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Topic Modelling of Contemporary Management Information Systems Research: A Latent Dirichlet Allocation Approach[1]

Güncel Yönetim Bilişim Sistemleri Araştırmalarının Konu Modellemesi: Bir Gizli Dirichlet Ataması Yaklaşımı

Ahmet Ayaz[2], Ahmet Kamil Kabakuş[3], Üstün Özen[4], Ömer Alkan[5], Serdar Aydın[6]

Abstract

This research thoroughly explores the expansive academic discourse on Management Information Systems (MIS), investigating its branches, influential theories, and diverse topics. Employing a topic modeling approach, the study analyzes 7852 article abstracts from the Scopus database (2022-2023) using the Latent Dirichlet Allocation algorithm. The goal is to identify research gaps and delineate key areas of interest. The findings suggest that the corpus of articles can be distinctly classified into varied thematic categories, each representing significant facets within the MIS domain. The analytical outcome postulates the existence of seven distinct thematic clusters such as "Digital Innovation and Business Performance", "Cost Optimization and Demand Analysis", "Advancements in Machine Learning and Deep Learning", "Sustainable Practices in Green Logistics and Supply Chain Management", "Impact of the COVID-19 Pandemic on Social Interaction and Crisis Management Strategies in Businesses", "Decision Making Systems and the Efficacy of Optimization Models", and "Consumer Satisfaction and Behavioral Analysis in Online Services". These insights not only underscore the heterogeneity and breadth of the MIS field but also underscore the dynamic nature of the discipline. The derived results hold the potential to steer future inquiries and foster novel contributions within the realm of MIS.

Keywords: *Management Information Systems, Topic Modelling, Latent Dirichlet Allocation, Text Mining, Machine Learning.*

Öz

Bu araştırma, Yönetim Bilişim Sistemleri (YBS) üzerine geniş kapsamlı akademik söylemi derinlemesine incelemekte, dallarını, etkili teorileri ve çeşitli konuları araştırmaktadır. Bir konu modelleme yaklaşımı kullanan çalışma, Scopus veri tabanından (2022-2023) 7852 makale özetini Gizli Dirichlet Ataması algoritması kullanarak analiz etmektedir. Amaç, araştırma boşluklarını belirlemek ve temel ilgi alanlarını tanımlamaktır. Bulgular, makale külliyatının, her biri YBS alanındaki önemli yönleri temsil eden çeşitli tematik kategoriler halinde belirgin bir şekilde sınıflandırılabileceğini göstermektedir. Analitik sonuç, 'Dijital İnovasyon ve İş Performansı', 'Maliyet Optimizasyonu ve Talep Analizi', 'Makine Öğrenimi ve Derin Öğrenmedeki Gelişmeler', 'Yeşil Lojistik ve Tedarik Zinciri Yönetiminde Sürdürülebilir Uygulamalar', 'COVID-19 Pandemisinin İşletmelerde Sosyal Etkileşim ve Kriz Yönetimi Stratejileri Üzerindeki Etkisi', 'Karar Verme Sistemleri ve Optimizasyon Modellerinin Etkinliği' ve 'Çevrimiçi Hizmetlerde Tüketici Memnuniyeti ve Davranış Analizi' gibi yedi farklı tematik kümenin varlığını varsaymaktadır. Bu görüşler sadece YBS alanının heterojenliğini ve genişliğini vurgulamakla kalmıyor, aynı zamanda disiplinin dinamik doğasının da altını çiziyor. Elde edilen sonuçlar, gelecekteki araştırmaları yönlendirme ve YBS alanında yeni katkıları teşvik etme potansiyeline sahiptir.

Anahtar Kelimeler: *Yönetim Bilişim Sistemleri, Konu Modelleme, Gizli Dirichlet Ataması, Metin Madenciliği, Makine Öğrenmesi.*

JEL Codes: *C81, D83, L86, M15, O33*

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[2]Öğr. Gör. Dr., Karadeniz Teknik Üniversitesi, Uzaktan Eğitim Uygulama ve Araştırma Merkezi, Trabzon, Türkiye, ahmetayaz@ktu.edu.tr, ORCID: https://orcid.org/0000-0003-1405-0546.

[3]Doç. Dr., Atatürk Universitesi, İktisadi ve İdari Bilimler Fakültesi, Yönetim Bilişim Sistemleri Bölümü Öğretim Üyesi, Erzurum, Türkiye, kkabakus@atauni.edu.tr, ORCID: https://orcid.org/0000-0003-3209-0672.

[4]Prof. Dr., Atatürk Universitesi, İktisadi ve İdari Bilimler Fakültesi, Yönetim Bilişim Sistemleri Bölümü Öğretim Üyesi, Atatürk University, Erzurum, Türkiye, uozen@atauni.edu.tr, ORCID: https://orcid.org/0000-0002-7595-4306.

[5]Prof. Dr., Atatürk Universitesi, İktisadi ve İdari Bilimler Fakültesi, Ekonometri Bölümü Öğretim Üyesi, Erzurum, Türkiye, oalkan@atauni.edu.tr, ORCID: https://orcid.org/0000-0002-3814-3539.

[6]Doç. Dr Atatürk Universitesi, Mühendislik Fakültesi, Yazılım Mühendisliği Bölümü Öğretim Üyesi, Erzurum, Türkiye, serdar@atauni.edu.tr, ORCID: https://orcid.org/0000-0003-4943-3272.

Introduction

Management Information Systems (MIS) play a pivotal role in modern organizations by facilitating the effective gathering, processing, storage, and dissemination of information. These systems are integral not only to operational efficiency but also to strategic decision-making, enabling organizations to adapt to dynamic market conditions and technological advancements (Bawack et al., 2022). MIS serves as the backbone for integrating technology with business processes, providing a competitive edge in an increasingly data-driven world.

The interdisciplinary nature of MIS encompasses a wide range of fields, including operations management, strategic management, and information technology (Mas-Tur et al., 2020). By synthesizing concepts from organizational theory, computer science, operations research, and economics, MIS addresses complex challenges in managing technological resources (Laudon & Laudon, 2012). This multifaceted integration makes MIS a dynamic and evolving discipline, shaped by advances in artificial intelligence, machine learning, big data analytics, and digital transformation (Bensghir, 2002; Baskerville & Myers, 2002).

Given its interdisciplinary scope, MIS research extends beyond organizational applications to address broader societal and technological issues. For instance, advancements in data analytics and automation have revolutionized supply chain management, customer relationship management, and enterprise resource planning systems, creating new opportunities for innovation and efficiency (Culnan & Swanson, 1986). As organizations increasingly adopt cloud-based solutions and Internet of Things (IoT) technologies, the MIS field has expanded to include emerging topics such as cybersecurity, green IT, and ethical considerations in AI-driven decision-making.

To fully comprehend the evolution of the MIS field, it is essential to periodically assess its intellectual foundations. This requires analyzing not just individual studies but also the collective body of knowledge that defines the discipline (Holsapple, 2008). By mapping out key contributions and trends, researchers can identify gaps in the literature and areas ripe for exploration. This study contributes to this effort by employing advanced bibliometric and topic modeling techniques to systematically analyze recent developments in the MIS field.

The overarching goal of this research is to provide a comprehensive understanding of the MIS discipline by identifying its core themes, influential theories, and emerging areas of interest. This effort not only aids scholars in navigating the vast MIS literature but also helps practitioners apply cutting-edge insights to real-world challenges.

1. Literature Review

Bibliometric analyses, in particular, have proven valuable in delineating the field and providing deeper insights into researcher profiles. These studies provide valuable insights into developments within the literature and help identify prominent scholars in the area (Mukherjee et al., 2022). Additionally, there is growing interest in applying bibliometric analysis to explore topics across fields such as management, public health, sustainability, and medical sciences (Mejia et al., 2021). Bibliometric studies have been crucial in mapping research trends, identifying key authors, countries contributing to research topics, and analyzing the intellectual structure of various fields (Ahmad et al., 2023). These analyses offer insights into the evolution of research areas such as strategic management for sustainability, project complexity, and supply chain financing (De Rezende et al., 2018; Suriyankietkaew & Petison, 2020). By employing bibliometric techniques, researchers can monitor the growth of research topics over time, recognize influential authors, and comprehend the global landscape of scholarly contributions (Ahmad et al., 2023).

The use of bibliometric and related methods in the MIS field dates back to the early 1980s. These studies typically feature statistical analyses of articles to track trends and the development of the field (Cooper, 1988; Culnan, 1986; Culnan & Swanson, 1986; Farhoomand, 1987; Hamilton & Ives, 1982). In addition to article-level analysis, bibliometric methods have been applied to MIS-related journals to examine their influence, citation patterns, and academic impact (Alavi & Carlson, 1992; Cocosila et al., 2011; Hamilton & Ives, 1982; Mohanty, 2014; Mohanty & Sahoo, 2016). These efforts help outline the intellectual structure of the MIS discipline by mapping out its literature and providing insights into key journals and contributors that shape the field.

While bibliometric analyses provide a broad overview of existing research, they often fall short in offering insights derived from semantic content analysis, limiting the depth of understanding of the literature (Gurcan et al., 2021). A more thorough analysis can be attained by integrating bibliometric methods with topic modeling techniques. Approaches like Latent Dirichlet Allocation (LDA) allow researchers to identify core themes within the academic literature and reveal emerging areas of research (Bilge & Yaman, 2022). As an unsupervised machine learning-based natural language processing technique, topic modeling helps detect core themes and trends within a specific research domain

(Oosthuizen, 2021). This technique is particularly effective for systematically analyzing large collections of academic literature (Blei et al., 2003).

Topic modeling, when combined with bibliometric analyses, provides a deeper insight into the themes, research interests, and evolving patterns within a field (Ozyurt & Ayaz, 2022). Thus, topic modeling serves as a powerful tool for uncovering research topics in any domain (Hu et al., 2014; Kang et al., 2019). For instance, Çallı et al. (2021) applied topic modeling to 574 postgraduate thesis abstracts in the MIS department, completed between 2002 and 2020. The study categorized the theses under 11 topic headings, including e-Commerce and Marketing, System Development and Impacts, Organizational Effects of Information Systems, Data Mining, Human Resource Management, Organizational Change, Specialized Studies I and II, Security, Education and Training, and Forecasting and Decision Support. Similarly, Özköse et al. (2023) explored MIS from an interdisciplinary angle by analyzing 25,304 articles published in the Scopus database from 2016 to 2021. Through topic modeling, the articles were organized into 15 categories, which were reviewed on an annual basis to derive comprehensive insights.

Although many bibliometric analyses have been performed in the MIS field, the use of topic modeling is still relatively limited. This study aims to systematically examine recent works in the MIS discipline by combining topic modeling and bibliometric analysis techniques. Specifically, 7,852 articles from the Scopus database, covering the period from January 1, 2022, to June 20, 2023, were examined.

2. Method

This study employs topic modeling to explore academic literature within the field of MIS, utilizing the SUBJTERMS (1404) code in the Scopus database, which corresponds to the MIS discipline. Topic modeling, a machine learning technique, is used to capture the essence of textual data and identify key words across a document collection that reflect underlying themes. This method organizes the words into clusters, with each cluster representing a distinct theme within the document (Sheriff & Sevukan, 2023).

In this study, topic modeling was utilized on academic articles within the MIS domain to conduct a comprehensive analysis of emerging trends and patterns. The dataset consisted solely of journal articles (both research and review) published in English from 2022 to 2023. The following query was employed to extract relevant articles from the Scopus database;

"SUBJTERMS (1404) AND (LIMIT-TO (PUBYEAR, 2023) OR LIMIT-TO (PUBYEAR, 2022)) AND (EXCLUDE (PUBSTAGE, "aip")) AND (LIMIT-TO (DOCTYPE, "ar") OR LIMIT-TO (DOCTYPE, "re")) AND (EXCLUDE (LANGUAGE, "Portuguese") OR EXCLUDE (LANGUAGE, "German") OR EXCLUDE (LANGUAGE, "Arabic") OR EXCLUDE (LANGUAGE, "Spanish") OR EXCLUDE (LANGUAGE, "French") OR EXCLUDE (LANGUAGE, "Czech"))"

The query was executed on June 19, 2023, yielding a total of 7,852 articles, consisting of 7,662 research articles and 190 review articles. The titles, abstracts, and author keywords from these articles were compiled into a dataset, forming a comprehensive "Management Information Systems" literature corpus.

2.1. Data Preprocessing

In topic modeling analysis, which is commonly used in text mining applications, certain preprocessing steps are required to prepare the raw data for meaningful analysis. These steps aim to clean and organize the data to ensure accurate results (Aggarwal & Zhai, 2013). The preprocessing steps are listed below:

Removing Stop Words: Commonly used words (e.g., "and," "the") that do not provide substantive meaning in the context of analysis are removed to focus on key terms.

Lowercasing: The entire text is converted to lowercase to prevent treating words like "Information" and "information" as separate entities.

Lemmatization: Words are reduced to their base or root form to account for variations, such as "manage," "managing," and "management," which are all treated as the same term.

Removing Punctuation and Special Characters: Symbols and unnecessary characters are excluded to maintain consistency in the textual data.

Tokenization: The text is divided into individual words or tokens, which act as the fundamental units for subsequent analysis.

2.2. Topic Modeling and İmplementation of Data Analysis

In this research, LDA (Blei et al., 2003), was used, which is widely regarded as the dominant algorithm for topic modeling (Jelodar et al., 2019), to identify the key topics and trends within the business and management literature related to digitalization. While this study employs LDA for topic modeling, advanced models such as BERT-based topic models and neural topic modeling techniques were not utilized. These methods, leveraging deep learning, offer improved performance in capturing contextual and semantic nuances. However, their computational intensity and the need for extensive fine-tuning make them less feasible for large-scale datasets like this study. LDA was chosen for its balance of interpretability and efficiency. LDA operates under the assumption that a corpus, or set of documents, contains a finite number of topics, each with varying proportions. These topics are represented as probabilistic distributions over a fixed set of words (Blei, 2012). Based on this assumption, LDA aims to utilize the words within the documents to reveal the underlying topical structure of the corpus.

The algorithm defines the conditional probabilistic distribution of the hidden topic structure, given the observed words, and uses techniques such as Gibbs sampling (Griffiths & Steyvers, 2004) to approximate the calculation of this structure. By doing so, LDA uncovers the latent topics that are present across the entire dataset, allowing for a clearer understanding of the prevailing themes and trends within the field of business and management, particularly in relation to digitalization.

After completing the preprocessing steps, the title, abstract, and keywords from each article are combined to form a unified dataset, ready for topic modeling analysis. Initially, a pilot LDA analysis is performed. In this pilot analysis, it is observed that the terms "management information systems" and other query-related terms appear frequently across nearly all topics, leading to redundancy.

To address this issue and prevent these terms from dominating the topic headings, the terms used in the query are added to the stop word list. This step ensures that these frequently occurring terms are excluded from the analysis, allowing more meaningful and distinct topics to emerge during the final LDA analysis. By refining the data in this way, the LDA model can better capture the unique themes and trends within the MIS literature.

In this study, the LDA model was implemented using the Gensim Python library (Prabhakaran, 2018) to analyze the MIS literature. Adapting the LDA model requires fine-tuning key parameters—α, β, and K—to optimize the model's performance. Each of these parameters serves a specific function:

- *α (alpha):* This parameter influences the distribution of topics within each document. A lower α value indicates that documents are likely to focus on fewer topics, whereas a higher α value suggests that documents might cover a wider range of topics.

- *β (beta):* This parameter controls the distribution of words within each topic. A lower β value means that each topic will have a smaller set of dominant words, while a higher β value allows for a more extensive range of words to describe each topic.

- *K:* This parameter represents the total number of topics to be extracted from the corpus. Choosing an optimal value for K is essential for the model to accurately capture the diversity of themes within the dataset (Blei, 2012).

By adjusting these parameters, the LDA model is fine-tuned to uncover the latent topical structure of the MIS literature, revealing distinct topics and trends in the field. As noted by Gurcan & Cagiltay (Gurcan & Cagiltay, 2022) these parameters are crucial adjustments that impact the performance of the LDA model. α parameters for determining the topic distribution per document are set to ['symmetric' 'asymmetric'], and the β (also known as beta) parameter for determining the word distribution per topic is set to ['symmetric']. Adjusting the alpha parameter in LDA as symmetric or asymmetric affects how document topic distributions are modeled. While symmetric alpha may result in documents having more similar topic distributions, asymmetric alpha allows documents to have different topic distributions.

The third parameter in fitting an LDA model is K, representing the number of topics to be extracted. Several methods are used in the literature to determine the most suitable number of topics. In some instances, researchers rely on their subjective interpretation of the data to decide the number of topics (Ankaralı & Külcü, 2020; Budak & Sökmen, 2022; Ekinci & Omurca, 2017). However, more systematic approaches employ metrics such as coherence values to evaluate and refine topic models (Gencoglu et al., 2023; Gurcan et al., 2023).

For instance, Pathan and Prakash (2021) demonstrated that LDA achieves improved results when the coherence value (CV) is used as the coherence metric. In this study, the coherence value (CV) was selected as the metric for determining the optimal number of topics. While this study employs the CV metric for coherence measurement, future studies could benefit from incorporating additional metrics such as UMass, UCI, and NPMI. These metrics provide complementary

insights into topic coherence, helping to validate the model's performance more comprehensively. However, due to resource limitations, only the CV metric was applied in this study.

The LDA model was executed with topic numbers ranging from 5 to 35, and the coherence metric (CV) was calculated for each K value to evaluate the quality of the resulting topic models. The highest coherence score, indicating the most coherent topic-word distributions, was observed with 7 topics, with coherence values ranging between 0.410 and 0.497. Blei et al., (2003) suggest that the number of topics with coherence values closest to 0.7 is typically ideal for achieving a well-balanced topic model. Based on these coherence values, 7 topics were chosen as the optimal number for this study.

3. Results and Discussion

The identified topics and their respective names were determined collaboratively by three domain experts. These experts carefully analyzed the key terms extracted by the LDA model and assigned meaningful names to the topics based on their semantic coherence and relevance to the Management Information Systems (MIS) field. This approach ensures that the topic labels accurately reflect the thematic essence of each cluster and align with the current trends and priorities in the MIS discipline.

3.1. Key Research Areas in the Field of Mıs Field

This section addresses the research questions concerning the prominent topics in MIS articles (RQ1) and highlights the most significant articles and journals within each of these topics (RQ2). The topics were identified and named by three domain experts based on the key terms that define each topic. The proportion of each topic was calculated according to the number of articles assigned to it. Table 1 presents the identified topics, organized by volume from the most to the least prominent. Furthermore, the top 15 terms for each topic are ranked according to their contribution to the respective topic. These terms were derived using the LDA model, with their contribution intensities reflecting their importance within the respective topics. This detailed breakdown provides insights into the specific themes that dominate the MIS field, while also helping to identify influential articles and journals associated with these themes. By analyzing the distribution of articles across these topics, researchers can gain a clearer understanding of the major research trends in MIS, and the ranked key terms offer a deeper look into the semantic structure underlying each topic.

Table 1. LDA Analysis Results

Topics	Topic terms	%
Digital Innovation and Business Performance	business | digital | innovation | financial | firm | performance | development | model | technology | system | analysis | company | value | information | market	51,87
Cost Optimization and Demand Analysis	model | cost | system | demand | problem | product | price | method | optimal | rate | inventory | logistics | statistical | policy | analysis	18,14
Machine Learning and Deep Learning	learning | model | network | method | feature | information | algorithm | deep | classification | graph | machine | image | performance | detection | neural	16,33
Green Logistics and Supply Chain Management	chain | supply | management | performance | knowledge | industry | relationship | analysis | factor | technology | green | logistics | company | business | information	9,84
COVID-19 Pandemic and Social Interaction in Businesses and Crisis Management	social | covid | pandemic | medium | employee | information | team | behavior | effect | leadership | health | job | analysis | public | crisis	1,62
Decision-Making Systems and Optimization Models	decision | system | algorithm | problem | model | process | method | project | approach | optimization | multi | cloud | solution | fuzzy | design	1,40
Customer Satisfaction and User Behavior Analysis in Online Services	service | customer | online | consumer | intention | user | student | quality | effect | perceived | model | mobile | brand | satisfaction | information	0,80

When Table 1 is examined, it is determined that the topics with the highest intensity are "Digital Innovation and Business Performance" (51.87%), "Cost Optimization and Demand Analysis" (18.14%), and "Machine Learning and Deep Learning" (16.33%). The least studied topic is identified as "Customer Satisfaction and User Behavior Analysis in Online Services" (0.80). To facilitate understanding, the meanings of these topics are explained below:

Digital Innovation and Business Performance (51,87%) topic signifies the relationship between digital innovation and business performance. In this context, digital innovation entails the adoption, implementation, and enhancement of business processes through the utilization of digital technologies by enterprises (Ciriello et al., 2018). Embracing digital innovation can assist businesses in gaining a competitive advantage, improving customer experience, and, overall, enhancing business performance.

Cost Optimization and Demand Analysis (18,14%) topic signifies the relationship between cost optimization and demand analysis. In this context, cost optimization is a strategy focused on minimizing costs to efficiently and effectively manage the operations of a business (Panjota et al., 2018). On the other hand, demand analysis involves examining the nature and quantity of demand for a product or service (Li et al., 2018).

Machine Learning (ML) and Deep Learning (DL) (16,33%) emphasize the principles of ML and DL, both fundamental components of artificial intelligence (AI). These concepts illustrate how computer systems acquire learning capabilities through diverse techniques.

Machine Learning (ML) is a field within artificial intelligence that allows computer systems to enhance their performance on designated tasks by learning from data. ML models gain proficiency by analyzing data, recognizing patterns, and applying algorithms to adapt to various tasks. The primary learning approaches in machine learning encompass supervised learning, unsupervised learning, and reinforcement learning, each employing distinct strategies for model training and data processing (Choi et al., 2020; Zhou et al., 2017). DL, a branch of machine learning, emphasizes more intricate and layered structures, such as artificial neural networks.These deep learning algorithms rely on large datasets and the automatic learning capabilities of multi-layered neural networks to solve tasks. DL excels at managing complex tasks like image recognition and speech processing because of its capability to learn hierarchical representations of intricate features, enabling the development of more advanced abstractions (Choi et al., 2020).

Green Logistics and Supply Chain Management (9,84%) focuses on environmentally sustainable practices in logistics and supply chain management. These concepts highlight the efforts of businesses to optimize logistics and supply chain operations while minimizing their environmental impact. Green logistics aims to reduce the ecological footprint of logistics processes, including transportation, storage, packaging, and distribution. This involves strategies such as lowering energy consumption, reducing carbon emissions, minimizing waste, and incorporating renewable energy sources into operations (Kumar, 2015). Supply Chain Management (SCM) refers to the broader field of managing the flow of goods and services, encompassing everything from production to delivery to consumers. SCM integrates processes like procurement, manufacturing, and distribution to ensure efficient operations while incorporating sustainability into the decision-making process (Mentzer et al., 2001). By aligning green logistics with SCM principles, businesses can create more environmentally responsible supply chains.

COVID-19 Pandemic and Social Interaction in Businesses and Crisis Management (1,62%) topic signifies the relationship between social interaction, crisis management, and businesses amid the COVID-19 pandemic. In this context, it encompasses the efforts of businesses to cope with social interaction, interpersonal communication, and crisis management strategies during the pandemic (Fasth et al., 2022). Pandemic conditions have significantly impacted social interaction in businesses, often leading to widespread use of remote work, virtual meetings, and other online communication tools. This situation involves businesses' endeavors to maintain interpersonal interaction among employees, enhance motivation, and preserve team spirit (Lal et al., 2023).

Decision-Making Systems and Optimization Models (1,40%) topic signifies the relationship between decision-making systems and optimization models. In this context, it encompasses the systems and mathematical models employed to support and optimize decision-making processes in businesses or other organizations. Decision-making systems are typically systems implemented through computer-based tools or software, aiming to provide information and analytical support to managers, decision-makers, or automated systems (J. Yang et al., 2022). Optimization models, on the other hand, are mathematical models designed to achieve the best possible outcome for a specific objective. These models aim to efficiently utilize limited resources to reach optimal results (Nili et al., 2021).

Customer Satisfaction and User Behavior Analysis in Online Services (0,80%) topic (0.80%) focuses on the study of customer satisfaction and user behavior within the realm of online services. Customer satisfaction refers to the evaluation of how well online services meet the needs and expectations of users. This involves assessing various aspects, such as the quality of service, user-friendliness, responsiveness, and the overall fulfillment customers experience when utilizing online platforms (Lu et al., 2020; Rita et al., 2019). User behavior analysis examines how users interact with online services, including their patterns, preferences, actions, and responses. This analysis explores the ways users navigate digital platforms, make decisions, and engage with content, aiming to identify trends and insights

that can improve the overall user experience (Gao & Huang, 2019). Understanding these dynamics helps service providers enhance user satisfaction and optimize service design for better engagement.

As a result of the analysis, a general distribution of MIS studies under 7 topics was drawn. Although the results are significantly like the international studies conducted by Özköse et al., (2023) and Çallı et al., (2021), they reveal that especially decision-making and decision support.

Research findings reveal that the topics “Digital Innovation and Business Performance,” “Cost Optimization and Demand Analysis,” and “Machine Learning and Deep Learning” have gained considerable momentum in recent years, together comprising the majority of total publications (86.34%). These are followed in volume by “Green Logistics and Supply Chain Management” and “COVID-19 Pandemic and Social Interaction and Crisis Management in Businesses.” The topics with the lowest volume include “Decision-Making Systems and Optimization Models” and “Customer Satisfaction and User Behavior Analysis in Online Services.”

Topics such as 'Digital Innovation and Business Performance,' 'Cost Optimization and Demand Analysis,' and 'Machine Learning and Deep Learning' have a larger share in terms of volume compared to others. These results indicate that scientific research in the MIS field is particularly concentrated on these three topics, attracting more attention compared to others. Özköse et al., (2023) pointed out that "Smart system technologies" is among the most studied topics, and "firm performance" has been studied since 2020. The topic we investigated in our study, 'Digital Innovation and Business Performance,' stands out as the most studied topic. This situation suggests that contemporary issues such as Metaverse, Internet of Things, and Blockchain have become more popular in the MIS field today. Additionally, Özköse et al., (2023) indicated that among topics whose percentage weight increased over time compared to other subjects (studied more than other topics), "Economics and finance" is notable. This situation aligns with our findings. The second most studied topic, 'Cost Optimization and Demand Analysis,' can be considered as a subcategory of the preceding topic. In contrast to the study by Özköse et al., (2023), the topic of 'Machine Learning and Deep Learning' has garnered attention. MIS are designed to collect, process, and manage data within organizations. Additionally, MIS is employed to manage and optimize business processes (Ada & Ghaffarzadeh, 2015). Machine learning and deep learning, on the other hand, leverage advanced analytical techniques to analyze large volumes of data and utilize learning capabilities. This facilitates organizations in making more informed decisions. Machine learning can enhance efficiency by analyzing business processes (Nguyen et al., 2019). This suggests that these topics play a significant role in today's business world and management processes, capturing more interest from researchers.

'Green Logistics and Supply Chain Management' and 'COVID-19 Pandemic and Social Interaction, Crisis Management in Businesses' also hold a prominent place in the MIS field. The volumetric pursuit of these topics reflects the importance of research in areas such as sustainability and risk management. Özköse et al., (2023) pointed out the increasing percentage weight of topics like sustainable development and supply chain management over time, making these areas a focal point of interest. Numerous studies on sustainable supply chain have made it inevitable to address these areas together. The topic we explored in our study, 'Green Logistics and Supply Chain Management,' appears to support these findings. The co-focus on these two concepts is not surprising. Additionally, Özköse et al., (2023) highlighted that "Risk assessment and management" is among the most studied topics in the MIS field. Risk analyses in areas such as technology, resource utilization, digital services, and cybersecurity can be considered examples of risk assessments in the MIS field. Moreover, it contributes to senior managers in creating action plans and minimizing risk in decision-making processes. The topic we investigated in our study, 'COVID-19 Pandemic and Social Interaction, Crisis Management in Businesses,' seems to align with this theme. The emergence of the Covid-19 crisis in 2020 can be considered a factor that brought social interaction and crisis management to the forefront in businesses. The increasing importance of these topics highlights the necessity of studies and solutions to cope with contemporary problems faced by businesses and society.

On the other hand, the lower volume of topics such as 'Decision-Making Systems and Optimization Models' and 'Customer Satisfaction and User Behavior Analysis in Online Services' suggests more research potential in these areas. Özköse et al., (2023) have identified a high trend in studies in the decision-making field. This indicates the emergence of new areas of interest, which is supported by the findings of our study. Furthermore, Özköse et al., (2023) stated that "Technology Acceptance" is among the topics whose percentage weight has increased over time (more studied than other topics). This may indicate that technology acceptance has been divided into more specific sub-branches with the topic of "Customer Satisfaction and User Behavior Analysis in Online Services", which is addressed in our study. These results indicate that more research and work in these areas would fill a significant gap and contribute valuable insights to the literature.

3.2. Bibliometric Results Related to Topics

The articles with the most citations related to the topics and the journals where the topics are most published are provided in Table 2.

Table 2. Bibliometric Results Related To Topics

Topics	Most cited articles related to topics	Most preferred journals related to topics
Digital Innovation and Business Performance	Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy (Dwivedi et al., 2022)	Quality- Access to Success (302)
Cost Optimization and Demand Analysis	Snake Optimizer: A novel meta-heuristic optimization algorithm (Hashim & Hussien, 2022)	Knowledge-Based Systems (431)
Machine Learning and Deep Learning	Aspect-based sentiment analysis via affective knowledge enhanced graph convolutional networks (Liang et al., 2022)	Knowledge-Based Systems (942)
Green Logistics and Supply Chain Management	Blockchain technology for bridging trust, traceability and transparency in circular supply chain (Centobelli et al., 2022)	Uncertain Supply Chain Management (98)
COVID-19 Pandemic and Social Interaction in Businesses and Crisis Management	A silver lining in the COVID-19 cloud: examining customers' value perceptions, willingness to use and pay more for robotic restaurants (Chuah et al., 2022)	Quality- Access to Success (12)
Decision-Making Systems and Optimization Models	Dynamic Levy Flight Chimp Optimization (Kaidi et al., 2022)	Knowledge-Based Systems (25)
Customer Satisfaction and User Behavior Analysis in Online Services	Anthropomorphism and customers' willingness to use artificial intelligence service agents (Yang et al., 2022)	International Journal of E-Services and Mobile Applications (9)

When examining Table 2, it is observed that articles under the title "Digital Innovation and Business Performance" have the highest density, addressing the effects and opportunities of digital innovation on business performance. The most cited article in this regard is titled "Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice, and policy". Articles on this topic have been predominantly published in the Quality-Access to Success journal.

Articles under the title "Cost Optimization and Demand Analysis" with the second-highest number of publications, present new methods, and approaches in the areas of cost optimization and demand analysis. The most cited article, titled "Snake Optimizer: A novel meta-heuristic optimization algorithm" was published in the Knowledge-Based Systems journal. Another significant preferred journal is the International Journal of Systems Science: Operations and Logistics.

Articles under the title "Machine Learning and Deep Learning" with the third-highest number of publications, discuss developments and new methods in the fields of machine learning and deep learning. The most cited article, titled "Aspect-based sentiment analysis via affective knowledge enhanced graph convolutional networks" was published in the Knowledge-Based Systems journal. The Big Data and Cognitive Computing journal is also an important preferred journal in this regard.

Articles under the title "Green Logistics and Supply Chain Management" with the fourth-highest number of publications, address innovative solutions in green logistics and sustainable supply chain management, such as blockchain technology. The most cited article, titled "Blockchain technology for bridging trust, traceability, and transparency in circular supply chain" was published in the Information & Management journal and received significant citations. Also, the preferred journal for articles on this topic is the Uncertain Supply Chain Management journal.

Articles under the title "COVID-19 Pandemic and Social Interaction in Businesses and Crisis Management" with the fifth-highest number of publications, examine the effects of the COVID-19 pandemic on businesses and crisis management strategies. The article with the most citations, titled "A silver lining in the COVID-19 cloud: examining customers' value perceptions, willingness to use and pay more for robotic restaurants" was published in the Journal of Hospitality Marketing & Management.

Articles under the title "Decision-Making Systems and Optimization Models" with the sixth-highest number of publications, discuss various new methods and applications in decision-making systems and optimization models. The

article with the most citations, titled “Dynamic Levy Flight Chimp Optimization” was published in the Knowledge-Based Systems journal, and the Information and Management journal is also among the preferred journals in this field.

Articles under the title “Customer Satisfaction and User Behavior Analysis in Online Services” with the seventh-highest number of publications, address customer satisfaction and user behavior analysis in online services. The article with the most citations, titled “Anthropomorphism and customers’ willingness to use artificial intelligence service agents” was published in the International Journal of Hospitality Marketing & Management. The International Journal of Electronic Marketing and Retailing is also one of the preferred journals in this regard.

This Table 2 provides a list of significant and impactful articles and journals under each topic, indicating the intensity and importance of academic research on these topics. Özköse et al., (2023) emphasized the inclusion of the journal “Knowledge-Based Systems” and "Quality-Access to Success" in the list of those aspiring to advance in the field of MIS. For academics and researchers, this list can serve as a useful reference to gain more information about the topic and keep track of current studies.

Conclusion

This study provides a comprehensive exploration of latent topics within the Management Information Systems (MIS) discipline, employing the Latent Dirichlet Allocation (LDA) technique to analyze a dataset of 7,852 articles from the Scopus database. The research identifies seven distinct thematic areas, shedding light on key trends and research priorities in the field. The findings demonstrate that MIS research is predominantly focused on themes such as "Digital Innovation and Business Performance," "Cost Optimization and Demand Analysis," and "Machine Learning and Deep Learning." These dominant topics reflect the growing significance of digital technologies and data-driven approaches in enhancing organizational efficiency, innovation, and decision-making capabilities.

The study highlights "Digital Innovation and Business Performance" as the most frequently studied theme, underscoring the strategic importance of adopting digital tools and innovations to improve firm performance and maintain competitive advantage. Similarly, "Cost Optimization and Demand Analysis" emphasizes the role of analytical and optimization techniques in enhancing operational efficiency, while "Machine Learning and Deep Learning" reflects the increasing integration of artificial intelligence in analyzing complex datasets and solving organizational challenges.

Beyond these prominent themes, the study also identifies underrepresented areas such as "Decision-Making Systems and Optimization Models" and "Customer Satisfaction in Online Services." While these topics have not received as much attention in recent years, they hold significant potential for future research, especially in light of the growing complexity of decision-making processes and the rapid expansion of digital service platforms. Addressing these gaps could provide novel insights and drive interdisciplinary collaborations that expand the boundaries of MIS research.

The findings of this study have several implications for both researchers and practitioners in the MIS field. For researchers, the results provide a roadmap for exploring emerging areas of interest, such as sustainability, ethical AI, and the role of digital platforms in transforming organizational processes. Practitioners, on the other hand, can leverage these insights to implement innovative solutions that align with contemporary trends in digital transformation and data analytics. For example, organizations can focus on integrating machine learning algorithms into their decision-support systems or optimizing supply chains using data-driven demand analysis models.

Moreover, the methodological approach of combining bibliometric and topic modeling techniques offers a replicable framework for analyzing scholarly literature in any academic domain. This dual approach not only identifies thematic clusters but also uncovers subtle relationships between topics, providing a deeper understanding of the intellectual landscape of a field. Future studies could apply this methodology to other disciplines or extend its scope to include more granular analyses, such as examining the evolution of specific subfields within MIS.

This study has several limitations that should be taken into account. First, the analysis is restricted to articles categorized under the "Management Information Systems" (SUBJTERMS 1404) field in the Scopus database. This restriction may have excluded relevant interdisciplinary research that overlaps with or contributes to the MIS field. Second, the study focuses exclusively on English-language publications, potentially limiting the generalizability of the findings to other linguistic and cultural contexts. Third, the temporal scope is confined to articles published between January 2022 and June 2023, offering a snapshot of recent trends but not capturing longer-term developments in the MIS discipline.

Additionally, this study did not incorporate word overlap and topic diversity analyses, which are crucial for evaluating the performance and discriminatory power of the identified topics. These metrics measure how distinct the topics are from each other and assess the model's ability to capture the general thematic diversity within the dataset (Sheriff & Sevukan,

2023). The absence of these analyses presents a methodological limitation in interpreting the results. Future studies could address this by including such metrics to enable a more comprehensive evaluation and improve the model's accuracy and discrimination power, particularly when working with large-scale datasets.

To overcome these limitations, future research should consider expanding the dataset to include a broader range of disciplines, languages, and time periods. Incorporating complementary methods, such as network analysis or sentiment analysis, could provide deeper insights into the evolving trends and relationships within MIS research. Moreover, integrating expert evaluations alongside automated techniques would enhance the interpretability, coherence, and practical relevance of the findings, offering a more holistic understanding of the MIS field.

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