

RESEARCH TRENDS OF ACCOUNTING INFORMATION SYSTEM: A BIBLIOMETRICS ANALYSIS USING VOSVIEWER AND POP SOFTWARE

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DOI: [10.5281/zenodo.11203576](https://doi.org/10.5281/zenodo.11203576)

Abstract

Accounting information Systems are crucial elements in an organization's operations, storage, and dissemination of financial data. This study examines the dynamics of accounting information systems in higher education to suggest future research directions. Using a Bibliometric approach, we looked at a sample of 116 documents from the Scopus database to identify studies of accounting information systems in college. The keywords "accounting information system" and "higher institution" were executed in the search query. We present the initial stages of research in higher education, next trends, and publication status based on source title, country and institution, and check publication citation patterns. We also cover themes based on occurrence, keyword terms, titles, and document abstracts. This Study also predicts future studies in universities. We find that the distribution pattern of authors contribution according to law. We conclude by suggesting some potential research directions for accounting information systems. Study on accounting information systems focuses on research on accounting information systems in higher educations.

Keywords: Accounting Information System, Higher Education, Bibliometric Analysis, VOSviewer, PoP Software.

INTRODUCTION

Accounting information systems have been at the centre of the attention of accounting researchers and practitioners in the last decade (Fullana & Ruiz, 2021; Van Helden & Reichard, 2019; Gulin et al., 2019). They attempt to understand, improve, and develop accounting practices by recognizing the important role these systems play in managing a company's financial and operational information. Numerous studies highlight various important aspects of accounting information systems, ranging from the integration of the latest technology to the development of data analysis methods. The implementation of accounting information systems brings significant benefits in optimizing accounting processes and increasing the accessibility of financial information (Hussain et al., 2023; Faccia & Petratos, 2021; Lestari & Rosyidi, 2020). By using an accounting information system, the process of recording, processing, and reporting financial data can be done more efficiently and accurately. This means that companies can save time and resources previously used for manual processes, as well as minimize the risk of human error. In addition, with an integrated accounting information system, financial information becomes more accessible to various interested parties. This can increase the transparency of the company and enable better decision-making based on available data quickly and accurately (Monteiro et al., 2022; Manita et al., 2020; Al-Okaily et al., 2020). Other findings by McCallig et al. (2020) show that accounting information systems can increase the security and reliability of company financial data.

With a good accounting information system, companies can ensure that their financial data is protected from the risk of theft, manipulation, or loss. In addition, this system can also increase the reliability of financial data by ensuring that the information presented is accurate, complete, and reliable.

Accounting information systems generally contain six fundamental fragments (Dalle et al., 2021). They incorporate people, frameworks and rules, data, programming, technology information establishment, and internal controls. Each of the six elements is inseparable if one wants good results in an organization. Since, the higher the help for management accounting information systems in an organization, the better the assessment (positive view) of the utilization thereof by chiefs regarding the finish of their errands (Dobroszek et al., 2019).

Higher education is an organization that is packaged based on the policies of each country which contains elements that demand to be able to run from elements of accounting information systems (Ramayani et al., 2021). Tertiary institutions cannot be separated from financial elements, which are an inseparable part, and in managing these finances, one should use an accounting information system, both a modern information system and a conventional information system (Dalle et al., 2021). A modern financial system here that has been integrated with the web or using separate software/applications and conventional financial system or is only assisted by Microsoft Excel (Dobroszek et al., 2019; Dalle et al., 2021; Phornlaphatrachakorn, 2020).

The development of accounting information systems has faced various challenges and advances, reflecting the dynamic nature of technological innovation and organizational needs. The problem in accounting information systems is the search for systems that accurately process financial data while facilitating efficient decision-making processes (Latifah et al., 2021; Kocsis, 2019). Along with the growth of the company and the complexity of financial transactions, organizations need to have a system that can integrate data thoroughly, providing clear reports.

With an effective accounting information system in place, companies can optimize their financial performance, reduce the risk of errors, and respond quickly to market changes. Academics face the complexity of integrating technology with accounting, seeking to strike a balance between maintaining existing standards and capitalizing on transformative opportunities (Kroon et al., 2021). They are trying to find the balance offered by technological developments.

This is not easy, as they must still ensure that the integrity and quality of financial information are maintained and be able to leverage technological innovations to improve efficiency and timeliness in reporting and analysis. Data security and integrity issues remain of the essence, especially in an era characterized by increasing cyber threats and regulatory controls (Abrahams et al., 2024; Gautam, 2023; Sule et al., 2021). Business operations have presented new challenges for accounting information systems.

Despite these challenges, continuous efforts in innovating and improving accounting information systems improve the reliability, relevance, and efficiency of accounting information for stakeholders. In addition, accounting information systems have been widely researched, but most of the research is carried out in office agencies or companies, and it is still very rare to study it in a university environment.

For this reason, an in-depth analysis is needed to identify various aspects that have potential in the development of accounting information systems.

This study aims to analyze trends and developments to help researchers form models applicable to viewing the accounting information system in tertiary institutions. We analyzed this aspect in detail to add to the body of knowledge in the bibliometric literature. Bibliometric analysis is used to review various aspects such as countries, institutions, authors, and journals and can also be used to analyze patterns of collaboration among various actors such as countries, institutions, and authors (Nguyen et al., 2023; Vengadesh et al., 2023; Camargo et al., 2023; Rulyansah et al., 2022).

This study addresses the following research questions (RQ): RQ1: What is the current state of publications in accounting information systems and higher education? RQ2: What are the citation patterns of current publications in accounting information systems and higher education? RQ3: What themes involving accounting information systems and higher education are most popular among academics?. This analysis can contribute to understanding the dynamics and development of accounting information systems. So that practitioners, researchers, and stakeholders can take steps to overcome challenges that may arise in the implementation of accounting information systems.

METHODOLOGY

This study uses bibliometric methods to analyze trends in accounting information systems in higher education. This approach was used to identify and evaluate relevant literature on the topic. Literature related to accounting information systems found in databases was collected.

The main data source used was Scopus because of its reputation as the largest single abstract and indexer database ever created (Najmi et al., 2023) and the largest searchable list of citations and abstract literature (Kushairi & Ahmi, 2021); as well as this database was chosen because it is a widely accepted scientific search tool after Web of Science (Camargo et al., 2023).

With its wide coverage and ability to index top journals, Scopus provides access to a wide array of information that is essential for this research. Its ability to easily track citations and abstract literature expands the accessibility and connectedness between studies, allowing for in-depth exploration of various topics.

Data for bibliometric analysis was collected using VOSviewer (Kushairi & Ahmi, 2021) and PoP (Publish or Perish) software. VOSviewer was used to analyze and visualize the network of interrelationships between identified sections including type, year, language, subject area, source title, keywords, abstract, country, affiliation, citations, and document authorship.

PoP is used to collect citation data and publication performance indicators such as number of citations and publication performance indicators. Data was taken from the Scopus database as of January 16, 2023. The keywords used in the search were "accounting information system; higher institution". The search for documents collected for this study was organized based on the research protocol as in Figure 1.

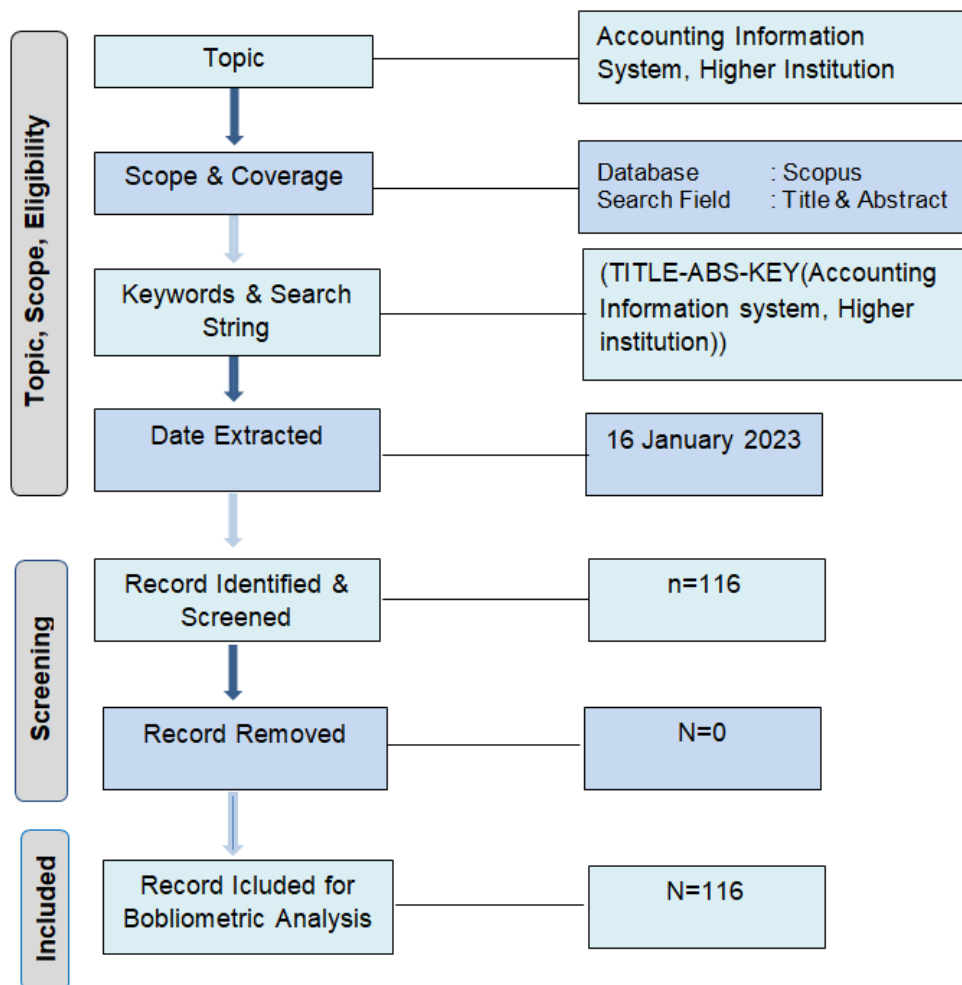


Figure 1: Research Protocol

The search process resulted in a total of 116 documents relevant to this study. A series of data cleansing exercises revealed no duplicate documents and ensured that every available document was important for further analysis. The importance of this precision was evident when we found that several documents previously thought to be duplicates were important reading material, which should be included in the analysis.

After the cleaning stage, all the data we collected from the Scopus database was carefully organized and exported into comma-separated values (.csv) and research information system (.ris) format files. This step ensured easy data processing and facilitated the accessibility and usability of the data for others who wanted to use it in the same research context. However, the data export step is only the beginning of a more in-depth analysis process. We proceeded to conduct a comprehensive descriptive statistical analysis, to provide a clear and in-depth description of the distribution and characteristics of the data that had been collected.

FINDINGS

To answer the research question, the analysis of this study used several aspects of the scientific work as its guide. First, we considered publications by year, document type, and source title. Next, we looked at the source type, publication country, and institutions involved in the publication.

Document language, subject area, and citation patterns were also the focus of our analysis. Especially in the context of accounting information systems, we explored the most active themes and universities based on keywords, titles, and abstracts. Our findings are presented in an easy-to-understand format, mainly in the form of frequencies and percentages.

However, we also conducted a more in-depth analysis by tracking the number of publications cited (NCP), total citations (TC), as well as average citations per publication (C/P) and average citations per publication cited (C/CP). In addition, we use indicators such as h-index and g-index to measure the impact and success of these publications.

We highlight the titles of the most active sources by providing information on the publisher's name and current Citation Score. This Citation Score is a useful tool to measure the level of weighted citations received based on the title of the source.

The Current State of Publication in Accounting Information System

To answer RQ1, we first analyzed publication trends in accounting information systems. We did this by examining various important aspects, such as total publications by year, types of documents published, as well as publications by source title and type, to provide a more complete overview of the variety of sources used in the literature on accounting information systems.

In addition, we dig deeper by examining the geographical distribution of publications, both in terms of countries and research institutions. This information provides important insights into the diversity of research origins and the contribution of certain institutions in the development of knowledge in this field. Moreover, we also analyzed the language used in the publications as well as the subject areas that were the main focus of the research.

Publication by Year

Based on data from Scopus, 1989 became an important milestone in the growth of accounting information systems in higher education. Four key articles mark this era. First, the article by Wilkins et al. (1989). Followed by the work of Perez et al. 1993). The analysis revealed that contributions from both articles came from different countries, demonstrating the global impact of this research.

The two articles obtained a total of 76 citations, reflecting significant recognition from the academic community, and confirming their role as pioneers in this field of publication. Both papers showed a focus on formative assessment of knowledge, underscoring the importance of content evaluation in the development of accounting information systems.

In addition, all three articles show a similar pattern in the emphasis on knowledge formats. They highlight the importance of formative assessment of knowledge in the context of accounting information systems, marking a crucial point in the understanding and development of this field.

Table 1 presented provides statistical details on accounting information systems publications in a university environment. It provides a clear picture of the development of the field over some time, highlighting the importance of the research conducted in 1989 as the foundation for continued growth in the field.

Table 1: Publications by year

Year	TP	NCP	TC	C/P	C/CP	H	G
2022	11	1	1	0.09	1.00	1	1
2021	12	7	16	1.33	2.29	3	3
2020	16	11	84	5.25	7.64	5	9
2019	11	9	67	6.09	7.44	4	8
2018	10	8	131	13.10	16.38	5	10
2017	3	3	36	12.00	12.00	2	3
2016	6	3	29	4.83	9.67	2	5
2015	3	2	14	7.00	7.00	2	2
2014	3	3	25	8.33	8.33	3	3
2013	8	7	80	10.00	11.43	10	33
2012	2	2	25	12.50	12.50	2	2
2011	3	2	98	32.67	49.00	2	3
2010	2	2	18	9.00	9.00	2	2
2009	1	1	1	1.00	1.00	1	1
2008	1	1	2	2.00	2.00	1	1
2007	3	3	47	15.67	15.67	3	3
2006	2	1	1	0.50	1.00	1	1
2005	4	4	26	6.50	6.50	3	4
2004	4	4	81	20.25	20.25	3	4
2003	1	0	0	0.00	0.00	0	0
2002	3	3	118	39.33	39.33	3	3
1999	2	1	8	4.00	8.00	1	2
1997	1	1	144	144.00	144.00	1	1
1995	1	0	0	0.00	0.00	0	0
1993	1	1	57	57.00	57.00	1	1
1992	1	0	0	0.00	0.00	0	0
1989	2	1	76	38.00	76.00	1	2
Total	1185						

Publication growth between 1989 and 1992 was quite slow, with an increase of less than 1.72% in 1992. The situation declined further from 1993 when only 0.86% of articles were published. However, there has been a significant change in recent years. This trend shows that the development of publications reached its peak in the last three years. In 2020, the number of publications reached 16, followed by 12 publications in 2021, and 11 publications in 2022. This indicates a significant increase in publication productivity in recent years.

Document Types

In the world of academia, document type is important to classify the various forms of writing produced. There are six main categories used, namely articles, conference papers, book chapters, reviews, conference reviews, and books. In the study conducted on accounting information system publications in higher education, Table 2 provides an overview of the distribution of these documents. The results show that the majority of publications are included in the article category, reaching 67.24% of the total, followed by conference papers covering 23.28%. Articles are the most common publications that contain information about specific research or concepts. Meanwhile, conference papers reflect the latest research results shared at scientific conferences. By understanding the distribution of these documents, academics and researchers can understand publication trends in the field of accounting information systems. This information can also help in directing further research efforts, both to explore certain under-researched topics and to gain insights from the latest research presented.

Table 2: Document Type

Type	Total Publications (TP)	Percentage (%)
Article	78	67.24
Conference Paper	27	23.28
Book Chapter	4	3.45
Review	4	3.45
Conference Review	2	1.72
Book	1	0.86
Total	116	100.00

Publication by Country

There are 26 countries that have been identified as the most productive in research, as noted in Table 5. In the top ten rankings, three Asian countries stand out, demonstrating their significant contribution to the international research arena. China leads among Asian countries with 9 publications, followed by Malaysia with 8 publications, and Indonesia with 5 publications. In the overall ranking, the United States tops the list with a total of 28 documents, representing 24.14% of all research production. China followed with 7.76%, confirming its increasingly influential role in the global research community. In addition, countries such as Malaysia, Portugal, and Spain also showed significant contributions with 6.90% of the total publications each. This indicates the diversity in the geographical origin of research contributors, with countries from different continents participating in generating knowledge for the world.

Table 3: Top Ten Publishing Countries on Accounting Information Systems

Country	TP
United States	28
China	9
Malaysia	8
Portugal	8
Spain	8
Brazil	6
Croatia	5
Indonesia	5
Germany	4
Canada	3

TP total number of publications

Publication by Institution

Table 6 shows the contribution of publications in the field of accounting information systems from various countries. In this analysis, the top three institutions from the region attract attention. They together contribute 22 publications, which is about 18.96% of the total contributions. It is no surprise that the United States stands out as a leader in terms of productivity, with the top three institutions coming from there. However, what is interesting is the dominance of China with nine institutions and the significant role played by Malaysia, Portugal and Spain, each with eight institutions. This indicates an encouraging development in the awareness of the importance of accounting information systems in the Asian region. This rapid increase in awareness seems to be most pronounced in China, Malaysia, and Indonesia. These countries in particular stand out in the increased implementation of accounting information systems. In addition, it is worth noting that Malaysia, despite being a developing country in the region, managed to include two institutions in the ranking of the most influential institutions, each with at

least ten publications. This shows significant commitment and progress in the field of accounting information systems in Malaysia, which deserves serious attention.

Table 4: Institutions Most Commonly Affiliated with Accounting Information Systems

Affiliation	TP	NCP
University of Zagreb, Faculty of Economics and Business	7	797
Instituto Superior de Contabilidade e Administração do Porto	3	0
Universidad de Castilla-La Mancha	2	278
Universiti Sains Malaysia	2	727
Harvard Medical School	2	1490
Universiti Utara Malaysia	2	230
University of Pennsylvania Perelman School of Medicine	2	18
University of Pennsylvania	2	38
Instituto Politécnico de Lisboa	2	27
Iscte – Instituto Universitário de Lisboa	2	81
University of Colorado School of Medicine	2	27
University of Minnesota Twin Cities	2	81
The Children's Hospital of Philadelphia	2	308
North Dakota State University	2	550
Universitas Padjadjaran	2	189
Université de la Manouba	2	10

TP total number of publications, *NCP* number of cited publications

Languages of Documents

The results of the analysis on publication distribution, English is the most dominating language with 106 publications, reaching a proportion of 90.60% of the total. This reflects the important role of English in disseminating knowledge and research results at a global level. With such a large prevalence, it is not surprising that English is often the first language in scientific publications.

However, we also see significant contributions from other languages in publications. Chinese, while only contributing 4 publications, still makes an important contribution, accounting for 3.42% of the total. This reflects the significant growth and influence of research in Chinese, indicating a development in the scientific literature. Meanwhile, Spanish, Portuguese, French and Ukrainian each contributed a few publications, adding variety and depth to the representation of languages in the research.

Although in smaller proportions, the presence of publications in these languages provides a snapshot of the global and local languages that are the focus of the research information. The total of all publications is 116, for a total percentage of 100%. This confirms the accuracy and completeness of the data presented in the analysis table.

Table 5: Languages Used for Publications

Language	Total Publications (TP)	Percentage (%)
English	106	90.60
Chinese	4	3.42
Spanish	3	2.56
Portuguese	2	1.71
French	1	0.85
Ukrainian	1	0.85
Total	116	100.00

Subject Area

Table 6 shows the distribution of total publications (TP) across various subject areas. One of the subject areas with the highest number of publications is "Business, Management and Accounting" with 40 publications, which accounts for 34.48% of the total. Meanwhile, the subject areas with the lowest publications are "Earth and Planetary Sciences", "Health Professions", "Immunology and Microbiology", "Multidisciplinary", and "Physics and Astronomy", each having only one publication, which is equivalent to 0.86% of the total publications for each subject area.

The top three subject areas with the most publications are "Business, Management, and Accounting", "Computer Science", and "Economics, Econometrics, and Finance", which together make up about 60% of the total publications. However, the subject areas with the lowest percentage of publications are "Energy", "Mathematics", "Pharmacology, Toxicology, and Pharmaceuticals", and "Agricultural and Biological Sciences", each with only 3.45%. It should be noted that this interpretation is based on the given context and the specific data presented in the table. There are a total of 16 subject areas listed in this table.

Table 6: Subject Area

Subject Area	Total Publications (TP)	Percentage (%)
Business, Management and Accounting	40	34.48
Computer Science	25	21.55
Economics, Econometrics and Finance	24	20.69
Medicine	24	20.69
Social Sciences	23	19.83
Engineering	19	16.38
Decision Sciences	10	8.62
Environmental Science	7	6.03
Biochemistry, Genetics and Molecular Biology	4	3.45
Energy	4	3.45
Mathematics	4	3.45
Pharmacology, Toxicology and Pharmaceutics	4	3.45
Agricultural and Biological Sciences	2	1.72
Arts and Humanities	2	1.72
Earth and Planetary Sciences	1	0.86
Health Professions	1	0.86
Immunology and Microbiology	1	0.86
Multidisciplinary	1	0.86
Physics and Astronomy	1	0.86

Citations Pattern on Accounting Information Systems, Higher Education

To answer RQ2, we present citation metrics and analyze the citation network of 116 selected articles in accounting information systems. In citation analysis, we measure the impact of the document by using the number of citations by other works (Kent Baker et al., 2020).

We utilized Harzing's Publish and Perish and VOSviewer software to analyze the data. The citation metrics for the retrieved documents as of January 16, 2023, are listed in Table 7. As can be seen, of the 116 articles studied, there was an average of 34.74 citations per year, with a total of 1181 citations reported.

Table 7: Citations Metrics

Metrics	Data
Publication years	1989–2022
Citation years	34
Papers	116
Citations	1181
Citations/year	34.74
Citations/paper	10.18
Authors/paper	0.98
h-index	18
g-index	31

Table 8 presents the total number of citations along with the average citations per year for all documents considered. It reveals the ten most frequently cited articles. The document by Hunton and Beller (1997) is listed as the most cited with a total of 144 citations or an average of 5.54 citations per year.

Table 8: Top–10 Highly Cited Articles

No.	Author (Year)	Title	Source	TC	C/Y
1	Musleh Al-Sartawi (2020)	E-Learning Improves Accounting Education: Case of the Higher Education Sector of Bahrain	Lecture Notes in Business Information Processing	30	10
2	Crijns et al. (2019)	Depression and Pain Interference Correlate With Physical Function in Patients Recovering From Hand Surgery	Hand	33	8.25
3	Chang et al. (2019)	Clinical pattern of antibiotic overuse and misuse in primary healthcare hospitals in the southwest of China	PLoS ONE	37	7.4
4	Anderson et al. (2018)	Disparities in outcomes and resource use after hospitalization for cardiac surgery by neighborhood income	Pediatrics	51	10.2
5	Ramírez Córcoles et al. (2011)	Intellectual capital in Spanish public universities: Stakeholders' information needs	Journal of Intellectual Capital	81	6.75
6	Antoniou et al. (2004)	In-hospital cost of total hip arthroplasty in Canada and the United States	Journal of Bone and Joint Surgery	62	3.26
7	Kimbrow (2002)	A Cross-Country Empirical Investigation of Corruption and its Relationship to Economic, Cultural, and Monitoring Institutions: An Examination of the Role of Accounting and Financial Statements Quality	Journal of Accounting, Auditing & Finance	73	3.48
8	Hunton & Beller (1997)	Effects of user participation in systems development: A longitudinal field experiment	MIS Quarterly: Management Information Systems	144	5.54
9	Perez et al. (1993)	Cost accounting in radiation oncology: A computer-based model for reimbursement	International Journal of Radiation Oncology, Biology, Physics	57	1.9
10	Wilkins et al. (1989)	Changes in mortality by income in urban Canada from 1971 to 1986	Health reports / Statistics Canada, Canadian Centre for Health Information	76	2.24

One of the highlights associated with citation analysis is the ability to visualize network maps based on source titles, as shown in Figure 2. This visualization is useful for illustrating the mutual citation interactions between source titles, including journals,

conference proceedings, and books. In this article, we applied the criteria of minimum number of documents and minimum number of citations to identify 79 source titles that met these thresholds. Further analysis was conducted to focus on source titles that are frequently cited in the literature. This process helped in highlighting titles that have significant impact and influence within the scientific community, as well as providing insight into the interconnections between different scientific works. Using this network map visualization, we can better understand the citation patterns and information flows between source titles that enrich the academic discourse in the field.

From the analysis, the five most cited source titles are Accounting Review with 8270 citations, Energy Economics with 5788 citations, Biological and Pharmaceutical Bulletin with 3458 citations, Bottom Line also with 3458 citations, and Advances in Intelligent Systems and Computing with 2036 citations. This analysis highlights the relevance and popularity of various source titles in the academic literature. "Accounting Review" and "Energy Economics" emerged as the main focus of scholarly studies, reflected by the high number of citations they received. Meanwhile, the "Biological and Pharmaceutical Bulletin" also show continued interest in this area, with relatively balanced citation levels. "Advances in Intelligent Systems and Computing" shows a growing interest in the field of information technology and artificial intelligence.

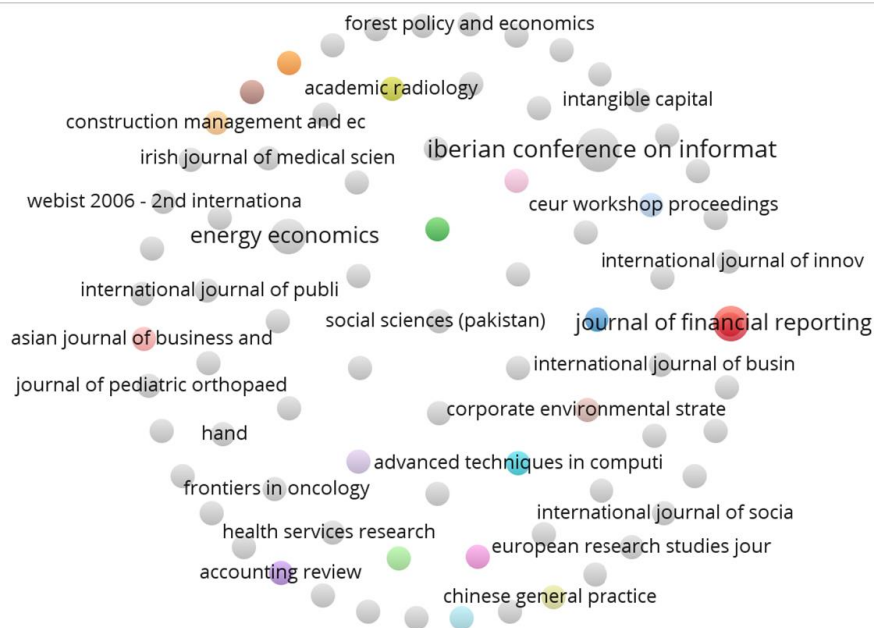


Figure 2: Network Visualization Map of the Citation by Sources

Themes in Accounting Information System Studies

In answering RQ3 about the most popular accounting information system themes among Scopus, we used the keyword and term co-occurrence analysis approach from the titles and abstracts of the data we retrieved from the Scopus database. Keyword co-occurrence analysis refers to the identification of the co-occurrence of two keywords in a scientific article. This phenomenon reflects the linkage or relationship between the two concepts represented by the keywords, in the study conducted by Kent Baker et al. (2020). This approach is taken to ensure that the selected keywords reflect accurately and precisely the content of the article.

Evaluation of keyword co-occurrence is important because it provides a more precise picture of the focus and substance of the article, and helps clarify the representation of concepts presented by the author (Rejeb et al., 2020).

The results of this co-occurrence analysis provide an overview of the current research trends and focus in the field of accounting information systems, according to the preferences and interests reflected in the scientific publications indexed in Scopus. Thus, we can describe more precisely the themes that are most relevant and in demand in this context. This approach helped us strengthen the relevance and representation of keywords to the substance of the paper and confirmed that careful selection of keywords is key to establishing an optimal fit between the information presented and the topic described in a study.

Keywords

Keywords have become very important in keeping up with current research trends. Author keyword analysis can make a significant contribution to measuring the progress of a research topic (He et al., 2023; Narong & Hallinger, 2023; Gupta et al., 2022). The analysis showed that the keywords used showed the highest activity, after removing duplicates caused by spelling variations. In a follow-up analysis, all keywords, from both authors and indexes, were mapped within each document using VOSviewer software to build and visualize the bibliometric network (see Figure 3). Keywords play a role in the current research footprint. Keyword analysis provides an understanding of research dynamics, enabling a more accurate measurement of the evolution of a topic (He et al., 2023; Narong & Hallinger, 2023; Gupta et al., 2022). From the results of the analysis, it can be seen that the keywords used stand out with the highest activity, after removing duplicates due to spelling variations such as the example of the words "accounting information system" and "higher education".

In this section, we analyze the co-occurrence of each keyword that appears at least twice. Using this baseline, we successfully identified 192 relevant keywords. The visualization of the overall keyword network is shown in Figure 3 using VOSviewer software. Here, the colour, circle size, font size, and thickness of the connecting lines illustrate the strength of the relationship between keywords. In particular, closely related keywords are marked with similar colours, indicating a tendency to appear together. For example, in the visualization, "flipped classroom," "flipped learning," "curriculum," "survey," "artificial intelligence," "student engagement," and "learning management system" - all coloured red - are closely related and tend to appear together. Through this analysis, we were able to visually map the complex interactions between significant keywords in this domain. From the 192 keywords identified, the network picture allowed us to recognize patterns of interrelationships that may not be directly visible through plain text analysis. The visualization illustrates how some concepts, such as "flipped classroom" and "flipped learning," are closely related to other topics such as "curriculum" and "learning management system".

In this visualization, each colour in the image represents a unique cluster. Four clusters can be identified. The first cluster, marked in red, consists of 82 items covering the themes of "accounting information system" and "Higher Education". Meanwhile, the second cluster, shown in green, includes 44 items with the main theme of "humans". The third cluster, shown in blue, consists of 41 items relating to "property journals", "articles", and "Major Clinical Studies". The fourth cluster, in yellow, contains 35 items related to the themes of "men" or "women". This visualization shows clear

thematic differences between each cluster based on colour. These clusters provide a visual representation of the groupings based on a particular theme. From covering accounting information systems to the themes of people, property journals and gender, this information is presented in an interesting and informative way. By using colour to distinguish clusters, these visualizations help researchers quickly identify and understand distributions and patterns in complex datasets.

Table 9: Top Keywords

Author Keywords	Total Publications (TP)	Percentage (%)
Humans	44	37.93%
Higher Education	33	19.82%
Article	21	18.10%
Societies And Institutions	15	12.93%
Female	13	11.21%
Information Systems	13	11.21%
Male	11	9.48%
Students	11	9.48%
Accounting	10	8.62%
Cost Accounting	10	8.62%
Information Use	10	8.62%
Major Clinical Study	10	8.62%
Priority Journal	10	8.62%

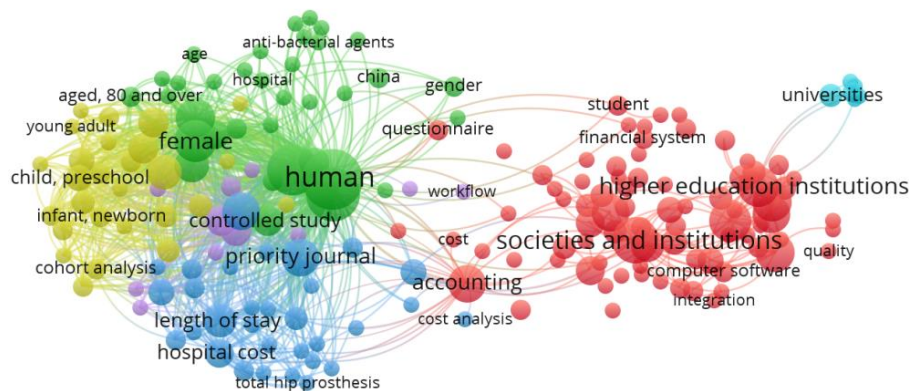


Figure 3: Network visualization map of all keywords

Title and Abstract

This article analyzes the occurrence of publication titles and title-abstract combinations taken from the Scopus database. In this study, calculations were made on the co-occurrence frequency of each word that appeared at least twice. The results show that out of a total of 1314 words analyzed, 192 words meet the set threshold. This number of words was selected based on the software's recommendations and showed significant co-occurrence. Visualization of the word map was performed using VOSviewer software, as shown in Figure 4. The nodes in the visualization network represent terms or concepts, while the distance between the nodes reflects the relationship between terms (Effendi et al., 2021).

The visualization map shows a different colour for each cluster, with a total of five clusters representing five main themes. The first theme (red) focuses on technology clusters with 35 items, while the second theme (green) is more about related factors

with 41 items. The third theme (blue) is more related to universities and contains 20 items. In addition, the accounting group (yellow) which describes business aspects includes 18 items, and the last theme (purple) deals with companies and the environment with 15 items. As such, this visual analysis provides a clear picture of the various themes that emerged from this study, dissecting the relationships and clusters of words that were deemed significant based on the data analysis conducted.

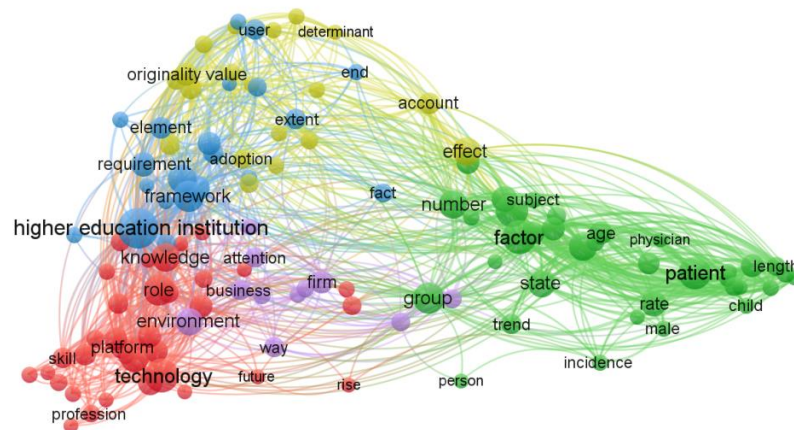


Figure 4: VOSviewer Visualisation of a Term co-occurrence Network on title and Abstract Fields

DISCUSSION

The current state of the publication in the accounting information system

This bibliometric analysis indicates a significant growth in the application of accounting information systems and the involvement of higher education institutions in the study since 1989. This trend is in line with the diffusion of innovations theory (Rogers, 2003) which explains how an innovation, in this case an accounting information system, is adopted gradually by individuals or organizations in a social system. The initial phase of implementing an accounting information system may face resistance and obstacles, but over time, the perceived benefits and advantages encourage higher adoption rates (Venkatesh et al., 2003). The finding that the United States dominates publications related to accounting information systems and higher education reflects the country's role as a centre for research and development of information technology. This is consistent with previous research highlighting the role of the United States as a global leader in information technology innovation and research (Archibugi & Coco, 2005). However, the inclusion of Asian countries such as China, Malaysia, and Indonesia in the top 10 rankings indicates the potential for increased contributions from this region in accounting information systems studies in the future.

Increased investment in research and development in Asian countries, especially China and Malaysia, marks an important shift in the global research map. Strong support for innovation in the accounting information systems sector promises significant developments in these two countries. China, with impressive economic growth and a growing focus on technology, has become an innovation hub attracting worldwide attention. Large investments in R&D projects have accelerated the development of information technology, including advanced digital accounting systems. Malaysia, meanwhile, is also showing strong momentum in terms of

accounting information system development. With a focus on technological excellence and progressive government support, Malaysia is increasingly recognized as a prime destination for research and development in this field.

Both countries have large populations, providing a broad user base for the trial and adoption of new technologies. Their potential to become major contributors to future accounting information systems research is further strengthened by the collaboration between universities, industry and government. China and Malaysia, with their thriving innovative ecosystems, offer unique challenges and opportunities for researchers to explore the latest trends in the field. With Asia's increasing role in the global research map, it is no surprise that experts around the world are increasingly keen to collaborate and invest in the region. Continued support for investment in R&D will be a key driver for the innovative and sustainable growth of accounting information systems in the future.

The current citation patterns of publication on the accounting information system

Based on the analysis of 116 documents collected from the Scopus database, a total of 1181 citations have been collected. The average number of citations obtained reached 34.74 per year, while each paper received an average of 10.18 citations, with an average of 0.98 authors per paper. Nonetheless, of the 116 existing documents, only 82 of them have been cited by other publications. In addition, studies in accounting information systems have also reached 18 h-index and 31 g-index at the time this data was analyzed. Based on the data presented, there is an increasing trend in research in the field of accounting information systems. Although only a portion of the publications have been cited, the average number of citations per year and paper is quite significant. This shows that research in this field has a considerable impact on the development of science. This finding is in line with previous research which states that interest in accounting information systems research continues to increase along with technological developments and the need for efficient information systems in organizations (Al-Delawi & Ramo 2020; Hutahayan, 2020; Rikhardsson & Yigitbasioglu, 2018). In addition, other studies also reveal that research in the field of accounting information systems is becoming increasingly important in supporting data-driven decision-making in companies (Rikhardsson & Yigitbasioglu, 2018).

The high average number of citations per year and paper indicates that research in this field has high relevance and contributes significantly to the development of science. This is supported by research findings stating that research in accounting information systems has a major impact on business practices and management decision-making (Richardson & Yigitbasioglu, 2018; Saukkonen et al., 2018). Nevertheless, it should be noted that there are still several publications that have not been cited by other studies. This can be caused by several factors, such as the novelty of the publication or topics that are less relevant to other studies. Therefore, efforts should be made to increase the visibility and impact of research in this field, for example through publications in reputable journals or dissemination of research through international conferences.

The most popular theme among scholars

Based on the analysis, this article found three main themes, namely accounting information systems, higher institutions, and people. However, analysis of term occurrence in the title and abstract from the Scopus database revealed five distinct clusters on the visualization map. These themes were grouped into technology (first

theme), factors (second theme), higher education (third theme), accounting as a business theme (fourth theme), and company and environment (fifth theme). This finding is in line with the Technology Acceptance Model developed by Davis (1989), which explains that the acceptance and use of technology are influenced by perceived usefulness and perceived ease of use. In the context of higher education institutions, factors such as management support, training, and adequate technological infrastructure can influence the acceptance and adoption of accounting information systems (Lutfi, 2022). In addition, recent research shows that environmental factors, such as competitive pressures and stakeholder demands, can also drive the adoption of technology-based accounting practices in companies (Afsay et al., 2023). Supporting data from previous research shows that higher institutions face challenges in integrating accounting information systems into the curriculum and learning process (Andiola et al., 2020). However, by considering factors such as perceived usefulness, ease of use, management support, and business environment demands, higher institutions can successfully adopt and utilize accounting information systems to improve the efficiency and quality of accounting processes (Allami et al., 2024; Bugembe et al., 2010; Almahamid et al., 2010).

CONCLUSION

Bibliometric studies indicate a meaningful increase in the use of accounting information systems since 1989, with higher education institutions involved in the research. The growth trend is consistent with the diffusion of innovations theory which explains how the adoption of innovations, such as accounting information systems, is slowly accepted by individuals or organizations in a social environment. Although it may initially be met with resistance, the perceived benefits of the innovation over time encourage a wider level of acceptance. Data shows that research in the domain of accounting information systems is on the rise. Although only a portion of publications are cited, the average number of citations per year and article is quite meaningful, indicating the great impact of this research on the advancement of science. This is in line with the growing interest in accounting information systems research as technology develops and the need for efficient information systems in organizations. This research is importance in supporting data-driven decision-making in companies. There are five main groups connected to accounting information systems in higher education, including technology, driving factors, the context of higher education, accounting as a business discipline, and the company and the external environment. This finding is in line with the concept of technology adoption, which emphasizes the influence of perceived usefulness and ease of use on information system adoption. This analysis has significance in recognizing patterns of research trends and focal points of relevant literature works, which can guide future research directions and priorities.

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