Tax Challenges of the Digital Economy: A Bibliometric Study in Light of International Initiatives and Reforms

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Abstract---The digital economy, increasingly reliant on intangible assets, extensive use of data, algorithms, and digital networks, has created significant challenges for the international tax system, particularly through the intensification of Base Erosion and Profit Shifting (BEPS) practices. These developments have necessitated broad initiatives to confront such challenges, accompanied by growing academic interest in the subject. Within this context, the present study conducts a comprehensive bibliometric analysis of this research domain by examining its conceptual structure, identifying collaboration networks, and highlighting research gaps. The analysis is based on peer-reviewed scientific articles indexed in the OpenAlex database covering the period from 1996 to 2024. The study identified key findings, notably the dominance of fundamental intellectual themes in the field, centered on new digital models, tax avoidance mechanisms, and emerging global solutions. It further revealed a qualitative shift in research focus, moving from diagnosing problems to evaluating proposed solutions. Additionally, co-authorship network analysis demonstrated that research activity is largely driven by networks in European countries and the United States, with a clear lack of collaboration involving developing nations. Consequently, the most urgent research gaps concern the economic implications of new solutions and their potential impact on developing countries.

Keywords---Digital Economy, Digital Taxation, BEPS, Pillar One, Pillar Two, Bibliometric Analysis.

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1. Introduction

In recent decades, the global economy has undergone a profound transformation toward digitalization, where business models increasingly depend on advanced technologies to deliver products and services across borders without the need for traditional physical presence. This shift has substantially shaped global economic dynamics, leading to the emergence of new markets, changes in consumption behavior, and novel forms of value creation (OECD, 2014). While such transformation has opened broad opportunities for growth and innovation, it has simultaneously posed fundamental challenges to international tax systems, which have historically relied on physical presence and the source principle to allocate taxing rights (Fajar & Irawan, 2024; Peng & Wei, 2016).

The central tax challenges arise from reconciling conventional international tax principles—primarily based on physical presence (Permanent Establishment) as a determinant of taxation, and the source principle, which links taxing rights to the place where income is generated, with digital business models that generate significant profits without requiring a defined physical presence. These models allow multinational corporations to shift profits toward jurisdictions with minimal or no taxation, thereby facilitating BEPS (Fajar & Irawan, 2024; Gupta & Mittal, 2015).

In response, the Organisation for Economic Co-operation and Development (OECD) and the Group of Twenty (G20) introduced in 2013 an action plan consisting of 15 measures designed to combat BEPS, with the first action (Action 1) dedicated specifically to the tax challenges of the digital economy. The plan aims to ensure that profits are taxed where the underlying economic activities occur and where value is generated (OECD, 2014). This initiative sparked extensive debate, producing a range of tax proposals.

On the one hand, long-term measures were advanced, such as redefining the concept of permanent establishment and reforming transfer pricing rules. On the other hand, short-term unilateral measures appeared, particularly in the European Union, where several countries introduced or proposed digital services taxes, digital advertising taxes, or unilateral amendments to the definition of intellectual property in national income tax legislation (Geringer, 2021).

The historic adoption of the Two-Pillar Solution in 2021 represented a critical turning point. This agreement seeks to reallocate part of the taxing rights over major digital corporations (Pillar One) and to establish a global minimum tax on corporate profits (Pillar Two) (OECD, 2021).

Despite the political progress achieved, the research landscape remains marked by ongoing debates regarding the effectiveness of these solutions, as well as the practical and legal challenges associated with their implementation. This highlights the importance of a systematic study capable of mapping the field, identifying its knowledge structure, tracing its temporal development, and examining the existing networks of scientific collaboration among researchers. Such analysis contributes to understanding the intellectual evolution of the domain and to guiding future research toward the most pressing priorities. Accordingly, this study addresses the following central research question:

How has the international intellectual landscape evolved in response to the challenges posed by the digital economy to the international tax system?

This overarching question is further divided into the following sub-questions:
• How has scientific production (publications) on the tax challenges of the digital economy evolved, and to what extent have OECD-led political initiatives influenced this development?
• Which scientific journals, authors, and countries are the most productive and influential in this area of research?
• What is the conceptual structure or the main thematic focus of this research field?
• What is the nature of the collaboration networks among the leading actors in this domain?

• What are the most urgent research gaps revealed by this analysis that could guide future research trajectories?

2. Methodology

To achieve the objectives of this study, the bibliometric analysis method was employed. This approach has gained substantial prominence in business research in recent years due to its capacity to process large volumes of data. Bibliometric analysis serves multiple purposes, including examining the temporal evolution and trends of publications, analyzing collaboration patterns, and exploring the intellectual structure of a given field (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). This section outlines the principal steps and procedures followed for data collection, the criteria for filtering and selecting the studies subject to bibliometric analysis, and the tools and techniques applied to ensure the highest level of accuracy and objectivity.

The OpenAlex database was chosen as the primary source of data collection for several distinctive reasons (Priem, Piwowar, & Orr, 2022):

  – **Comprehensiveness:** OpenAlex indexes more than 200 million scientific publications from diverse sources, thereby offering a more complete overview of the scientific output in this area compared to other databases.
  – **Accessibility:** OpenAlex is free and open, ensuring equal access for all researchers and enhancing the replicability of research. This openness strengthens the transparency and credibility of the study's findings.
  – **Metadata Availability:** OpenAlex provides extensive metadata on authors, institutions, and keywords, forming a crucial basis for bibliometric analysis.
  – **Compatibility with Bibliometric Tools:** OpenAlex allows data export in formats such as JSON, ensuring seamless compatibility with leading bibliometric analysis software like VOSviewer, and thereby enabling a smooth transition from data collection to analysis.

Given these advantages, OpenAlex constitutes the optimal choice for this study, combining comprehensiveness, accessibility, metadata availability, and compatibility with analytical tools, ultimately establishing a solid foundation for bibliometric analysis.

To provide a systematic and comprehensive overview of the research process, and to establish inclusion and exclusion criteria (such as time frame, types of publications, and language) leading to the final set of studies analyzed, the PRISMA 2020 framework (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) was applied. This framework ensures transparency throughout the stages of analysis, enables traceability of research steps, and reduces bias in the selection of studies (Page et al., 2021). Figure 1 illustrates the stages followed in accordance with this framework.

OpenAlex search

Identification

Records identified from:
OpenAlex database:
(n=3973)

Records removed *before screening*:
Timeframe: studies published outside 1996-2024 (n=412)
Domain: studies not relevant to the Social Sciences (n=591)
Field: studies not relevant to the Business, Management and Accounting **and** Economics, Econometrics and Finance (n=680)
Publication type: Non-article documents (n=528)
Language: non-English records(n=63)

Screening

Records screened
(n=1699)

Records excluded:
Topics not relevant (manually excluded after review) (n=368)

Reports assessed for eligibility
(n=1331)

Reports excluded:
- Articles from SSRN platform (n=301)
- Articles from deleted journals (n=40)
- Full article not in English language (n=6)

Included

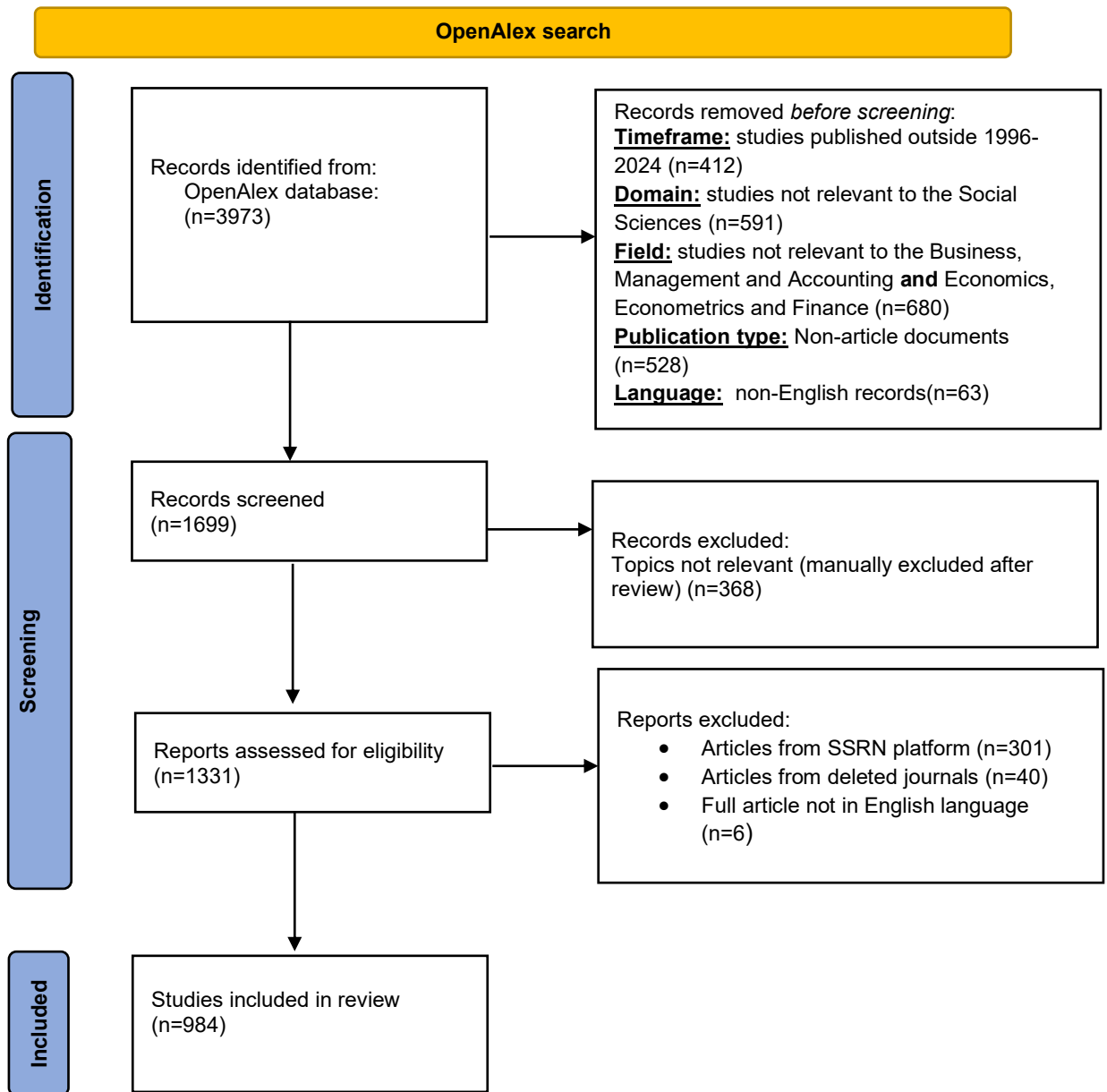Studies included in review
(n=984)

Fig.1: The PRISMA framework

From Figure 1 above, the process of searching and selecting the publications under study involves three main stages:

- **Identification Stage**

The search process began with identifying potential studies within the OpenAlex database, where carefully selected search terms were used to comprehensively capture the subject from multiple dimensions. These terms cover four contexts:

1. **Digital Context:** including the nature of the digital economy, platforms, and e-commerce.
2. **Tax Context:** covering all general and essential tax-related terms.
3. **International Context:** highlighting the cross-border dimension, tax avoidance practices, and BEPS.
4. **Specific Solution Terms:** including modern digital tax solutions and policies, such as Pillar One/Two and digital taxes.

These search terms were applied to both the title and abstract fields to ensure maximum relevance. Importantly, in order to avoid excluding studies that may not explicitly include the terms "solutions" or "reform" in their titles or abstracts, these terms were not imposed as mandatory elements of the search string. The final search string was as follows:

("digital economy" OR "digitalization" OR "e-commerce" OR "platform economy" OR "online economy") AND ("tax" OR "taxation" OR "taxing") AND ("international" OR "multinational" OR "cross-border" OR "avoidance" OR " Evasion" OR "Base Erosion" OR "Profit shifting" OR "BEPS" OR "OECD" OR " Transfer Pricing " OR "digital service tax" OR "digital services tax" OR "Pillar One" OR "Pillar Two")

The total (raw) number of studies extracted at this stage was first identified. Subsequently, strict preliminary filters were applied to automatically exclude ineligible studies prior to initiating the detailed manual screening. These filters included the exclusion of the following publications:

- **Publication Years:** Studies published in 2025 were excluded, as the research was conducted at the beginning of the year, along with studies prior to 1996, given that interest in this research field originated in that year (U.S. Department of the Treasury, 1996).
- **Domain:** The search results were restricted to scholarly articles in the field of Social Sciences, while studies from other domains were excluded.
- **Document Type:** Only peer-reviewed scholarly articles were included, while other types (such as books, conference proceedings, etc.) were excluded in order to ensure homogeneity and to analyze only original, peer-reviewed research.
- **Language:** Articles written in languages other than English were excluded.

- **Screening Stage**

Following the identification stage, the screening stage was applied to the remaining studies through two steps. In the first step, studies were screened and assessed based on their titles and abstracts (Title and Abstract Screening) to verify compliance with the initial inclusion criteria. Studies irrelevant to the subject were excluded, with the number of excluded studies and the reasons for exclusion recorded. In the second step, concerning eligibility assessment (Eligibility), these studies were evaluated in greater detail against the final inclusion and exclusion criteria. The reasons for exclusion at this stage included:

- Excluding studies published on SSRN as well as articles listed in Deleted Journals, in order to ensure that the analysis relied exclusively on peer-reviewed publications issued by journals with a continuous publishing record and academic credibility.
- Excluding articles that were not fully available in English.

- **Inclusion Stage**

At this stage, the final set of publications extracted from the OpenAlex database to be included in the bibliometric analysis was determined after applying all the aforementioned criteria. The final number of publications eligible for analysis amounted to 984 articles. The bibliographic data of these articles were extracted and exported into EXCEL format for conducting the bibliometric analysis.

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For the analysis of the extracted bibliographic data, the VOSviewer software was used. This software is notable for its capacity to analyze complex relationships, such as co-occurrence networks of keywords, which assist in identifying core and sub-themes and intellectual trends; collaboration networks among authors, research institutions, and countries; as well as co-citation and bibliographic coupling networks (van Eck & Waltman, 2010).

3. Results and Discussion

This section presents the findings of the bibliometric analysis of the scientific output .addressing the tax challenges of the digital economy, extracted from the OpenAlex database. It examines multiple dimensions, both quantitative and qualitative, of research production in this field, including the historical evolution of publications, the most productive and influential journals, authors, and countries, as well as the most frequently used keywords and the patterns of research collaboration networks. Collectively, these results provide a comprehensive understanding of the intellectual trends shaping this domain.

3.1. Historical Development of Publications and Their Trends

Tracing the historical development of scientific production in a specific research field is a fundamental step in any bibliometric study, as it reflects the academic community's level of interest in the subject while also revealing the key milestones that have shaped its trajectory. Figure 2 illustrates the annual distribution of peer-reviewed scientific articles published in the OpenAlex database between 1996 and 2024 that examine the tax challenges of the digital economy. This provides a basis for identifying the main phases of development in this research area and its broader trends.
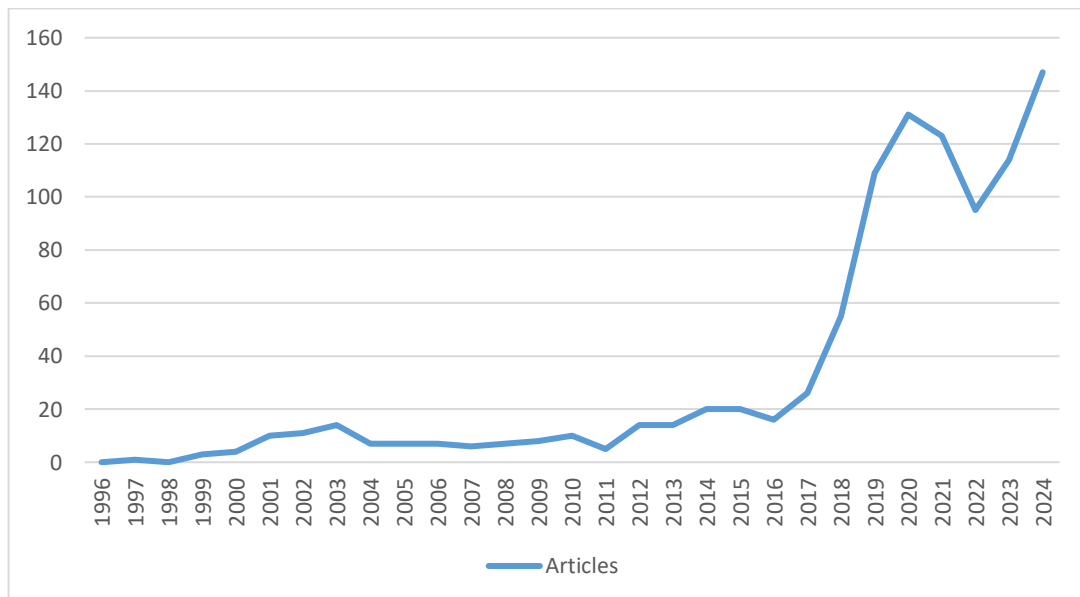

Figure (2): Annual Development of Scientific Production on the Tax Challenges of the Digital Economy (1996–2024)

From Figure (2), the evolution of scholarly interest in the tax challenges of the digital economy can be divided into three temporal stages, each closely linked to pivotal political and economic events and factors.

• **Phase One (1996–2013):**

This phase was characterized by limited and fluctuating scientific output. The first article was recorded in 1997, entitled *"New Age International Taxation in the Digital Economy of the Global Society"* (Hinnekens, 1997). The number of published articles grew slowly, not exceeding 14 articles annually. This pattern can be attributed to the perception that the tax challenges of the digital economy were primarily technical issues that could be addressed within a narrow scope, and which had not yet ascended to the top of the global political agenda, despite growing recognition of their existence.

In 1996, the U.S. Department of the Treasury issued a report on electronic commerce, which examined whether developments in international e-commerce could result in revenue losses or other adverse consequences, such as the increased use of tax havens for avoidance or evasion purposes (U.S. Department of the Treasury, 1996). In 1997, members of the Organisation for Economic Co-operation and Development (OECD) discussed the tax challenges of cross-border e-commerce for the first time at a meeting in Finland and issued a brief report outlining an agenda to address these issues (COCKFIELD, 2006).

The debates during this stage were largely theoretical and foundational, focusing on the conceptual challenges of e-commerce, such as the definition of permanent establishment, without significant international political momentum driving practical solutions.

• **Phase Two (2014–2020):**

This period marked a turning point, as it witnessed a sharp increase in the number of published articles, rising from 20 in 2014 to a historical peak of more than 130 in 2020. This surge reflected a direct response to a pivotal international event: the launch of the Action Plan on Base Erosion and Profit Shifting (BEPS) by the OECD in 2013, at the request of the G20. Within this project, and particularly Action 1, *"Addressing the Tax Challenges of the Digital Economy,"* the issue of digital economy taxation was placed firmly at the center of international debate (OECD, 2013).

This development redirected the attention of researchers and policymakers toward studying these challenges and exploring possible solutions. This trend is clearly demonstrated in the OECD's 2015 final report, which analyzed available options in light of proposals submitted by businesses, civil society, and academics, but ultimately failed to reach a consensus (OECD, 2015).

The absence of agreement paved the way for several countries, particularly in Europe, to act unilaterally by proposing Digital Services Taxes (DSTs), a development that significantly intensified both political and academic debates during this phase (Kofler & Sinnig, 2019). Consequently, the sharp increase in the number of articles between 2019 and 2020 can be interpreted as a direct reflection of the escalating global controversy over the effectiveness of unilateral measures.

• **Phase Three (2021–2024)**

After 2020, the curve shows a decline in the number of published articles until 2022, followed by a sharp rise that reached its highest point in 2024. This decline does not necessarily reflect a diminished importance of the subject, particularly since this period witnessed the official conclusion of the historic agreement on the *Two-Pillar Solution*, Pillar One and Pillar Two, in October 2021 (OECD, 2021).

This milestone encouraged researchers to examine the progress achieved, the obstacles hindering implementation, and to assess the potential impacts on corporations and tax systems (Fajar & Irawan, 2024; Wang, 2023). This explains the renewed growth in publications during 2023 and 2024.

In general, the curve outlines a comprehensive trajectory of the evolution of this research field, which advanced rapidly from the stage of theoretical diagnosis to the stage of studying and evaluating complex international solutions. This accelerated progression indicates that, despite its relative novelty, the field has already entered a stage of maturity. Future research will likely be more in-depth, specialized, and concentrated on the consequences of ongoing transformations.

3.2 The Main Actors

The principal actors in this research field are identified by analyzing the productivity of scientific journals, authors and their affiliated institutions, as well as countries of origin. Understanding this

network of main actors highlights the geographical and intellectual hubs of knowledge, while providing insight into the nature of the debate and the most influential research communities. The analysis begins with the scientific journals that constitute the primary platforms for publishing peer-reviewed research.

A. Journals: Top 10 Most Productive International Journals
Identifying the most productive journals not only guides authors to the most relevant outlets but also clarifies the nature of the dominant debate, whether economic, legal, or political. Table 1 presents the ten most productive journals in this field during the period 1996–2024:

Table I: The Ten Most Productive Journals in the Field of Digital Economy Taxation (1996–2024)

Source	2yr mean citedness	Publisher	TP*	Most cited publication	Times Cited**
European Taxation	0.05	IBFD	34	*The Italian Web Tax from a National and International Perspective*	14
International Transfer Pricing Journal	0.065	IBFD	23	*Proposed 3% Digital Services Tax*	18
Intertax	0.439	Springer Nature	17	*Debate: Implications of Digitalization for International Corporate Tax Reform*	42
World Tax Journal	0.585	IBFD	14	*International Taxation in the Digital Economy: Challenge Accepted?*	120
International Tax Studies	0.105	IBFD	14	*Taxation in the Digital Economy – Recent Policy Developments and the Question of Value Creation*	11
Canadian Tax Journal	0.091	Canadian Tax Foundation	8	*The Digital Services Tax on the Verge of Implementation*	8
British Tax Review	–	Sweet & Maxwell	7	*Implementing E-Commerce Tax Policy*	9
IMF Working Paper	3.658	International Monetary Fund	7	*Tax Policy for Inclusive Growth in Latin America and the Caribbean*	14
National Tax Journal	1.398	University of Chicago Press, on behalf of the National Tax Association (NTA)	6	*Taxing the Digital Economy: Investor Reaction to the European Commission's Digital Tax Proposals*	19
Florida Tax Review	0.137	University of Florida Levin College of Law	6	*Cloudy with a Chance of Taxation*	5

*TP: Total publications in the field
**Total citations of the article

Table 1 provides a clear overview of the journals that have served as incubators for the scholarly debate on the tax challenges of the digital economy. As shown, journals specializing in tax policy and international tax law dominate both in productivity and influence, compared to economics or management journals. *European Taxation* (34 articles), *International Transfer Pricing Journal* (23 articles), *Intertax* (17 articles), and *World Tax Journal* (14 articles) stand out as the most prolific outlets. These specialized journals function as intellectual platforms catering exclusively to tax experts. Consequently, the academic debate in this field is highly technical and legal in nature, focusing on the complexities of tax treaties, transfer pricing, and comparative tax policies.

The table also highlights a contrast between productivity and scholarly impact. While *European Taxation* ranks first in terms of output, its average citedness remains low (0.05), with its most-cited article receiving only 14 citations. By contrast, *World Tax Journal*, despite publishing fewer articles (14), produced the most-cited paper in the field, with 120 citations. This underscores the pivotal role of the journal in disseminating seminal works that shape discourse in this area. Furthermore, the presence of *European Taxation*, *British Tax Review*, and *Intertax* in the list reflects the strong European footprint in this

debate, which is logical given that EU countries were at the forefront of advancing unilateral Digital Services Taxes (DSTs).

B. Authors: Top 10 Most Productive Authors

After identifying the journals that constitute the primary platforms of discussion, the next step is to determine the most productive authors in order to highlight the leading experts and active researchers in the field, along with the institutions they represent. Table 2 presents the ten most productive authors in this Field.

Table 2: The Most Productive Authors in the Field

Author	Institution	H-Index	T.P*	T.C**
Georg Kofler	Vienna University of Economics and Business	10	8	90
Annet Wanyana Oguttu	University of Pretoria	6	7	32
Ifeanyi Chukwunonso Okeke	Standards Organisation of Nigeria	3	7	1
João Félix Pinto Nogueira	University of Cape Town, International Bureau of Fiscal Documentation	3	6	6
Rifat Azam	Reichman University	4	6	17
Christoph Spengel	Centre for European Economic Research, University of Mannheim	22	6	157
Victoria Plekhanova	Massey University	2	5	22
Stefan Greil	Federal Ministry of Finance	3	5	6
Joe Kennedy	University of Gothenburg	6	5	4
Favourate Y. Mpofu	University of Science and Technology	14	5	82

*T.P: Total publications in the field
**T.C: Total citations of the publications in the field

Analysis of Table (3) offers comprehensive and multidimensional insights into the pioneers of this research field. The examination of the most productive authors reveals the social and intellectual structure underpinning the field. The table indicates that the debate is led by a group of experts specializing in tax law and international tax policy. This is evident in the prominence of leading researchers such as Georg Kofler (Vienna University of Economics and Business) and Christoph Spengel (Centre for European Economic Research, University of Mannheim), who have made substantial contributions to international tax studies, alongside other scholars affiliated with institutions such as the International Bureau of Fiscal Documentation (IBFD). This clearly reflects Europe's pioneering role in advancing tax solutions, whether unilateral or multilateral.

The analysis also reveals a notable disparity between the productivity and the impact of authors. While some researchers rank highest in terms of the number of published articles, others exert far greater scientific influence. A prominent example is Christoph Spengel, who, despite having published only six articles, has received 157 citations, demonstrating that his contributions represent seminal works upon which subsequent studies have heavily relied. Another noteworthy observation is the emergence of authors from universities in South Africa and Nigeria, suggesting that the scope of the debate is broadening to incorporate perspectives from developing countries. However, their impact, measured by citation counts, remains relatively limited.

C. Top 10 Most Productive Countries

To capture the geographical and political dimensions of the debate surrounding the taxation challenges of the digital economy, the geographical distribution of published articles was analyzed to identify the most productive countries. This analysis highlights the leading nations in this field, with Figure 3 presenting the ten countries with the highest publication output.
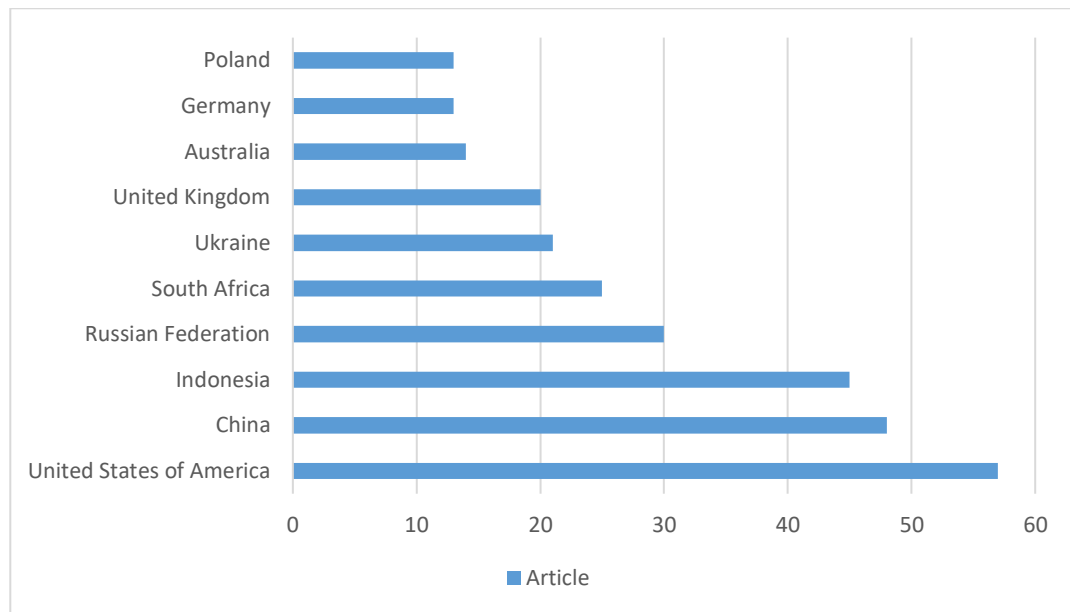
Figure 3: The Ten Most Productive Countries in Publishing Research on Digital Economy Taxation

The figure provides a clear picture of the main centers of gravity in this domain, from which the following observations can be drawn:

The United States leads with 57 articles, reflecting its dominance in scientific production in this area. This preeminence can be attributed to several factors, notably the fact that the U.S. hosts the headquarters of major multinational digital corporations such as Google, Apple, Meta, and Amazon. Consequently, it has a vested interest in debates concerning taxes imposed on these companies and in shaping proposed solutions. In addition, the U.S. possesses prestigious academic institutions and leading research centers in economics and law, which facilitate the production of high-quality research in this domain. Its central role in OECD negotiations, where it contributed to proposed solutions, is further reflected in its substantial scientific output, particularly considering that the U.S. was among the first countries to officially address this issue (U.S. Department of the Treasury, 1996).

China ranks second with 48 articles, reflecting its rise as an economic and technological power accompanied by growing interest in the taxation challenges of the digital economy. Its substantial research production mirrors the rapid expansion of its digital sector, with major tech giants such as BATX (Baidu, Alibaba, Tencent, Xiaomi) generating complex tax challenges that demand scholarly analysis.

The figure also highlights the strong presence of countries such as Indonesia (approximately 45 articles), followed by Russia and South Africa. The inclusion of these countries confirms the growing research awareness in these regions and their efforts to analyze the issue from both national and regional perspectives, while proposing solutions tailored to their specific economic contexts.

The European presence appears more balanced and distributed. Significant contributions come from several countries, including the United Kingdom, Germany, and Poland, yet no single country dominates the list. This suggests that the debate within Europe is dispersed across multiple nations rather than being concentrated in one.

3.3. Conceptual Structure Analysis of the Field: Keyword Co-occurrence Mapping

The process of science mapping involves analyzing the relationships among research components and highlighting the intellectual interactions and connections that bind them. Science mapping techniques

include Co-occurrence Analysis, Co-authorship Analysis, Citation Analysis, Co-citation Analysis, and Bibliographic Coupling. These methods enable the presentation of the intellectual structure of the research field with efficiency and effectiveness (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). A keyword co-occurrence analysis was conducted to examine the most frequently used keywords, thereby identifying the core concepts of the research field and clarifying the relationships between them. Figure (4) presents the Keyword Co-occurrence Map, prepared using the VOSviewer software. In this map, each circle (node) represents a keyword, with its size reflecting the frequency of its appearance in the analyzed articles. The lines connecting the nodes represent the co-occurrence of keywords within the same article. The different colors indicate clusters of keywords that frequently appear together, revealing the fundamental research themes of the field.
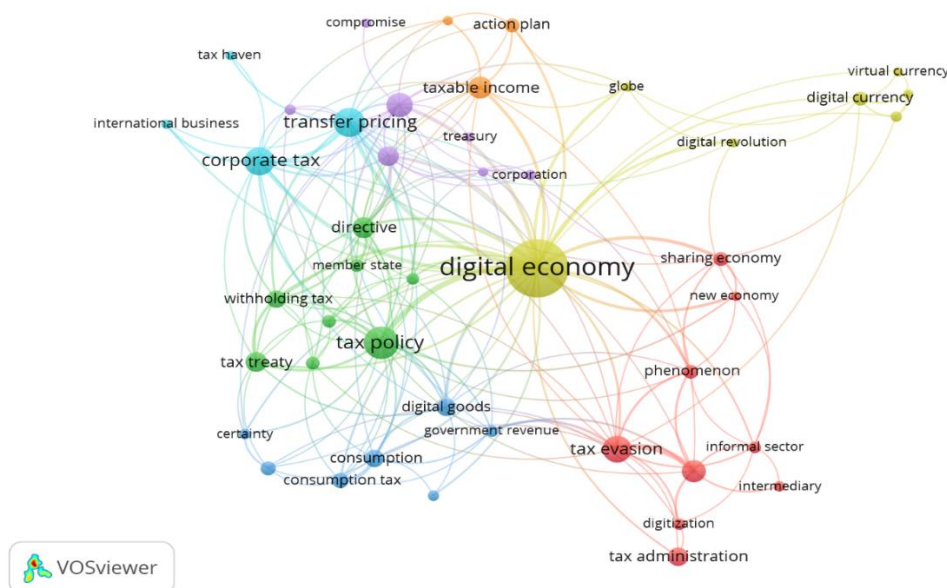

Figure 4: Keyword Co-occurrence Map

Figure 4 reveals a complex and multidimensional intellectual structure, which can be analyzed by identifying the core nodes and the clusters they form. At the center of the map lies the term "digital economy", represented by the largest node due to its frequency of appearance (191 times). This confirms that it is not merely a keyword but the central phenomenon underpinning all debates, as it embodies the very reality that has given rise to tax challenges. This observation aligns perfectly with the foundational literature, which established that the characteristics of digital business models have weakened the link between value creation and taxation under traditional international tax rules (Peng, 2016).

The map also shows that the keywords are grouped into clusters of different colors, each representing a core research theme:

- **The Green Cluster:**

This cluster includes terms such as "tax policy", "tax treaty", and "withholding tax", which are interconnected and linked to "digital economy." This reflects research efforts aimed at developing tax policies and establishing international understandings or mechanisms tailored to the particularities of the digital economy. In other words, this cluster mirrors the early attempts to understand and diagnose the problem, and the search for solutions to address tax avoidance by digital companies while ensuring fair tax collection.

- **The Light Blue Cluster:**

This cluster centers on terms such as "corporate tax" and "transfer pricing." These terms point to the fundamental issue of Base Erosion and Profit Shifting (BEPS). Their connection to the "digital economy" illustrates that much of the research emphasizes the practices of multinational digital corporations that exploit transfer pricing rules to shift profits from high-tax jurisdictions to tax havens, thereby exacerbating the problem of base erosion (Omara & Zolkaflila, 2015).

- **The Red Cluster:**

This cluster is built around terms such as "tax evasion", "tax administration", "digitization", and "new economy." The co-presence of these terms within the same group indicates that digitization and the emergence of the new economy have created a complex business environment that amplifies opportunities for tax evasion. This places increasing pressure on states to develop new strategies and tools that ensure tax compliance and facilitate efficient revenue collection.

- **The Yellow and Orange Clusters:**

These represent the most recent cluster, including terms such as "action plan" and "globe." These concepts emerged in connection with the recent efforts of the OECD, particularly the proposed Two-Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy (OECD, 2021). The presence of this cluster suggests that research has moved beyond merely diagnosing the problem to engaging in serious discussions of internationally proposed solutions.

It is also notable that some terms act as bridges between different clusters. For example, the term "directive" connects the green cluster (traditional tax policies) with the yellow cluster (new solutions). This highlights the role of European directives (such as the proposed DSTs) as a transitional mechanism bridging older tax policies with emerging global solutions.

3.4 Co-authorship Analysis

Co-authorship analysis is one of the fundamentals of bibliometric evaluation, as it provides comprehensive insights into the dynamics of research development. It sheds light on intellectual schools, research groups, and the degree of openness of the field to collaboration. Below is an analysis of author collaboration networks, including references to their research institutions and international cooperation in this research area:

- **Author Collaboration:**

Co-authorship network analysis helps examine the interactions and relationships among authors and their affiliated research institutions, as well as the extent and manner in which these relationships influence the development of the research field (Donthu, Kumar, Mukherjee, Pandey, & Lim, 2021). Figure (5) presents the collaboration network map of the most productive and collaborative authors in this field. Authors included in this map are those who published at least two articles (minimum threshold = 2 articles) with a minimum citation count of 0. The total number of included authors was 161 out of 1,522. Each node represents an author, with its size reflecting the author's productivity, while the connecting lines denote co-authorship relationships. Different colors indicate collaboration clusters, which are groups of researchers frequently working together.
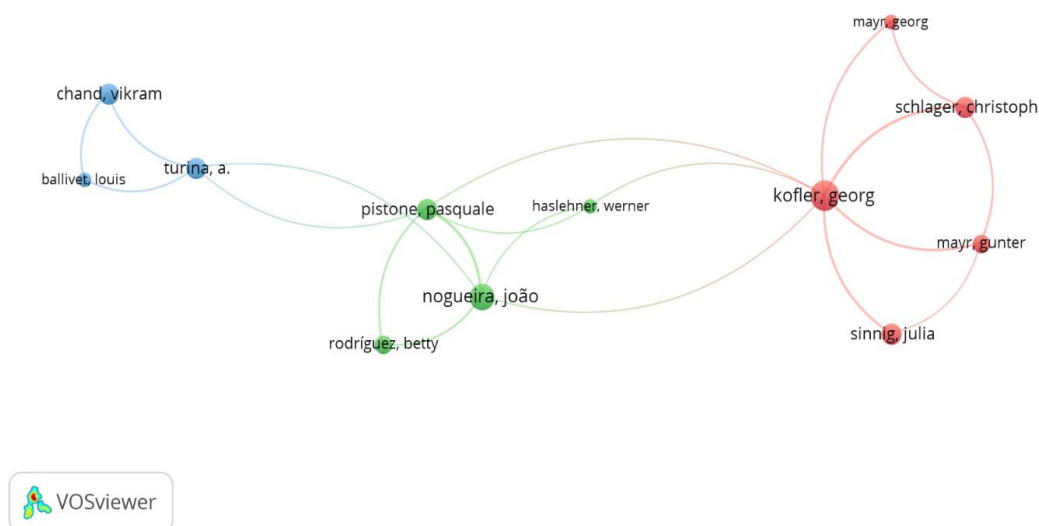
Figure 5: Individual Co-authorship Map

The map reveals a fragmented structure encompassing several intellectual schools, suggesting that knowledge production in this research domain results from the interactions of multiple research groups. Three principal research clusters can be identified:

• **The Red Cluster:**

This cluster is centered around Georg Kofler, who stands out as a pivotal author with eight publications, making him the most productive researcher in this network. Kofler collaborates with Christoph Schlager and Julia Sinnig (4 joint articles), Gunter Mayr (3 joint articles), and Georg Mayr (2 joint articles). This grouping points to the existence of a research team working on related issues, potentially forming a specialized research group. The thickness of the connecting lines between authors reflects the strength of collaboration, i.e., the number of joint publications.

• **The Green Cluster:**

This cluster includes authors such as João Nogueira (6 publications), Pasquale Pistone (4 publications), Werner Haslehner (2 publications), and Betty Rodríguez (3 publications). The group reveals collaboration among its members and significant research contributions, particularly given that most of its authors are affiliated with the International Bureau of Fiscal Documentation (IBFD). This affiliation underlines their profound expertise in international taxation and tax law and their focus on practical issues. Consequently, this cluster serves as a bridge connecting academic research with professional practice in the field.

• **The Blue Cluster:**

This smaller cluster includes Vikram Chand and A. Turina (4 publications), along with Louis Ballivet (2 publications). Despite its limited size, the clear links among its members indicate the existence of an active and effective collaboration.

The co-authorship map thus highlights that research on the taxation challenges of the digital economy is characterized by vibrant academic collaboration networks, with central figures such as Georg Kofler leading strong research teams. This collaborative nature reflects the complexity and multidimensionality of the subject, requiring the combined expertise of scholars from diverse backgrounds.

• **Country Co-authorship Analysis**

Knowledge production is often shaped by both national and international environments, and it is not confined to individual researchers or institutions. The analysis of international co-authorship networks reveals the countries driving the debate as well as those contributing to it. Figure (6) presents the map of country collaboration networks. The map illustrates several clusters of countries in different colors,

pointing to distinct collaboration networks. Each node represents a country, its size reflecting the total number of published articles in the field, while the connecting lines denote the presence of joint publications between researchers from the linked countries.
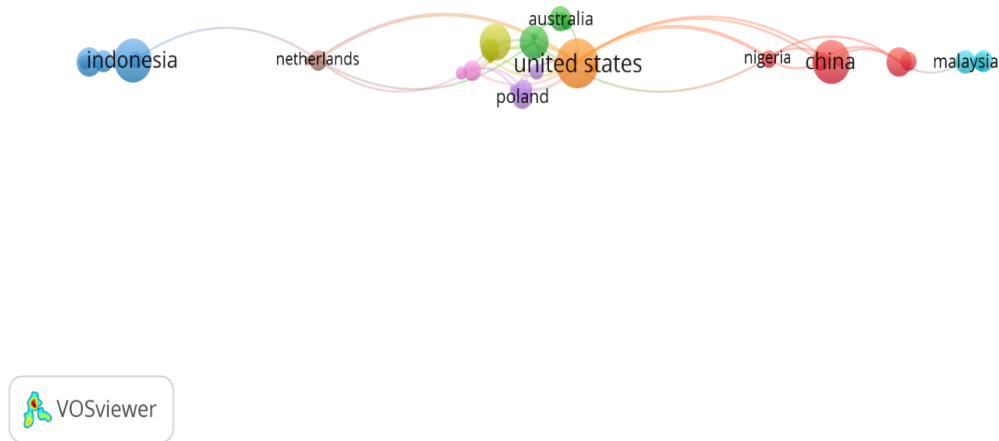

Figure 6: Country Co-authorship Analysis

Figure 6 uncovers a networked structure in which clear hubs of research collaboration are visible, while at the same time exposing significant gaps in the global discussion. Several observations can be drawn:
The map clearly highlights the United States as the central and largest node in this network, underscoring its leading role not only in terms of productivity but also as a pivotal collaboration partner. The United States is closely linked with Australia and European countries such as the Netherlands and Poland. This axis represents the traditional hub of research and knowledge in taxation. The U.S. is home to the largest multinational digital corporations, making it a natural starting point for debates in this field. In addition, academic institutions and research centers in these countries have long-standing expertise in international tax law. This axis is largely composed of member states of the OECD, which spearheads global tax reform efforts. However, the strength of this axis may also suggest that the proposed solutions disproportionately reflect the priorities and interests of advanced economies, potentially at the expense of others.

At another end of the map, an emerging and strongly interconnected axis appears, centered around China, which maintains close ties with other Asian countries, particularly Malaysia, as well as links with African nations such as Nigeria. This axis demonstrates that the debate is no longer the exclusive domain of Western countries. With the rapid growth of digital economies across Asia and Africa, these countries have developed their own research networks to address tax challenges from their own perspectives.

One of the most striking observations from this map is the weakness of direct links between the two main axes (the United States and China). The connecting lines between them are few and thin, suggesting that the global debate is unfolding in "two separate arenas" with limited interaction between them. This fragmentation constitutes a significant challenge and reveals a gap: solutions developed within one axis may not necessarily account for the interests and priorities of the other. While OECD countries tend to focus on issues such as "significant economic presence" and "transfer pricing," developing countries may prioritize simpler solutions such as withholding taxes or digital services taxes (DSTs) as more practical and immediate measures. Building research bridges between these axes is

therefore not merely an academic opportunity but a political necessity to ensure that international tax rules are fair and inclusive for all parties.

4. Conclusion and Recommendations

This study provides a comprehensive picture of the intellectual structure of research on the tax challenges of the digital economy, through a systematic analysis of peer-reviewed scholarly output (published scientific articles) indexed in the OpenAlex database during the period 1996–2024. The purpose of analyzing the trajectory of this research field, identifying its key actors, and mapping collaboration networks is not only to document the past but also to anticipate and pinpoint the most pressing research gaps.

The study revealed a continuous and accelerating intellectual evolution. The debate progressed from the initial diagnostic stage in the late 1990s, when the focus was on adapting traditional tax policies and treaties to the challenges posed by the digital economy, towards a phase of deeper analysis after 2013, in which concepts such as the Base Erosion and Profit Shifting (BEPS) Action Plan and Transfer Pricing emerged. Since 2020, the field has entered a new phase, centered on the design and evaluation of internationally oriented solutions, with the OECD's Pillar One and Pillar Two frameworks constituting the core of the debate. This trajectory reflects the intellectual maturation of the field, marking its transition from problem identification to the evaluation of proposed solutions, thereby opening the door to future research focused on the economic impacts of these solutions and the challenges of their implementation.

The analysis also showed that the peer-reviewed academic debate in this area remains an elite discourse, driven by interconnected and specialized research groups. The examination of international collaboration networks revealed two main axes: one led by the United States and OECD member states, and an emerging Asia–Africa axis led by China. The absence of strong connections between these two poles represents the most significant gap identified in this analysis, as it could hinder the achievement of sustainable solutions that enjoy broad international acceptance.

Beyond mapping the intellectual structure of the field, this study also highlights unexplored topics. The most pressing research gaps identified include the urgent need for impact assessment studies. As the debate shifts towards solutions, there is a growing need to evaluate the economic and administrative consequences of implementing Pillar One and Pillar Two for both corporations and states. Furthermore, there is a pressing need for studies that articulate the perspectives of developing countries on the proposed challenges and solutions, assessing their readiness to implement the new rules and the implications for their tax revenues.

In conclusion, this study underscores that the taxation challenges of the digital economy constitute one of the most dynamic and vital areas of contemporary economic and legal thought. By presenting this comprehensive bibliometric mapping, the study lays a foundation for understanding the intellectual structure of the field and its main actors, while also guiding future research efforts towards the most significant and urgent topics.

References

Cockfield, A. J. (2006). The rise of the OECD as informal 'world tax organization' through national responses to e-commerce tax challenges. Yale Journal of Law & Technology, 8(1), 136–187.

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, pp. 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070

Fajar, F., & Irawan, F. (2024). Analysis of the implementation and implications of oecd/g20 pillar one on the taxation system in indonesia. Educoretax, 4(05), pp. 597-619. https://doi.org/10.54957/educoretax.v4i5.815

Geringer, S. (2021). National digital taxes – Lessons from Europe. South African Journal of Accounting Research, 35(1), pp. 1-19. https://doi.org/10.1080/10291954.2020.1727083

Gupta, S., & Mittal, P. (2015). Base Erosion and Profit Shifting: The New Framework of International Taxation. Journal of Business Management and Information Systems, 2(2), pp. 108-114. https://doi.org/10.48001/jbmis.2015.0202009

Hinnekens, L. (1997). New Age International Taxation in the Digital economy of the Global Society. INTERTAX, 25(4), pp. 116-119. https://doi.org/10.54648/taxi1997027

Kofler, G., & Sinnig, J. (2019). Equalization Taxes and the EU's 'Digital Services Tax'. Intertax, 47(2), pp. 176-200. https://doi.org/10.54648/TAXI2019017

OECD (2013). Action Plan on Base Erosion and Profit Shifting, OECD Publishing, Paris, https://doi.org/10.1787/9789264202719-en

OECD (2014). Addressing the Tax Challenges of the Digital Economy, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris, https://doi.org/10.1787/9789264218789-en

OECD (2015). Addressing the Tax Challenges of the Digital Economy, Action 1 - 2015 Final Report, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, Paris, https://doi.org/10.1787/9789264241046-en

OECD (2021). Statement on a Two-Pillar Solution to Address the Tax Challenges Arising from the Digitalisation of the Economy, OECD/G20 Base Erosion and Profit Shifting Project, OECD Publishing, https://www.oecd.org/content/dam/oecd/en/topics/policy-issues/beps/statement-on-a-two-pillar-solution-to-address-the-tax-challenges-arising-from-the-digitalisation-of-the-economy-october-2021.pdf

Omar,N.B., & Zolkaflila , S. (2015). Profit Shifting and Earnings Management through Tax Haven Subsidiaries: An Exploratory Analysis of Multinational Companies. Procedia Economics and Finance, 28, pp. 53-58. https://doi.org/10.1016/S2212-5671(15)01081-3

Page, M., McKenzie, J., Bossuyt, P., Boutron, I., Hoffmann, T., Mulrow, C., . . . Tetzlaf, J. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ, 372(71), pp. 1-9. https://doi.org/10.1136/bmj.n71

Peng, Wei. (2016). Multinational Tax Base Erosion Problem of the Digital Economy. Modern Economy, 7(3), pp. 345-352. http://dx.doi.org/10.4236/me.2016.73038

Priem, J., Piwowar, H., & Orr, R. (2022). OpenAlex: A fully-open index of scholarly works, authors, venues, institutions, and concepts. the 26th International Conference on Science, Technology and Innovation Indicators (STI 2022) GRANADA, SPAIN. https://doi.org/10.48550/arXiv.2205.01833

U.S. Department of the Treasury, Office of Tax Policy. (November 1996). Selected Tax Policy Implications of Global Electronic Commerce. Washington, https://home.treasury.gov/system/files/131/Report-Global-Electronic-Commerce-1996.pdf

Van Eck, N., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics (84), pp. 523-538. https://doi.org/10.1007/s11192-009-0146-3

Wang, J. (2023). A New Pillar to Address Tax Challenges Arising from Digitalization of the Economy Consensus-Based Digital Services Taxes? Florida Tax Review, 26(2). https://doi.org/10.5744/ftr.2023.2005