures that are unable to handle these complexity. In the fields of IT Governance, IT-Business Alignment, and IT Performance Measurement. Significant fragmentation is revealed by the analysis: new European clusters led by Loukis, Charalabidis, and Bernroider, which focus on e-government and SME applications, remain detached from a traditional Western cluster centered on Van Grembergen's work on COBIT and Balanced Scorecard. Chien-Chih Yu and other bridging figures provide a fragile connection between these groups. Additionally, citation trends show a move toward Asian-focused publications and open-access journals like Heliyon, which reflects increased regional relevance. In order to enable adaptive performance assessment, the research makes three contributions: (1) comprehensive mapping of bibliometric trends that provide insights into research dynamics; (2) an innovative evaluation framework that integrates quantitative and qualitative indicators, relevant to practitioners in developing countries such as Indonesia; and (3) policy recommendations to strengthen digital literacy in performance measurement. This paradigm promotes sustainable digital initiatives in developing economies, bridging theoretical underpinnings with practical implementations.

Keywords: digital performance; digital transformation; Bibliometric Analysis; IT governance; performance measurement.

INTRODUCTION

The global business world is entering an era of digital transformation, making digital business a key pillar in economic growth, driving innovation and efficiency across various industrial sectors. The World Economic Forum (2024) states that 70% of companies are integrating digital elements into their core business, requiring companies to change their operational models, competitive strategies, and customer interactions. The success of this digital transformation is highly dependent on measuring business performance evaluation, but this is difficult to do because the things being measured are complex digital business dynamics, including user interactions, data

value, and interrelated platform ecosystems, making it difficult to accurately measure the impact. Digital transformation is moving rapidly, so accurate and relevant measurement tools are needed.

In developing countries, especially when discussing Indonesia, the use of digital technology still needs to be developed and upgraded further (Kesuma et al., 2025). We still use traditional metrics, such as profit and loss or market share, where businesses still find it difficult to transform to capture the complex dynamics of digital business, making it difficult to measure the impact accurately. This shows that currently there are no adequate solutions or research to measure business performance. Although there is a lot of research discussing matters related to digital business (Kesuma et al., 2025), there is still no research that connects and combines all these aspects, whether from research studies or various aspects such as qualitative, quantitative, and technology (Henrika et al., 2025), as well as global and local markets, to form a complete framework. Most of the research and measurement tools originate from the United States, which makes them less relevant for implementation in local markets.

Given the existing challenges, bibliometric analysis offers a powerful methodological approach in the world of digital business (Rafasya et al., 2025). Bibliometric analysis has become a popular and rigorous method for mapping developments in a field of study based on scientific publications (Donthu et al., 2021). Bibliometrics involves mapping and analyzing scientific publications using citation indicators, co-authorship, and keyword clustering, which provide a deep understanding of the evolution of knowledge in the field of digital business. Bibliometrics discusses the mapping of global trends, such as AI, big data analytics, and sustainability metrics. In addition, bibliometrics can also identify research gaps, patterns of collaboration between countries, and the influence of leading journals.

This approach produces tangible evidence based on processed data, enabling the creation of new metrics tailored to the local market by combining quantitative indicators such as digital ROI (Kesuma et al., 2025), which discusses profits divided by online campaign costs, and engagement rate, which discusses user interactions (likes, shares, and comments) per audience size. Additionally, this approach incorporates qualitative indicators such as user satisfaction based on survey results or reviews, and cultural adaptation, which addresses the alignment of digital strategies with local values (language, holidays, and SME customs). Bibliometrics serves as a practical measurement tool that assists companies in making decisions with long-term impacts that are environmentally friendly, socially responsible, and relevant for the future. In other words, bibliometrics supports sustainable business strategies.

This study utilizes bibliometrics to present a comprehensive and practical mapping of the research landscape so that it can be implemented in the Indonesian market. Therefore, this study has the following objectives: (1) comprehensive mapping of bibliometric trends that provide insights into research dynamics; (2) an innovative evaluation framework that integrates quantitative and qualitative indicators, relevant to practitioners in developing countries such as Indonesia; and (3) policy recommendations to strengthen digital literacy in performance

measurement. In this way, bibliometrics contributes to enriching the data-driven discourse on digital business, enabling companies and researchers to make better decisions in the rapidly changing digital era.

METHODS OF RESEARCH

This research sources its data from the Scopus database (Arar & Yurdakul, 2023), which is widely regarded as a reliable platform for tracking academic work across disciplines. However, the search process required several adjustments to ensure that no relevant content was overlooked. For the development of a dataset that captures the broad landscape of literature on digital business performance, the following keyword variations were used: “digital business performance,” “digital performance measurement,” “digital business metrics,” and “digital transformation performance.” These terms were selected as alternative author terminologies that represent similar concepts, enabling the inclusion of relevant literature (Ramadhina et al., 2024).

Because bibliometric data are not always coherent, overlaps were screened during the search process, and the selected records were curated manually. The initial dataset contained around 14 records, showing considerable heterogeneity in publication years, with most papers appearing only in 2023. This limited the ability to represent developments across a broader time span of up to two decades. The dataset was exported in *.csv format for processing in Excel, allowing organization of article metadata such as author names, article titles, publication years, journal titles, publishers, citation counts, and URLs.

This preliminary observation is challenged by evidence showing that the final dataset consists of more than 1,200 publications published between 2002 and 2025. While this large dataset is statistically meaningful, it may also suggest that the field remains relatively isolated or dominated by a limited number of influential contributions. As a result, certain patterns observed in the analysis may reflect small-sample tendencies rather than broad, sustained scholarly activity.

To analyze the dataset, this study employed VOSviewer, a widely used bibliometric analysis tool that requires familiarity to interpret its outputs effectively. The software enables the visualization of co-authorship networks, keyword co-occurrences, and citation relationships that cannot be easily detected through manual reading of articles (Saputra et al., 2025; Suriyanti, et al., 2024).

The analysis applied co-occurrence and bibliographic coupling to examine the thematic structure of the literature. Co-occurrence analysis identifies terms that frequently appear together in author keywords, titles, abstracts, or full texts, with recurring pairings indicating conceptual relationships. This method helps reveal emerging themes and reinforces patterns identified through other analytical techniques. Bibliographic coupling, meanwhile, measures the overlap in references between publications; when two documents rely on many of the same sources, they are understood to explore related issues or follow similar research trajectories. This technique helps

form thematic clusters that represent the current state of inquiry in the field. Using both co-occurrence and bibliographic coupling provides a more comprehensive understanding of the research domain. Together, these approaches highlight thematic content derived from textual patterns and reveal interconnections shaped by shared references among studies.

RESULT AND DISCUSSION

Based on the tools we used in this study, we answered the objectives of the paper in a structured manner regarding the development of research related to IT Governance, IT-Business Alignment, and IT Performance Measurement. The results show the formation of groups of authors and publication sources with different topic focuses. This mapping shows a shift from a theoretical approach that prioritizes classical research to a practical approach that is developing in the context of digital management. In addition, the results also highlight the lack of integration between generations of research. From these findings, this study developed a digital performance evaluation framework that includes quantitative and qualitative indicators to meet the need for more flexible measurement, especially for developing countries. The analysis of publication sources and collaboration patterns also provides a basis for policy recommendations that emphasize improving digital capabilities, enhancing collaboration between academics and institutions, and implementing more integrated digital performance measurement.

The co-occurrence analysis method was performed using VOSviewer, with a minimum number of occurrences of a keyword set at 5, resulting in a total of 23 thresholds from a total of 587 keywords. This produced three main clusters of keywords, each representing interconnected research focuses but with different thematic emphases. Network visualization in Table 1 shows the structure of relationships between concepts, while overlay visualization in Table 2 provides an overview to help identify themes that change over time. The results of Table 1 and Table 2 provide a clear picture of the themes of this research in terms of both context and development.

Co-Occurrence Analysis

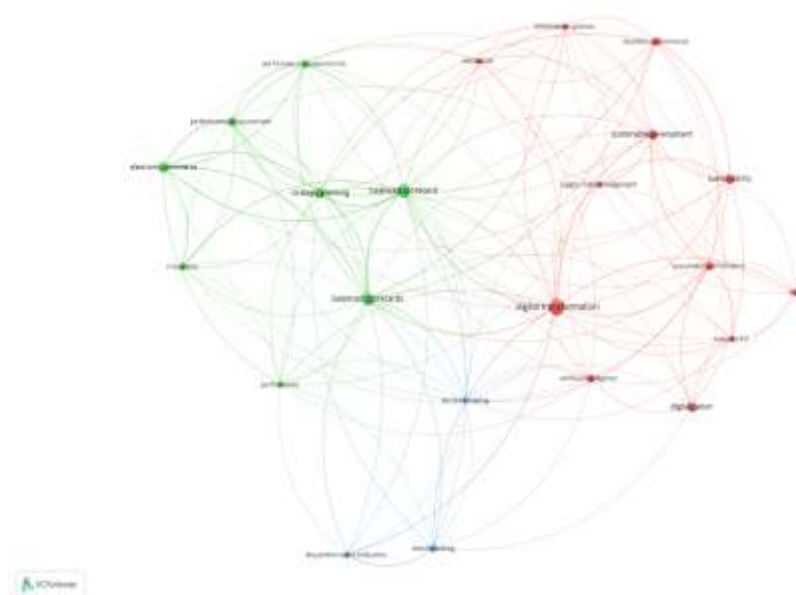


Figure 1. Network Visualization
(Source: Data Processed, 2025)

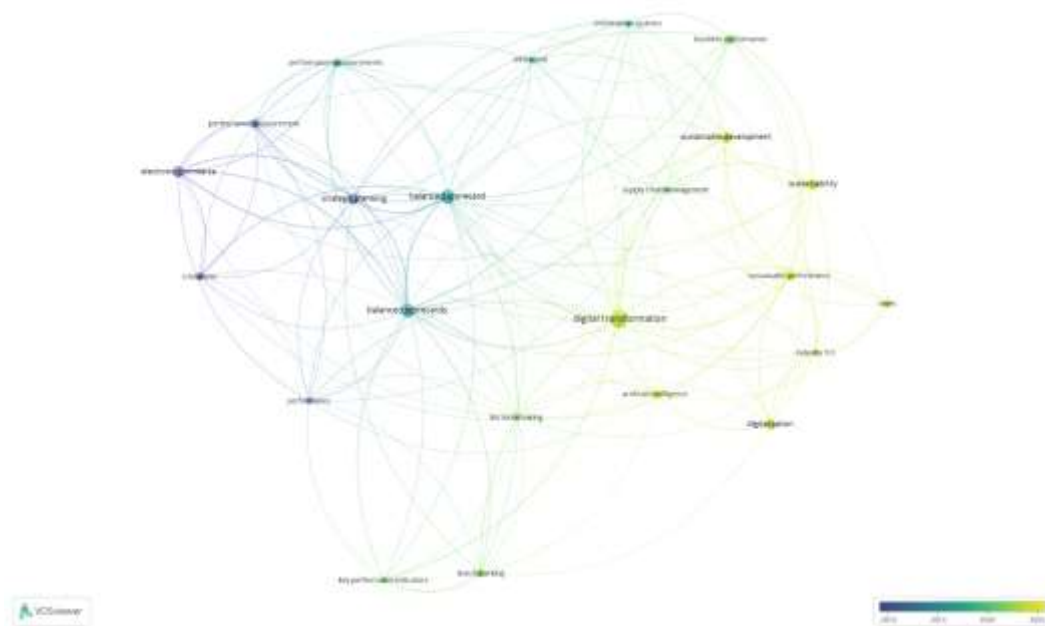


Figure 2. Overlay Visualization
(Source: Data Processed, 2025)

The first cluster (red) shows that the landscape of these research results is greatly influenced by digital change and the sustainability agenda. Keywords such as digital transformation (2023), digitalization (2023), industry 4.0 (2022), innovation (2018), as well as sustainability and sustainable performance (2023) indicate that the latest research is moving towards technological changes that impact organizational management performance. The high normalized citation values for digitalization, innovation, and sustainable performance (Irianto et al., 2025; Kesuma et al. 2025) indicate that these themes are gaining attention in the latest literature. Meanwhile, keywords such as business performance, supply chain management, and information systems serve as connecting elements that link technological aspects with operational processes. This confirms that digital transformation does not only focus on technological aspects, but also affects business strategy, supply chain effectiveness, and how organizations manage sustainability issues. The dominance of recent publication years in this cluster illustrates that this field is at the forefront of global research developments.

The second cluster (green) shows a well-conceived and organized foundation for measuring business performance, as demonstrated by keywords such as balanced scorecard, performance measurement, performance measurements, electronic commerce, and strategic planning. On average, older publications (2007-2016) show that the second cluster is a solid basic concept and is often used as the main benchmark. The close connection between balanced scorecard, performance, and strategic planning indicates that traditional performance measurement systems remain a relevant foundation for this research, especially when organizations seek to adjust their performance measurements to the needs of digitalization. The high total link strength between performance measurement and balanced scorecard proves that this concept is a gravitational foundation in the literature, serving as the main basis for researchers in developing new assessment approaches that are more suited to the era of digitalization.

This third cluster (blue) shows a focus on analytical processes in decision-making and strategic evaluation, presented with keywords such as benchmarking, decision making, and key performance indicators. With a relatively recent average publication year and strong methodological relevance, this cluster emphasizes the important role of comparable assessments and performance indicators that can determine the effectiveness of digital change. Its connection to concepts in other clusters illustrates the importance of data-driven decision-making in the crucial era of new technology.

Based on the results of the above analysis, it can be concluded that the cluster structure shown not only provides a descriptive overview of the research, but also proves the importance of integration between digitization, performance measurement methods, and analytical capabilities in forming an appropriate business performance model in the era of digital transformation.

Bibliography Coupling Analysis (Documents)

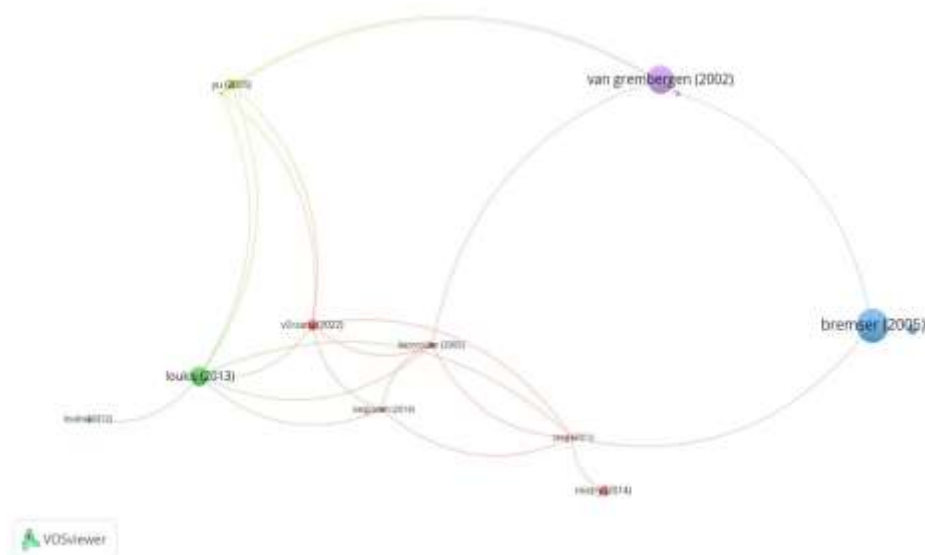


Figure 3. Bibliography Documents
(Source: Data Processed, 2025)

The graph above shows a dataset that is almost entirely derived from bibliometric analysis on the topics of IT Governance, IT-Business Alignment, and IT Performance Measurement / Balanced Scorecard for IT, COBIT framework, or IT value realization. Nodes represent individual authors, while the size of the nodes indicates the number of publications or total collaboration strength, where larger nodes are more productive or collaborate more frequently with other nodes. Each node has a label that provides the author's name and year (the year is the average publication year or the first significant year in the dataset). Looking at the networks above, there are one or more lines indicating co-authorship in the same paper. The colors on the nodes represent clusters that are automatically calculated by VOSviewer based on the strength of the relationships between authors. Authors with the same color tend to collaborate frequently with each other and form their own "communities."

The green cluster represents the most active and cohesive group that has a positive impact on the development of the field. Loukis' research focuses on e-government and public-sector IT, which allows the research to represent the newer "applicative/public sector" (2010-present). The blue cluster is quite distant from the other clusters, indicating that it rarely collaborates with other communities and represents research that is more oriented towards finance and compliance (Ariswati et al., 2025; Irianto et al., 2025; Widaryo et al., 2025). The purple cluster indicates research that is widely cited but rarely collaborates with newer groups, with researcher Van Grembergen being the "grandfather" in this field. The pink cluster shows researchers who have collaborated but not intensively, creating weaker ties, as seen in the lines showing 1 to 2

collaborative papers. Meanwhile, the research themes are diverse and not focused on a single theme, representing ERP, SME, and IT adoption in developing countries.

Table 1. Bibliography Document

Author	Year	Cluster Color	Nodes Size	Note
Loukis	2013	Green	Large	Euripidis Loukis (Yunani), focus e-government, IT adoption, decision support systems
Loukis	2012	Green	Large	Other possible publications by the same author
Bremser	2005	Blue	Large	Warren G.Bremser or similar, often in accounting information systems / IT control
Van Grembergen	2002	Purple	Medium	Wim van Grembergen (Belgia) → Pioneer IT Governance, COBIT, IT Balanced Scorecard
Yu	2005	Yellow	Small	Possibly Chun-Yu or another variant (many authors use "Yu" in IS)
Bernroider	2005	Pink	Medium	Edward Bernroider (Austria), ERP implementation, IT adoption di SME
Belgzadeh	2014	Pink	Small	Possibility A. Belgacem Zadeh or variant (less common)
Zeng	2011	Pink	Small	Many Possibilities, often in IT value / China- related IS research
Mistry	2014	Pink	Small	-
Vlyvzan	2022	Red	Medium	Possible typo / transliteration could be "Velivyzan." "Vlivizan," r actually "Vlachopoulou" / "Vlzani" - new publication (2022)

(Source: Data Processed, 2025)

From 2002 to 2010, van Grembergen dominated the field, discussing IT Governance, COBIT, and IT Balanced Scorecard. Then, starting in 2010, there was integration into the use of practical applications and e-government, dominated by European researchers such as Loukis and

Bernroider. The isolation of old and new researchers has led to a lack of integration between old and new theories.

Bibliography Coupling (Authors)



Figure 4. Bibliography Authors
(Source: Data Processed, 2025)

Nodes (round) These round nodes represent individual authors. **Edges (connections)** These curved connections represent collaborations, such as collaboration on publications. Node size, which is comparable in size, indicates that there is no measurement based on the number of publications or citations. Red indicates authors who focus on digital governance and online interactions, for example, the application of social media in public policy.

Green indicates a group that prioritizes IT management and e-business planning, including performance evaluation using a balanced scorecard. **Distance between nodes:** The closer the distance between nodes, the more frequently the authors collaborate. The small distance between nodes within each cluster reflects a high level of collaboration, such as the pairing of Charalabidis and Loukis, who regularly collaborate, and Van Grembergen and Amelinckx, who have a close relationship in their respective fields, even though the connections between the clusters are indirect and only through a single primary link.

The curved lines, the wave-like shape of the graph from left to right, indicate the development of research themes, starting with elements of technology and social relations in the red cluster, through the Chien-Chih Yu bridge in the center, which connects the world of digital government with business applications, and ending with management methods in the green cluster.

There are five authors labeled: Charalabidis, Yannis K. and Loukis, Euripidis N. on the left side in red, then Yu, Chien Chih (possibly a variation of Chien-Chih Yu) in the middle which is also in red, and Van Grembergen, Wim and Amelinckx, Isabelle on the right side in green.

Table 2. Bibliography Authors

Author	Position	Color	Research Field
Charalabidis, Yannis	Top-left	Red	e-Government, Digital Governance
Loukis, Euripidis N.	Bottom-left	Red	Social Media in Public Sector
Yu, Chien Chih	Center	Red	E-commerce, IT Performance
Van Grembergen	Top-right	Green	IT Governance, Balance Scorecard
Amelinckx, Isabelle	Bottom-right	Green	e-Business Strategy

(Source: Data Processed, 2025)

The Red Cluster (Charalabidis, Loukis, Yu) demonstrates strong collaboration with direct and close connections. In this case, Charalabidis and Loukis are the primary authors who frequently collaborate, while Yu serves as a link to the other clusters, reflecting an emphasis on digital governance and online interactions. The Green Cluster (Van Grembergen, Amelinckx) displays a strong partnership with high proximity, but is only connected to the red cluster through Yu without any direct connectivity to Charalabidis or Loukis. This emphasizes aspects of IT performance measurement and e-business strategy.

Looking at the collaboration patterns in the graph, we can focus on strengthening digital literacy through performance measurements inspired by the clusters listed in accordance with policy recommendations. In Indonesia, existing policies can encourage collaboration between institutions. This can be seen from the red Charalabidis-Loukis cluster with literacy training programs that are used and specifically designed for civil servants. For public policy, the policy recommendation that can be implemented is through performance indicators with online engagement levels. This policy can implement bridges such as Yu, which connects digital governance with business. Then, for intensive policies made for universities, this can be done by implementing international collaboration. This international collaboration can encourage IT performance measurement using a balance scorecard (green cluster). This policy can also establish bibliometric monitoring to assess digital literacy at the national level by reducing the distance between clusters through workshops or collaboration platforms. Based on the discussion above, the policies implemented must emphasize quantitative and qualitative integration so that they can

strengthen a universal digital ecosystem, especially in rural areas where digital literacy is still relatively low.

Bibliography Coupling (Sources)

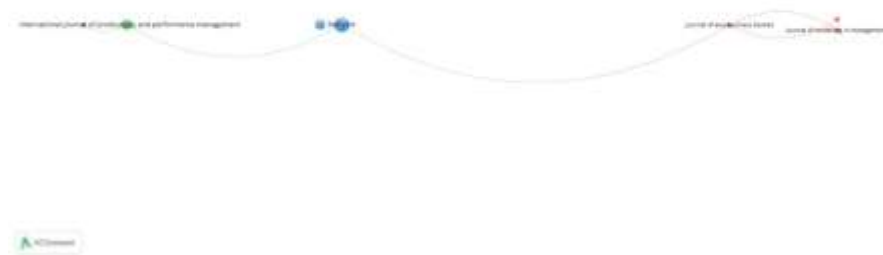


Figure 5. Bibliography Source
(Source: Data Processed, 2025)

Table 3. Bibliography Source

Journal	Publisher	Impact Factor	Main Focus
International Journal of Productivity and Performance Management (Green)	Emerald	3,8	Productivity, Measurement, Scorecard, Excellence
Heliyon (Blue)	Elsevier	4,0	Open-Access, Multidisciplinary (all fields, including business & management)
Journal of Asia Business Studies (Pink)	Emerald	2,5	Business & Management in Asia, Emerging Markets
Journal of Modelling in Management (Red)	Top-right	2,2	System dynamics, simulation, mathematical modeling in management

(Source: Data Processed, 2025)

Only four journals are displayed in the network above because the other journals did not pass the threshold. In VosViewer, there is a threshold set that we set to be less than or equal to five citations in research, so other journals with fewer than that number are automatically eliminated by VosViewer. The International Journal of Production and Performance Management was cited eight times, and the Heliyon journal was cited 12 times.

Nodes represent scientific journals, and the larger the node, the greater its influence in terms of the number of citations or publications. The color of the node circle indicates clusters of related journals, while the lines indicate citations between journals; the thicker the line, the stronger the relationship between them. There are several journals that appear, such as Heliyon with a large blue node in the center, which is a multidisciplinary open access journal from Elsevier, while the small green node on the left is the International Journal of Productivity and Performance Management, and other journals on the right with small red nodes are the Journal of Asia Business Studies and the Journal of Modeling in Management. The relationships between nodes can be seen from the light green lines, which indicate relationships with journals in the green cluster, and the pink lines, which indicate relationships with journals in the red cluster.

In the green cluster, there is the International Journal of Productivity and Performance Management, which is the "beacon" of classical performance measurement research. Then there are Asia-focused journals that show a trend toward regionalization, so that performance measurement is widely implemented in Asia (Indonesia, Malaysia, China, India). In the network above, there is a thick red line that shows the strong relationship between the Journal of Asia Business Studies and the Journal of Modelling in Management, which are widely discussed in business modeling in Asia.

Meanwhile, Heliyon is in the middle, which is a journal that democratizes publication, so it is widely used in research in developing countries and has become a bridge journal between Western measurement and modeling in the Asian context. Heliyon is open-access and multidisciplinary, so it often serves as a link between different communities. This is a sign that the field is shifting from Western theory to application in emerging markets, with open-access beginning to dominate citation visibility.

CONCLUSION

The bibliometric analysis results show that research in the fields of IT Governance, IT-Business Alignment, and IT Performance Measurement forms a knowledge structure that is segmented into several major clusters, with each cluster representing distinct thematic orientations and historical evolutions. The early researcher cluster, led by figures such as Van Grembergen, emphasized theoretical foundations related to COBIT (Control Objectives for Information and Related Technologies) and the Balanced Scorecard, whereas contemporary researcher clusters, represented by Loukis and Charalabidis, have expanded the focus towards the implementation of

digital governance and e-government, with Yu serving as a bridging figure across different approaches. This mapping provides a comprehensive understanding of the dynamics of research development while highlighting the existence of an integration gap between classical theory and application-oriented approaches. These findings serve as the basis for formulating an integrated evaluation framework that combines quantitative and qualitative indicators to assess digital performance in a more adaptive manner, particularly in the context of developing countries. Additionally, the inter-journal relationship patterns which are evident in journals such as the *Internal Journal of Productivity and Performance Management*, *Heliyon*, and the *Journal of Asia Business Studies*. The journals that were noted reveal a shift in publication orientation toward regional focus and multidisciplinary approaches. The shift has led to policy recommendations aimed at strengthening digital literacy, which encourages inter-institutional collaboration, and promoting the systematic adoption of digital performance measurement practices. Thus, our research results directly address the study's objectives of mapping the knowledge domain, developing an integrated framework, and formulating policy recommendations.

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