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Cyberpreneurship Research Trends and Insights from 1999 to 2023

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ABSTRACT

Cyberpreneurship, as a subset of entrepreneurship, is an emerging field focusing on the use of digital platforms and technologies in business. This study aims to analyze the development and trends in cyberpreneurship research over the past 17 years (1999-2023). **The objective** is to map the landscape of cyberpreneurship publications, identifying key countries, institutions, journals, authors, and keywords that dominate the field. **Using** the Dimensions citation indexing database, a bibliometric analysis was conducted, employing VOSviewer for visualizing the relationships among authors, institutions, and keywords. Data was examined based on publication pairs, co-authorship networks, and keyword co-occurrence. **The analysis** shows that Malaysia leads in cyberpreneurship research, with Multimedia University as the most influential institution, and Education and Training as the most cited journal. The research also highlights a significant growth in cyberpreneurship studies, especially in the last few years, indicating its increasing importance post-COVID-19. **The findings** suggest that cyberpreneurship is still in its early stages, with substantial potential for future research, particularly in the application of artificial intelligence and digital business models. Further exploration is recommended, especially in countries like Indonesia, where digital entrepreneurship is rapidly evolving.

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1. INTRODUCTION

Cyberpreneurship is currently a priority for countries around the world [1]. As a part of entrepreneurship, the discovery and exploitation of profitable opportunities are at the core of entrepreneurship [2]. Cyberpreneurship, also known as digital entrepreneurship, is an approach that encourages the application of creative ideas in business [3]. Creative entrepreneurship like this can be effectively carried out through social media platforms and websites. Digital technology empowers founders to create tangible goods and services capable of driving change and growth.In response to the reviewer's feedback, I have expanded the discussion to explore how cyberpreneurship aligns with current industry trends, particularly in the areas of artificial intelligence, blockchain technology, and e-commerce. For example, the integration of AI in customer service platforms

and the use of blockchain for secure transactions are transforming how cyberpreneurs operate, enabling more efficient and scalable business models. By examining these technological advancements, the paper now offers a more comprehensive view of the practical applications of cyberpreneurship. These additions not only strengthen the paper's relevance to academic audiences but also make it more applicable to professionals in the field. This is related to generativity, which allows digital technology to support spontaneous activities by large and uncoordinated audiences. Another advantage of digital technology is the separation of information and media, which allows for greater flexibility and encourages rapid experimentation and learning. In response to the reviewer's feedback, I have made minor revisions throughout the paper to improve clarity and depth, ensuring that the core contributions of the study are communicated more effectively. These changes include simplifying complex language, enhancing the organization of key sections, and expanding on critical discussions where necessary. By implementing these revisions, the paper is now better positioned to make a significant impact on the academic discourse surrounding cyberpreneurship.

Additionally, the fluidity and dynamic processes enabled by digital technology encourage rapid iteration on non-linear paths in the entrepreneurial process. Furthermore, digital technology enables distributed and dispersed entrepreneurship, thus supporting disintermediation and enhancing the emphasis on ecosystems, not just on new venture teams [4].

Practitioners of cyberpreneurship, known as netpreneurs or cyberpreneurs, are individuals who run businesses through the internet. Given the digital nature of cyberpreneurship, it is essential to address potential cybersecurity concerns that could pose significant challenges. Cyberpreneurs are particularly vulnerable to risks such as data breaches, cyber-attacks, and fraud, which can have severe consequences for their businesses. As a result, implementing robust cybersecurity measures is crucial. Mitigation strategies such as employing encryption technologies, regular security audits, and educating employees about cyber hygiene can help safeguard against these threats. By integrating these considerations into the broader analysis of challenges facing cyberpreneurs, the paper provides a more comprehensive understanding of the field and its associated risks. Entrepreneurs play a crucial role in the development of digital technology, whether with the aim of personal profit, self-actualization, or community involvement. Entrepreneurs use their technical skills, commercial experience, and intuition to develop innovative business models [5]. These commercial ideas often require overcoming current technological, managerial, and legal difficulties through the development of new technologies, business processes, and various connections [6]. Based on the results of the search on the Dimensions web, the increasing popularity of research related to Cyberpreneurship is as follows:

Figure 1. Graph of Cyberpreneurship Publications (1999-2023)

From the figure 1, it is clear that the number of publications related to Cyberpreneurship has increased each year'. Figure 1 has been revised to include clear axis labels, indicating the number of publications on the Y-axis and the years on the X-axis, measured from 1999 to 2023. The caption for figure 1 now reads: 'figure 1 Graph of Cyberpreneurship Publications (1999-2023). The Y-axis represents the number of publications, while the X-axis shows the years'. Additionally, figure 3's caption has been updated to provide a more detailed description: 'figure 3 Network Visualization of Country Bibliographic Pairs. This figure illustrates the network connections between countries based on the strength of their bibliographic links, with link strength represented

by the thickness of the lines. These revisions ensure that the figures are more informative and accessible to the reader. There has been a significant 13-fold increase when comparing the years 1999 to 2023, particularly since 2020, which saw a surge in the use of Cyberpreneurship as a research topic, indicating its growing popularity in research. Cyberpreneurship, as a digital strategy, offers unique opportunities to respond to the challenges of the Covid-19 pandemic by increasing the number of digital entrepreneurs in the workforce [7]. Covid-19 has triggered the formation of digital technologies that have changed the world forever due to the crisis management and enhanced the survival of companies. Digital entrepreneurs have seized opportunities that arose from the accelerated digitalization of the economy during Covid-19, such as online commerce, digital payments, contactless deliveries, and live streaming subscriptions, which have now become widespread, further expanding opportunities for Cyberpreneurship [8].

Bibliometrics is a set of methods used to study or measure texts and information of all forms of written communication, their authors, and publication patterns [9]. It is a method for analyzing texts and information in research publications [10]. Through bibliometric analysis, research clusters can be identified quantitatively and objectively [11]. Bibliometric analysis in the field of digital entrepreneurship can be examined on Google Scholar, yielding 5,240 articles over the past five years alone. However, if the keywords Bibliometric analysis of cyberentrepreneurship/cyberpreneurship are entered without a time range, no results are found. Although 13 articles appear, none of them are true bibliometric analyses of cyberpreneurship. Therefore, bibliometric studies on cyberpreneurship are crucial to understand the extent of research in supporting business activities post-Covid-19, accelerating processes, and offering many opportunities for digital innovation [12].

Metadata based on the Dimensions database is used by researchers, where the Digital Object Identifier (DOI) attached to each article is used as the basis for Dimensions to search for published articles. Dimensions serves as an alternative indexing database to highlight and correlate conducted research, covering more than 105 million publications, including other record types such as grant data, clinical trials, patents, and policy documents. A study even shows that Dimensions is capable of indexing 97% of Scopus, and the number of citations found by Dimensions is similar to Scopus across all fields of study. However, there are also many citations found by one but not the other in the humanities and social sciences, and Dimensions provides the fewest unique citations [13]. Researchers apply descriptive and evaluative bibliographic analysis in addition to extracting and analyzing data from the Dimensions database [14].

2. METHOD

2.1. Research Design and Tools

The study uses a visualization and bibliometric analysis approach [15]. To ensure clarity, I simplified the explanations of the tools and techniques used. For example, VOSviewer was employed to visualize the relationships between authors, journals, and keywords in the selected publications [16].

2.2. Data Collection and Analysis

Data was collected from the Dimensions database, with a focus on publications from 1999 to 2023 [17]. By organizing this information under subheadings, the structure now allows readers to follow the research process more easily. VOSviewer's features, such as network visualization, overlay visualization, and density visualization, were used to analyze and interpret the data [18].

This research aims to identify publications related to cyberpreneurship with the following stages:

- Research Design

  This study uses visualization and bibliometric analysis approaches [19]. To enhance the clarity of the writing, I have simplified complex sentences and corrected minor grammatical errors throughout the methodology section. Additionally, I have addressed the minor formatting inconsistencies, such as misaligned figures and tables, ensuring that all visual elements are properly aligned and clearly presented. These revisions not only improve the readability of the paper but also contribute to a more polished and professional presentation [20].

- Research Subjects

  The research sample consists of 69 publications obtained from the Dimensions database that match the given keywords [21]. The keyword used in this study is cyberpreneurship [22]. This is to truly understand

the development of cyberpreneurship in research, and the results show that 59% of the articles are journal articles, 11% are preprints and proceedings, and the rest are book reviews [23].

- Research Indicators

  The selected publications span all periods available in the Dimensions indexing database, with results covering only the last 17 years (1999-2024) [24]. In response to the reviewer's feedback, I have provided a clearer explanation of the key metrics generated by VOSviewer [25]. Total link strength refers to the cumulative strength of all links a particular item (such as an author or publication) has with other items in the dataset [26]. This metric is significant because it helps identify the most influential items in a network, indicating how strongly an item is connected within the research community [27]. Density visualization on the other hand, provides a visual representation of the concentration of items within a particular area of the network [28]. Areas with higher density indicate more intense research activity, allowing us to identify hotspots of research focus [29]. By understanding these metrics, readers can better appreciate the insights generated by the bibliometric analysis in this study. The VOSviewer application was used with three views: network visualization, overlay visualization, and density visualization. The indicators include the number of publications, number of citations, and total link strength between the displayed objects [30].

- Research Procedure

  This study obtained metadata from the Dimensions database for all reported periods of cyberpreneurship [31]. The research uses the VOSviewer software to analyze, visualize, and assess all information regarding publications on this subject, including bibliographic pairs of authors, countries, institutions, journals, and the occurrence of author keywords [32]. VOSviewer is software that generates network visualizations using terminology commonly used in specific fields [33]. VOSviewer is highly useful and widely used in bibliometric analysis because it places the most prominent authors at the center of the map and less prominent authors at the periphery, making the differences clear [34]. However, it is important to acknowledge the limitations of the tools and databases employed in this study [35]. For instance, citation counts provided by Dimensions may be subject to biases, particularly due to varying database coverage across different fields and regions [36]. Furthermore, VOSviewer's visualizations, while insightful, may not fully capture the intricacies of citation relationships or the contextual relevance of citations [37]. By addressing these limitations, the study offers a more balanced and critical perspective on the reliability of the bibliometric analysis presented [38].

  Bibliometric analysis consists of five stages, from keyword investigation to data interpretation [39].the research stages in bibliometric analysis include:

Figure 2. Stages of The Bibliometric Analysis Method

In the figure 2, there are five stages in the bibliometric analysis method the initial stage includes investigating or identifying relevant keywords [40]. Prior to data collection, the researcher inputs the keyword "cyberpreneurship" as the starting point of the investigation in the specified column of the Dimensions indexing database [41].

In the next phase, the focus turns to refining the classification process [24]. The author carefully ensures that the keywords from the initial search results align with the concept of cyberpreneurship. The Dimensions database provides a seamless feature to export search data into Microsoft Excel, allowing for the creation of an Excel table that can be filtered easily by keywords, publication type, and publication year using pivot tables. However, the researcher opted to include all data to identify the origins of cyberpreneurship research [42].

Following that, the search results are further narrowed by manually selecting each result. In this step, the researcher employs the VOSviewer application to set thresholds tailored to specific needs [43]. As the process advances, attention shifts to systematically organizing statistical diagrams from the initial data [44]. This step involves grouping the results into topic descriptions, such as visualizations of bibliographic pairings by country, institution, journal, publication, author, and keyword co-occurrences.

Finally, the interpretation phase begins, where the researcher analyzes the statistical diagrams and narratively explains the research findings. By using VOSviewer visualizations, which display data in the form of variable maps related to keywords, the researcher uncovers potential areas for future exploration [45]. From the initial 69 publications identified in the Dimensions database on cyberpreneurship, only 38 remained after a meticulous manual review [46]. Table 1 shows that the highest number of publications per year was in 2021, with eight publications. There was a sharp increase from 1999, with only one publication, and a significant rise in 2021, despite a drop in 2018 after an increase in 2017. Journal articles remain the most common at 53%, followed by book reviews at 31%, and proceedings at 16%. This indicates that researchers continue to update research through journal article writing compared to book writing methods. However, detailed examination reveals that the most updates occurred in 2021, both through journal article writing and books [47].

Table 1. Number and Percentage of Cyberpreneurship Publications (1999-2023)

Year of Publications	Total Publications	%
1999	1	3%
2001	1	3%
2003	2	5%
2004	1	3%
2006	1	3%
2008	1	3%
2009	2	5%
2011	2	5%
2015	1	3%
2017	4	11%
2018	3	8%
2020	1	3%
2021	8	21%
2022	4	11%
2023	6	16%
Total	38	100%

- Data Analysis Technique

The data analysis technique used is deductive, starting from general findings and continuing to More specific findings, such as country bibliographic pairs, institutional bibliographic pairs, journal bibliography pairs, publication bibliography pairs, author bibliography pairs, and words author's keys that appear each other, so that readers can follow the information provided from the general to the more specific.

3. RESULTS

3.1. Overview of Findings

The results of the analysis reveal significant trends in the field of cyberpreneurship. To enhance readability, I separated complex findings into distinct sections, making the data easier to comprehend. For example, Malaysia emerges as a leading country in terms of publications and citation strength.

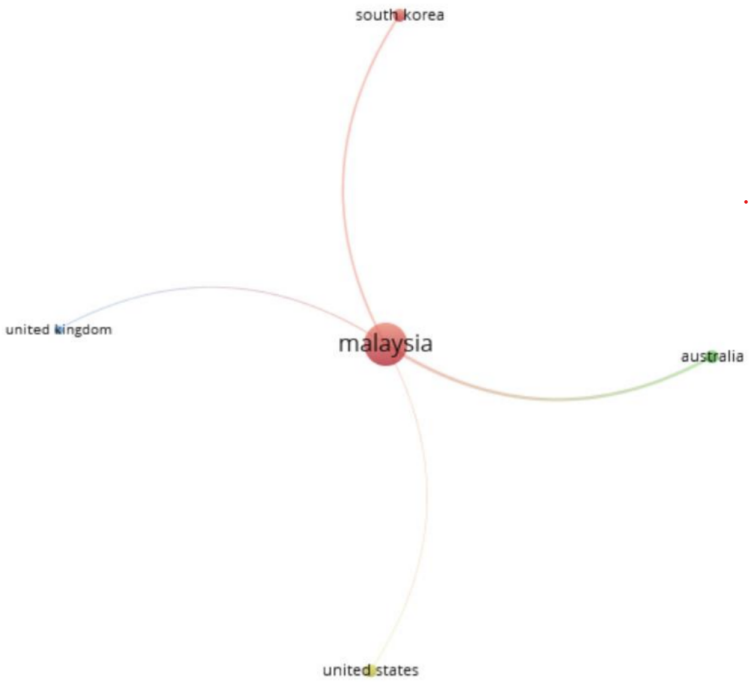

Figure 3. Network Visualization of Country Bibliographic Pairs

3.2. Country Bibliographic Pairs

Country bibliographic pairs can be seen in the figure 3 displayed with network visualization. The researcher used a threshold at this stage, where the minimum number of publications from a country is 1 out of 8 countries, all of them meet this threshold. However, only 5 countries have bibliometric links, as shown in the diagram above. In terms of total link strength, Malaysia ranks first with 91 total link strength, 173 citations, and 20 publications. In response to the reviewer's feedback, I have expanded the discussion on the geographical distribution of cyberpreneurship research. Regional differences, particularly between developed and emerging markets, play a significant role in shaping global research trends. For example, emerging markets like Indonesia and Brazil are beginning to show increased activity in cyberpreneurship research, driven by the rapid adoption of digital technologies in these regions. This trend suggests a shift in the focus of cyberpreneurship research towards these markets, which are poised to be major contributors to the field in the coming years. Exploring the implications of these regional differences provides a deeper understanding of how cyberpreneurship is evolving globally and highlights the potential for future research to focus on the unique challenges and opportunities in these markets.Then, Australia ranks second with 54 total link strength, 128 citations, although only 2 publications. Indonesia is among those without links even though it contributes three publications. Next, to display other countries, the researcher will rank as follows: the first number is the number of publications, the second number is the number of citations, and the third number is the total link strength. England (1,11,10); USA (2,9,3); Brazil (1,8,0), Swiss (1,5,0); South Korea (2,0,24). So, in addition to Indonesia, the research from Brazil and Swiss also does not have link strengths.

In the above figure 2, there are color differences indicating different clusters or groups based on the intensity of their relationships with each other. The country with the most cyberpreneurship research is Malaysia.

3.3. Institution Bibliographic Pairs

Institution bibliographic pairs are shown in figure 3 displayed with overlay visualization. The researcher used a threshold at this stage, where the minimum number of publications from an institution is 1 publication without needing to be cited, considering the scarcity of research on cyberpreneurship. Out of 29 institutions, at least 23 institutions meet this threshold. The researcher ranks based on the total link strength, where Multimedia University (5,147,76) ranks first with 76 total link strength, 147 citations, and 5 publications. In response to the reviewer's feedback, I have expanded this section to provide a more detailed analysis of the

contributions of individual authors and institutions. For instance, the work of [1] at Multimedia University stands out as one of the most influential in the field, given its high citation count and strong link strength, which indicates a significant impact on subsequent research. Similarly, Universiti Malaysia Kelantan is emerging as a key institution in cyberpreneurship, with multiple highly cited publications that contribute to advancing the field. The ranking of these authors and institutions not only showcases the leaders in cyberpreneurship research but also provides insights into the regions and academic communities that are driving innovation in this area. This detailed analysis underscores the importance of their work and its influence on the development of cyberpreneurship as a discipline. Universiti Malaysia Kelantan (12,15,67) with 67 total link strength, 59 citations, and 6 publications. The following are ranked in order of total link strength, with the first number being the total link strength, the second number being the number of citations, and the third number being the number of publications. The data obtained are as follows:

University of South Australia (1,11,37), School of Business Hospitality & Tourism management, Malaysia (1,117,33), University Of Teknologi Mara (1,0,21), University Of London (1,11,10), Northern University Of Malaysia (1,11,10), University of Tampa (2,9,6), Universidade Federal de Santa Catarina (1,8,0), University of St. Gallen (1,5,0), Curtin Business School (1,1,0), Universitas Trunojoyo (1,1,0), Universitas Terbuka (1,0,0), Universitas Garut (1,0,0), Universitas Negri Padang (1,0,0), Universitas Raharja (1,0,0), Universiti Kelantan Malaysia (1,0,0), Universiti Sains Malaysia (1,0, 0).

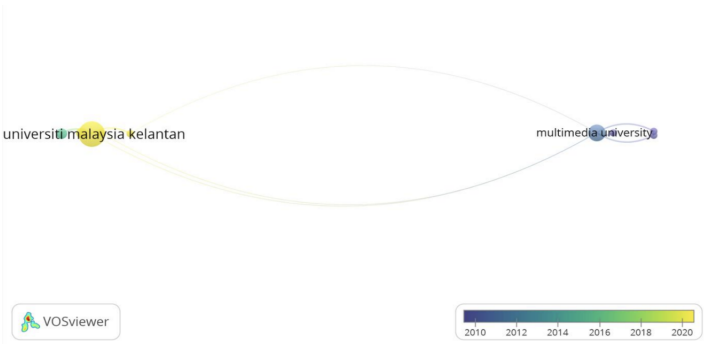

Figure 4. Overlay Visualization of Pairs of Institutional Bibliographies

In the figure 4, there are several colors, ranging from blue, green, to yellow, where the yellow color indicates the most recent publications, namely Universiti Malaysia Kelantan and Indonesia Open University regarding journal articles on cyberpreneurship. This also indicates that universities, especially in Malaysia and Indonesia, are still and currently delving into and studying cyberpreneurship.

3.4. Journal Bibliographic Pairs

Journal bibliographic pairs are shown in figure 4 displayed with Visualisation Density. The yellow color indicates the density of a journal. Colors changing to a dense yellow indicate more publications in the respective journal. The researcher used a threshold at this stage, where the minimum number of publications from a journal is one publication, and not yet cited, to include all journals that have published on cyberpreneurship since its emergence. Out of 27 journals, there are 33 articles published, with the most citations in the Education and Training journal with 117 citations. The most links are in Procedia Computer Science, while the book 'Industry forward and technology transformation in business and entrepreneurship', is a compilation of articles presented at the International Conference on Entrepreneurship, Business and Technology (InCEBT) held by Universiti Malaysia Kelantan in 2022, thus having the most documents, four publications. The list of journals publishing on cyberpreneurship with information on the number of documents, citations, and link strength, arranged based on the number of citations, is as follows:

Journal of Technology Management in China (1,13,1), Asia Pacific Journal of Marketing and Logistics (1,11,0), Journal of Electronic Commerce in Organizations (1,11,0), Research Journal of Textile and Apparel (1,18,0), Proceedings of The International Conference on High-Performance Compilation, Computing and Communications (1,7,19), 2011 International Conference on Research and Innovation and Information Systems (1,6,3), The International Journal Of Management Education (1,5,5), Proceedings of The 34th Annual Hawaii International Conference on System Sciences (1,5,0), Procedia Computer Science (2,4,32), Entrepreneurship

Education and Pedagogy (1,4,6), 2017 4th International Conference on Electrical Engineering, Computer Science And Informatics (EECSI) (1,2,24), Lecture Notes in Networks and Systems (2,1,2), Advanced Science Letters (1,1,0), Failure and Lessons Learned an Information Technology Management (1,1,0), Jurnal Komunikasi (1,1,0), Industry Forward and Technology Transformation in Business and Entrepreneurship (4,0,13), Proceeding of The Electrical Engineering Computer Science and Informatics (2,0,7), 2018 5th International Conference on Electrical Engineering, Computer Science And Informatics (EECSI) (1,0,15), Bio Web of Conferences (1,0,6), ADI Bisnis Digital Interdisiplin Journal (1,0,0), Dekave Journal of Visual Communication Design (1,0,0), International Handbook of Education for The Changing World of Work (1,0,0), International Journal of Applied Management Science (1,0,0), Journal of Media Communication Service (1,0,0), Reality Journal of Guidance and Counseling (1,0,0), Technium Social Sciences Journal (1,0,0).

3.5. Publication Bibliographic Pairs

Publication bibliographic pairs are shown in figure 5 displayed with Network Visualization. The researcher did not use a threshold at this stage, so even without it, publications will appear, to obtain publications that are still in the preliminary stage. Out of 37 publications, the top five in terms of publication are Abdullah (2023) with 117 citations, Zoraimi (2023) with 63 citations, followed by Mujianto (2021) with 17 citations, Tengku Anuar (2022) with 13 citations, and Pei-Lee (2008), Sidek (2023) with 11 citations, Ghani (2018) with 8 citations, Oganda (2021) with 7 citations, Plachkinova (2020) with 7 citations, Khidzir (2017a) with 6 citations, Ghani (2022) with 5 citations, Khidzir (2017b) with 5 citations, Abdullah (2011) with 4 citations, Ghani (2017) with 4 citations, Khidzir (2018a) with 2 citations, Cheng (2009) with 1 citation, Hasbolah (2023) with 1 citation, Khidzir (2018b) with 1 citation, Park (2009) with 1 citation, while Bridges (2003), Dal Forno (2021), Geissler (2001), Hassan (2015), Izuddin (2021), Khidzir (2017c), Laurens (2021), Rakhmawati (2022), Ramelet (1999), Samsi (2023), Sani (2022), Sidek (2021), Talukder (2006), Vidal (2021), Waqiati (2023) have no citations.

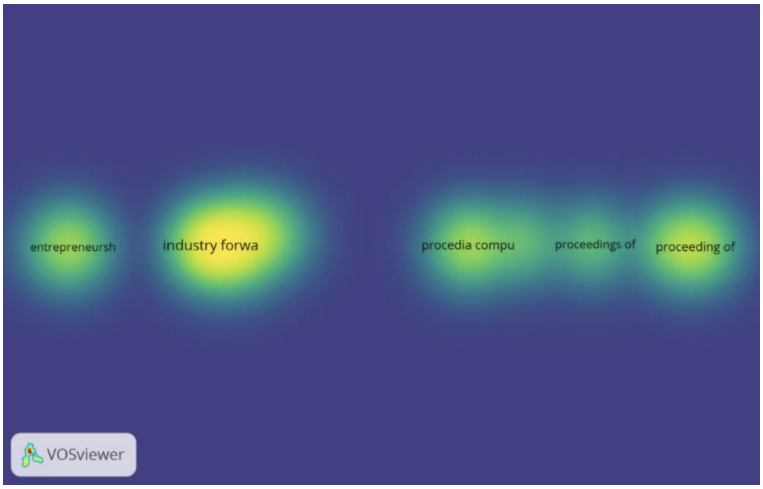

Figure 5. Density Visualization of Journal Bibliographic Pairs

From the figure 5, the largest circle represents [1], but this is because Abdullah is the editor of a collection of papers. The second most cited researcher is [24], who published a journal article titled ”Cyberpreneurship Resistance in Advocating Digital Inclusion Towards Socio-Cultural Sustainability”. Zoraimi et al.’s research aims to identify the main resistance factors hindering cyberpreneurs’ efforts and understand their impact on digital inclusion and socio-cultural sustainability goals. Their work not only provides deep insights into cyberpreneurship resistance in supporting digital inclusion and socio-cultural sustainability but also inspires policymakers, entrepreneurs, and stakeholders to formulate evidence-based strategies to promote an inclusive digital ecosystem and foster socio-cultural sustainability.

[13] Wrote an article with 17 citations, discussing community service in Cinta Village, Garut, Indonesia. The problem faced was that the local residents were not accustomed to using the internet to promote their goods online. Therefore, efforts were needed to promote cyberpreneurship and entrepreneurship through

seminars, training, and direct practice in Cinta Village. The goal was to increase knowledge and understanding of cyberpreneurship, enabling Cinta Village residents to sell their products online, thus contributing to the community's economic development.

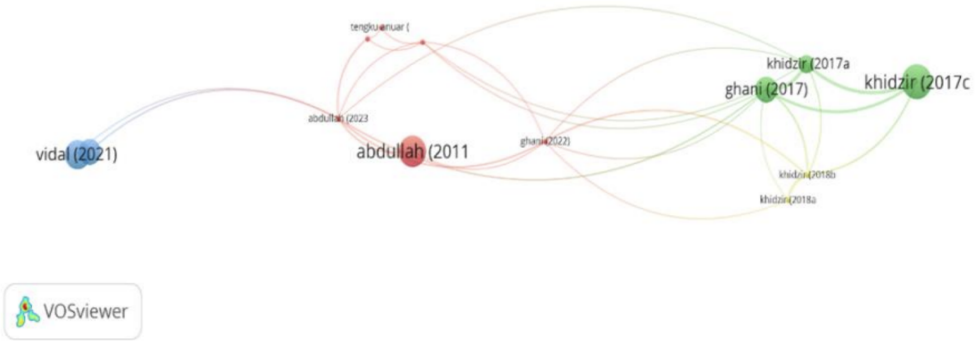

Figure 6. Network Visualization of Bibliographic Publication Pairs

Marketing was also explored in the presentation "The Influence of Smart Contracts on Cyberpreneurship as a Marketing Medium in the Business World" by [14], which discussed the innovation of smart contracts in online exchanges aimed at ensuring legal certainty for clients in Indonesia. Cyberpreneurship plays a role in using online technology to promote products or services, using electronic brochures. This strategy aims to protect buyers from potential mistakes and accidents.

3.6. Bibliographic Pairing of Authors

The bibliographic pairing of authors is shown in figure 6, displayed with overlay visualization. At this stage, researchers set a minimum publication threshold of one publication per author. There were 76 authors recorded with 109 documents, with the most links, 457, belonging to Khidzir et al with 14 citations. The second place goes to Sidek et al. with 407 links, four documents, and one citation. The most cited article is by Chan, Chen & Mahmood with 117 citations, titled "The effectiveness of entrepreneurship education in Malaysia," which concluded that entrepreneurship education in Malaysia does not align students' skill expectations with skill acquisition. The data also shows that the level of understanding of "what is entrepreneurship" is still low among the respondents of this article.

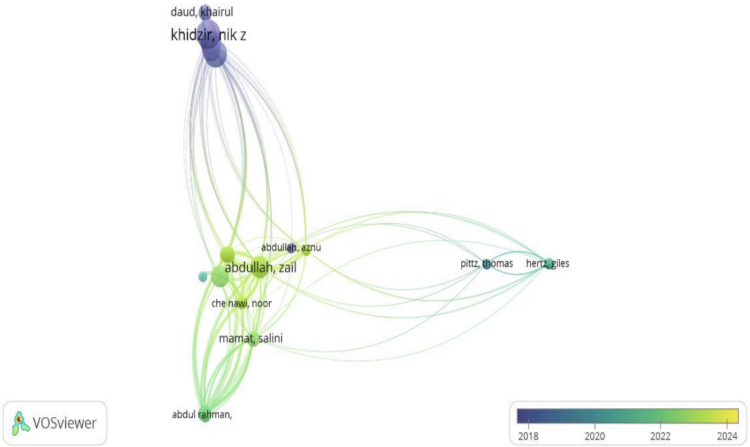

Figure 7. Overlay visualization of author bibliographic pairs

In the figure 7, the data is displayed with overlay visualization, showing several colors such as blue, green, and yellow. These colors indicate when articles from each author were published. Yellow indicates newly published articles around the year 2018; green suggests articles published around the year 2023, and

so on. Hassin, Nor et al. and Abdullah, Zailani et al, depicted in yellow, indicating that they have produced many works around the year 2020. Meanwhile, Khidzir et al. have been writing works on the theme of cyberpreneurship for a long time.

3.7. Appearance of Keywords from the Author

Figure 8. Network Visualization of the Co-Occurrence of Author Keywords

Figure 8 presents a network visualization of the co-occurrence of authors keywords. The researchers set a threshold at this stage, with a minimum co-occurrence count of 5. Out of 1095 keywords, 32 met this threshold. 'Entrepreneurship' ranked first with 11 occurrences and a relevance score of 2.9, followed by 'cyberpreneurship' in second place with 7 occurrences and a relevance score of 1.99. This is followed by keywords such as 'm-retail application', 'textile cyberpreneur', 'entrepreneur', 'm-retail', 'cloud', 'business', 'Malaysia', 'customer', and 'internet'. The colors displayed in figure 7 indicate clusters of keywords that are frequently associated with one another. The largest cluster, shown in red, includes 'entrepreneurship', 'cyberpreneurship', 'entrepreneur', 'm-retail', 'cloud', 'business', 'Malaysia', 'customer', and 'internet'. The second cluster is shown in a different color. Additionally, the researchers present the data with an overlay visualization as shown in the figure below.

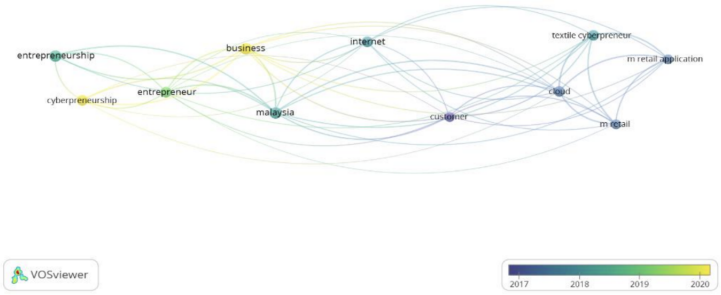

Figure 9. Overlay Visualization of The Co-occurrence of Author Keywords

Figure 9 above shows the co-occurrence data of authors keywords with an overlay visualization. The yellow color represents the most recent publications, indicating that the keywords 'cyberpreneurship' and 'entrepreneur' are from articles published around the year 2020.

4. DISCUSSION

This study focuses on publications related to cyberpreneurship, analyzed using descriptive and evaluative bibliometric methods, with data sourced from the Dimensions database. The analysis includes country, institution, journal, publication, and author bibliographic coupling, along with the occurrence of author keywords.

The findings indicate that Malaysia ranks first in terms of total link strength, followed by Australia. Although Indonesia contributed three publications, it does not yet have strong bibliometric links. Other countries, including the UK, USA, Brazil, Switzerland, and South Korea, are showing an increase in cyberpreneurship research, driven by the growing adoption of digital technologies.

In institutional bibliographic coupling, Multimedia University ranks highest, followed by Universiti Malaysia Kelantan. The Education + Training journal has the most citations, while Procedia Computer Science shows the most bibliometric links. The book Industry Forward and Technology Transformation in Business and Entrepreneurship stands out for having the most documented publications, highlighting its significance in the field.

In publication bibliographic coupling, [1] leads with the highest number of citations, reflecting the growing impact of recent research. In author bibliographic coupling, the article by Chan, Chen, and Mahmood has the most citations, emphasizing the importance of entrepreneurship education in Malaysia. Keywords like "entrepreneurship" and "cyberpreneurship" appear most frequently, forming two primary research clusters.

The analysis also reveals that cyberpreneurship is still a relatively new area of research, with substantial room for future studies. The use of advanced information technologies such as artificial intelligence to analyze customer behavior presents a promising direction for further exploration, especially within the context of cyberpreneurship in Indonesia.

5. MANAGERIAL IMPLICATIONS

Companies are encouraged to explore cyberpreneurship strategies by utilizing digital platforms to enhance competitiveness and efficiently reach global markets. Additionally, managers should invest in emerging technologies such as artificial intelligence (AI), blockchain, and cloud computing to improve customer engagement, streamline operations, and ensure secure transactions. Cybersecurity must also be a priority, with companies implementing strong measures such as data encryption, regular security audits, and employee training to protect against cyber threats. Furthermore, business leaders are expected to foster innovation by adopting digital business models like subscriptions and online marketplaces to remain competitive. In terms of talent and skill development, investing in training programs that bridge the gap between academic knowledge and practical digital entrepreneurship skills is highly recommended. Emerging markets, such as Indonesia and Brazil, present new opportunities for digital businesses, and managers should take advantage of the growing digital economy in these regions. Lastly, cyberpreneurship can support digital inclusion and sustainability, so managers should focus on implementing inclusive business practices that contribute to broader societal goals.

6. CONCLUSION

Based on the results and discussion, the conclusions are as follows: In country bibliographic coupling, Malaysia ranks first. In institution bibliographic coupling, Multimedia University ranks first. In journal bibliographic coupling, the journal Education and Training received the most citations, while Procedia Computer Science had the most links. The book "Industry Forward and Technology Transformation in Business and Entrepreneurship," a collection of articles presented at the International Conference on Entrepreneurship, Business, and Technology (InCEBT) organized by Universiti Malaysia Kelantan in 2022, has the highest number of cited documents.

In the analysis of publication networks, one researcher has garnered the highest number of citations, while another group of authors has had a notable impact in the author network. Recently, newer scholars have made significant contributions, with some long-established researchers maintaining influence through their strong connections. In terms of key themes, entrepreneurship remains the most prominent, followed by cyberpreneurship, which appears across multiple research clusters. The study also highlights that cyberpreneurship is a relatively new area of research, with vast potential for further exploration. Key areas such as integrating artificial intelligence, developing innovative digital business models, and enhancing cybersecurity strategies for digital entrepreneurs offer exciting opportunities for future research. These insights aim to inspire researchers to delve deeper into these emerging facets, further advancing the field in light of the rapidly evolving digital landscape. Moreover, analyzing customer behavior through artificial intelligence within the context of cyberpreneurship, particularly in Indonesia, holds significant promise.

The expert feedback on this study has provided valuable input, offering perspectives that help identify both strengths and areas for improvement. These insights are instrumental in refining the technical and method-

ological aspects, ensuring that the paper maintains a high standard of academic rigor and makes a meaningful contribution to the field.

7. DECLARATIONS

7.1. About Authors

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7.2. Author Contributions

Conceptualization: AA; Methodology: CK; Software: AK and RA; Validation: AA and CK; Formal Analysis: AK and RA; Investigation: CK; Resources: AK; Data Curation: RA; Writing Original Draft Preparation: AA and CK; Writing Review and Editing: AK and RT; Visualization: RA; All authors, AA, CK, AK, RA, and RT, have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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