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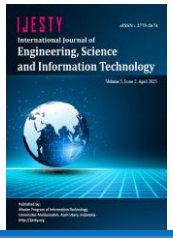

Analysis of Systematic Studies in Research Mapping Entrepreneurs in the Metaverse Era

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Abstract

The Metaverse refers to a virtual environment concept that evolves in parallel with the real world, driven by technological advancements. In the present day, the Metaverse functions as a medium for entertainment and an emerging ecosystem where entrepreneurs can innovate and expand their businesses. This study aims to review existing literature on the Metaverse within the entrepreneurship framework and comprehensively analyze its role as a dynamic business platform for entrepreneurs. This research also seeks to map the studies conducted to help researchers and businesses explore and develop the potential of the Metaverse as a future entrepreneurial opportunity. The Metaverse provides opportunities for entrepreneurs to implement innovative promotional strategies in the digital world, which mimic real-world business dynamics. In the context of industry, the Metaverse is increasingly strengthening its position as a new entrepreneurial ecosystem, and some companies have started to utilize it for business expansion. The qualitative method used in this research is a bibliometric technique through the Visualization of Similarities (Vosviewer) application, with the keywords metaverse, entrepreneur, digital, and experience. This research identified 258 articles, which were then analyzed using Vosviewer. The results of this analysis produce a mapping of scientific developments related to the Metaverse and reveal potential future research that can be a reference for researchers in developing research in the entrepreneurship field in the metaverse era.

Keywords: *Metaverse, Entrepreneur, Virtual Environment, New Ecosystem, New Business.*

1. Introduction

Entrepreneurship in the metaverse era is an idea that is increasingly developing along with the advancement of digital technology and the merging of the physical and virtual worlds. Metaverse, an integrated virtual space where users can interact, work, and play, offers new opportunities for entrepreneurs to create innovative business models and transform how we interact with products and services.

The Metaverse is a digital ecosystem that unites virtual reality (VR), augmented reality (AR), and blockchain technology, creating interactive experiences that resemble real life. Within the Metaverse, users can create avatars, engage in social activities, conduct economic transactions, and access various services without physical barriers.

Entrepreneurs in the Metaverse have the opportunity to create digital products such as virtual assets, digital fashion, and interactive experiences that allow users to engage in activities that cannot be done in the physical world.

The Metaverse provides access to a broader global market. Entrepreneurs can reach consumers worldwide without geographical limitations, making business expansion easier. With the advent of the Metaverse, various new business models have emerged, such as token-based economies, subscription services for virtual experiences, and digital asset trading. In addition, entrepreneurs can build communities in the Metaverse and develop stronger relationships with customers and business partners through richer virtual interactions.

Although many opportunities are available, entrepreneurship in the Metaverse also faces several challenges, such as uncertainty regarding regulations in the virtual world, which can be an obstacle for entrepreneurs. In addition, data security and user privacy issues have become paramount. Entrepreneurs must continuously keep up with technological developments to remain relevant and competitive in the rapidly changing market.

Society must also adapt to new ways of interacting with products and services in the Metaverse, which may require time and education. Thus, entrepreneurship in the metaverse era presents unique challenges and opportunities. By leveraging advanced technology and understanding the new market dynamics, entrepreneurs can create innovations that meet consumer needs and redefine the business experience. Therefore, entrepreneurship in the metaverse era offers unique challenges and opportunities. By utilizing modern technology and understanding the new market dynamics, entrepreneurs can create innovations that meet consumer needs and change how we do business. Therefore, it is essential for entrepreneurs to continuously learn, adapt, and innovate in exploring the limitless potential offered by the Metaverse.

2. Literature Review

The Metaverse is a universe and a new dimension of reality where the virtual and the real can be experienced simultaneously. It was created by combining all virtual worlds and materials on the internet, using augmented reality (AR), virtual reality (VR), and blockchain technology [1]. Some entrepreneurs have already realized that the Metaverse offers new opportunities in both the virtual and physical worlds. Many companies have created a digital world that can accommodate various entrepreneurial activities [2]. The Metaverse offers opportunities to invest and trade virtual assets, such as digital properties, avatars, digital artworks, and other virtual goods. These assets, usually represented as NFTs, can be bought, sold, or traded on various metaverse marketplace platforms [3].
The concept of the Metaverse has attracted a lot of attention from researchers. Various significant studies agree that the Metaverse is a series of advanced technologies [4], [5]. These studies provide a structural perspective on the Metaverse, identifying its main features and mapping its potential domains for entrepreneurs in various fields (e.g., retail, tourism, and logistics) [6].
However, a complete focus on technology has limitations and can highlight the challenges and opportunities for entrepreneurs in the business world. This research examines the evolving concept of the Metaverse and explores how entrepreneurs can innovate [6].

Table 1. External Stimulus Factors

Factors	Description	References
Innovation	Innovation from creativity drives economic growth and expands market share.	[7], [8], [9]
Digital	Digital technology delivers experiences that drive innovation and business transformation.	[8], [10], [11]
Strategies	Business strategy focuses on innovation, differentiation and market opportunities.	[3], [12], [13]
Experience	Metaverse provides an immersive experience that makes it seem as if we were in a virtual world.	[12], [14], [15]
Entrepreneur	Innovators leverage technology to turn opportunities into new businesses and take risks.	[1], [3], [16], [17], [18]
Virtual Reality	The rise of VR/AR and affordable devices supports the younger generation's interest in digital experiences.	[3], [17], [18]
Business	The Metaverse opens up more significant business opportunities and expands faster.	[13], [19], [20]
Consument	Consumers use digital technology to influence business decisions.	[21], [22]
Goods	Virtual experiences in the Metaverse increase the resale value of items.	[2], [21], [23]
IDEA	Focus on innovation and developing ideas for the future of the Metaverse.	[24], [25]
Information	Information processing, security and privacy, social influence.	[26], [27], [28]
Product	Product excellence and virtual experience are now key determinants of business success in the Metaverse.	[2], [29], [30]
Service	active participation of customers, opening up new opportunities and improving services.	[2], [31]

External stimuli and cognitive responses are used as keywords in bibliometric analysis. Factors often used by researchers to express cognitive responses are Benefits, Drivers, Barriers and Challenges, as seen in Table 2.

Table 2. Cognitive Response Factors

Factors	Description	References
Benefit	VR technology is transforming work, learning, and business to be more immersive.	[1], [3], [19]
Driver	Metaverse opens up innovative business opportunities through VR/AR.	[1], [2], [3]
Barriers	Technology, cost, and privacy concerns hinder VR and entrepreneurship.	[1], [3], [32]
Challenge	Cost, regulation, security, and asset ownership are key challenges in virtual business.	[1], [3], [32]

3. Research Methods

The method used in this article is qualitative research with a historical approach. This method is used to identify developments, trends, or research mapping related to entrepreneurship in the metaverse era. The study was conducted in two stages. The first is the systematic collection of data sources. The data sources used in this research are articles published in reputable international journals.
The second stage involved analyzing the articles collected using bibliometric analysis. This analysis processes and organizes data through words or strings from published articles' titles and abstracts. This process helps map entrepreneurship-related developments, trends or research in the current metaverse era and provides recommendations for research themes or variables for future researchers.

3.1. Collecting Data Method

The data collection consisted of research articles taken from a group of leading journal publishers: 1) Elsevier, 2) Emerald, 3) Springer, 4) Taylor, 5) Wiley, and 6) Sage Journals. Articles were collected from accessible databases from the six journal publisher groups. Search for articles using Publish or Perish (PoP). This software helps to find articles with relevant research topics. The stages of data collection are as follows :

1. The search is limited to the years 2011-2024.
2. The keywords used as search criteria are ["Entrepreneur"] and ["Metaverse"].
3. The combination of keywords used as search criteria consists of two combinations. The first combination ["innovation; virtual; digital; strategy; reality"]. The second combination ["experience; entrepreneurship; virtual; business; consumer"]. The third combination ["goods; ideas; information; products; services"].
4. Furthermore, the research collected by this software was reduced based on journals written in English. Source articles from reputable journals.
5. The search was limited to journal articles in the scientific fields of management, business, economics, social, information, and entrepreneurship. This study's data did not include conference proceedings, meeting results, or books.
6. Articles to be analyzed were checked for research completeness regarding the presence of "title", "abstract", and "keywords".
7. The completeness that needs to be considered in selecting articles to be processed is DOI, publishing journal, publisher, article URL, Number of citations, GS Ranking, CitesPerYear, CitesPerAuthor, and AuthorCount.

The articles collected from searches using Publish or Perish from 2011 to 2024 totalled 258. With a combination of search titles and keywords, as shown in Table 3.

Table 3. Search Combinations and Resulting Journal Articles

Titles	Keywords	Amount
Metaverse	Innovation, virtual, digital, strategies, reality	100 Article
Metaverse	Experience, entrepreneur, virtual, business, consumers	100 Article
Metaverse	Goods, IDEA, information, product, service	100 Article

3.2. Analysis Data Method

Bibliometric analysis using the VOSviewer application. The analysis results show a bibliographic map of entrepreneurship in the metaverse era. The resulting bibliometric analysis is a map of bibliographic data and text data extracted from the titles and abstracts of selected articles [33].

The analysis results were used to map and develop the field of reference studies [33]. Scientific mapping analyzes trends and patterns of scientific research development related to the results of research studies on entrepreneurs. VOSviewer analyzes published scientific articles.

VOSviewer visualizes knowledge development through network visualization and provides cluster labelling. In other words, VOSviewer includes information on research updates and how much research related to this field has been conducted.

The output of VOSviewer displays maps and networks based on co-citation data or keyword maps based on highly detailed keyword co-occurrence and relevance data.

The map visualization and keyword network have different colours for each data cluster [33]. The VOSviewer application displays an overlay network that shows the development of articles over time. The overlay network presents a period (year) in which the linkage of each keyword is presented in the form of a network. Based on the visualization of the overlay network, it is known how far the research progress is related to Entrepreneurship and Metaverse. In addition, there is a density visualization. The density visualization shows the high or low frequency of concepts or constructs used in research.

4. Results and Discussion

4.1. Numbers of Publication Years

The early 2020s witnessed the evolution of entrepreneurship in the metaverse era. Technologies supporting virtual and augmented reality are advancing rapidly, creating new opportunities for entrepreneurs to innovate in the digital world. The number continues to grow as the presence of the Metaverse as an interactive and immersive virtual ecosystem brings about significant changes in how businesses are managed, opening up space for interactions and transactions that are no longer limited by physicality and geography. Changes in the technological environment that alter other macro-environments drastically change the business management landscape. This condition has led many researchers to research the Metaverse, both as article titles and as keywords in articles. The search results were 258 articles from 2011 to 2024, as shown in Table 4.

Table 4. Numbers of Publication Years from 2011-2024

Years	Publication Years
2011	1
2013	4
2017	1
2019	1

Years	Publication Years
2021	10
2022	70
2023	77
2024	94
Total	**258**

The value continues to increase from 2021 to 2024. Entrepreneurs, whether in large corporations or startups, must be able to leverage metaverse technologies to stay competitive. New challenges are constantly emerging with the rapidly changing and complex business environment. In this metaverse era, experts and researchers around the world are working to understand, predict, and develop strategies that enable entrepreneurs to adapt to an increasingly integrated and immersive digital ecosystem

4.2. Author Analysis

The author's analysis uses Google Scholar (GS) rankings. GS generally has a functionality similar to the Thomson ISI Web of Knowledge, which generates Journal Impact Factors (JIF). JIF assesses the impact factor of articles [33]. GS has an advantage in ranking through access to free articles. Free article access allows researchers to cite these articles, regardless of the financial capabilities of the affiliated institutions.

Table 5. Active Publications per Year from 2022-2024

Authors Name	Title	GS Rank
A Othman, K Chemnad, AE Hassanien, A Tlili, CY Zhang, etc. (2024)	Accessible Metaverse: A Theoretical Framework for Accessibility and Inclusion in the Metaverse	70
A Tlili, R Huang, B Shehata, D Liu, etc.(2022)	Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis	68
Y Wang, Z Su, N Zhang, R Xing, D Liu, TH Luan, X Shen (2022)	A survey on Metaverse: Fundamentals, security, and privacy	86
L Yang, ST Ni, Y Wang, A Yu, JA Lee, P Hui (2024)	Interoperability of the Metaverse: A Digital Ecosystem Perspective Review	66
X Zhang, Y Chen, L Hu, Y Wang (2022)	The Metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics	88
R Muhammad Sohail Jafar, W Ahmad, Y Chen (2024)	Metaverse in Human Behavior: The Role of Telepresence and Flow Experience on Consumers' Shopping Behavior in the Metaverse	36
Y Zhao, J Jiang, Y Chen, R Liu, Y Yang, X Xue, S Chen (2022)	Metaverse: Perspectives from graphics, interactions and visualization	48
Y Liang, X Zhang, H Wang, M Liu (2024)	Users' willingness to adopt Metaverse drawing on flow theory: An empirical study using PLS-SEM and FsQCA	57
H Wang, H Ning, Y Lin, W Wang, S Dhelim, etc. (2023)	A survey on the Metaverse: The state-of-the-art technologies, applications, and challenges	52
J Zheng, JZ Zhang, AKM Au, VC Storey, H Wang, Y Yang (2024)	Shaping innovation pathways: Metaverse application configurations in high-technology small, medium-sized enterprises	63
TR Gadekallu, T Huynh-The, W Wang, G Yenduri, P Ranaweera, etc. (2022)	Blockchain for the Metaverse: A review	56
T Huynh-The, QV Pham, XQ Pham, TT Nguyen, Z Han, DS Kim (2023)	Artificial Intelligence for the Metaverse: A survey	30

GS ranking can be seen from the author's contribution to producing articles yearly. Based on the data collected, 12 authors actively write. Table 5 discusses the authors contributing articles each year by looking at the GS ranking. Table 5 shows how the author's contribution in producing articles each year [33]

4.3. Citation Analysis

Citation analysis shows how many articles are cited or referenced by other researchers. Researchers related to digital transformation continue to increase, especially from 2021 to 2024. This metaverse technological change creates problems in business management. Business managers, both large companies and startups, must adapt to these changes and challenges. Efforts to increase this adaptation encourage the high commitment of researchers to continue developing scientific knowledge to answer business management problems in the metaverse era. The journals with the highest number of metaverse publications are Elsevier journals.

Table 6. Top 25 Cited Authors and Articles in Entrepreneurship in the Age of the Metaverse

Author's Name	Publisher	Frekuensi Disitasi
YK Dwivedi, L Hughes, AM Baabdullah, S Ribeiro-Navarrete, M Giannakis, etc. (2022)	Journal of Manufacturing Systems	1844
SM Park, YG Kim (2022)	IEEE Acces	1588
Y Wang, Z Su, N Zhang, R Xing, D Liu, T H. Luan, X Shen (2022)	IEEE Communications Surveys & Tutorials	1162
H Wang, H Ning, Y Lin, W Wang, S Dhelim, etc (2023)	IEEE Internet of Things Journal	939
A Tlili, R Huang, B Shehata, D Liu, J Zhao, etc. (2022)	Smart Learning Environments	514
D Gursoy, S Malodia, A Dhir (2022)	Journal of Hospitality Marketing & Management	487
S Kraus, DK Kanbach, PM Krysta, MM Steinhoff, N Tomini (2022)	International Journal of Entrepreneurial Behavior & Research	467
KG Barrera, D Shah (2023)	Journal of Business Research	437
D Buhalis, D Leung, M Lin (2023)	Tourism Management	431
E Dincelli, A Yayla (2022)	The Journal of Strategic Information Systems	391
TR Gadekallu, T Huynh-The, W Wang, G Yenduri, P Ranaweera, etc. (2022)	Social and Information Networks	372
X Zhang, Y Chen, L Hu, Y Wang (2022)	Frontiers in Psychology	372
Y Zhao, J Jiang, Y Chen, R Liu, Y Yang, X Xue, S Chen (2022)	Visual Informatics	341
A Koohang, JH Nord, KB Ooi, GWH Tan, M Al-Emran, etc (2023)	Journal of Computer Information Systems	312
JD Dioniso, WG Burns III, R Gilbert (2013)	ACM Computing Surveys	271
T Huynh-The, QV Pham, XQ Pham, TT Nguyen, Z Han, DS Kim (2023)	Engineering Applications of Artificial Intelligence	245
T Hennig-Thurau, DN Aliman, AM Herting, GP Cziehso, M Linder, RV Kubler (2023)	Journal of the Academy of Marketing Science	205
GD Ritterbusch, MR Teichmann (2023)	IEEE Acces	177
R Hadi, S Melumad, ES Park (2024)	Journal of Consumer Psychology	176
M Wang, H Yu, Z Bell, X Chu (2022)	IEEE Transactions on Learning Technologies	175
C Koo, J Kwon, N Chung, J Kim (2023)	Current Issues in Tourism	173
E Gadalla, K Keeling, I Abosag (2013)	Journal of Marketing & Management	169
K Yoo, R Welden, K Hewett, M Haenlein (2023)	Journal of Retailing	159

Author's Name	Publisher	Frekuensi Disitasi
SG Lee, S Trimi, WK Byun, M Kang (2011)	Service Business	156
D Mourtzis, N Panopoulos, J Angelopoulos, B Wang, L Wang (2022)	Journal of Manufacturing Systems	129

4.4 Bibliometric Analysis

Bibliometric analysis can help researchers map and determine the relationship between research developments and the Metaverse. The results enable researchers to identify relevant and up-to-date research themes or variables, thereby clarifying the potential impact of the ongoing research.

In co-authorship analysis, there are authors associated with other authors' names. The results of this analysis indicate that the authors collaborated in conducting research related to the Metaverse, as shown in Figure 1. Wang H collaborated with other authors. Two different research teams worked on two articles published by Wang H. Similarly, Wang W and Huynh-the T produced two articles published by different writing teams.

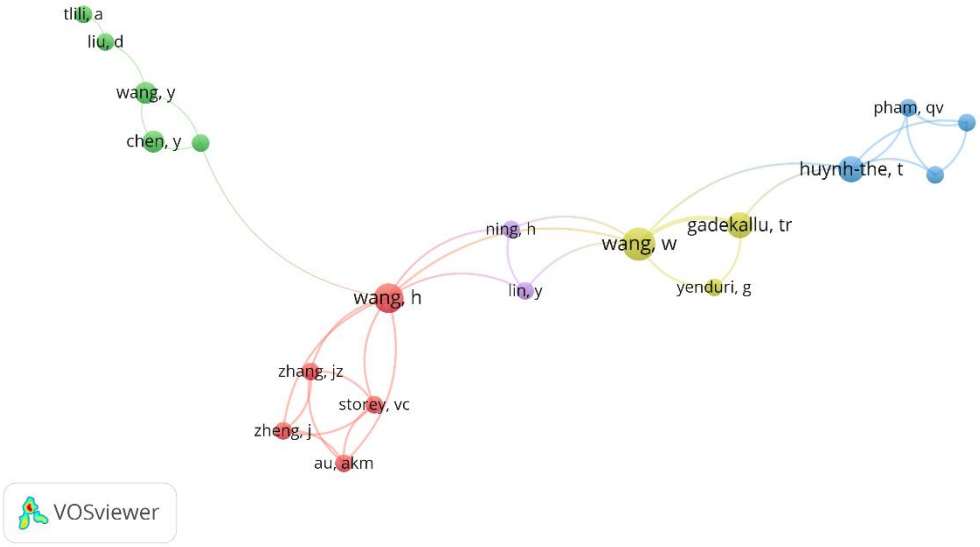

Fig 1. Author Network

The collaboration undertaken by the authors shows a high commitment to continue conducting research related to the Metaverse. Table 7 displays the research titles of the authors involved in the study.

Table 7. Author Collaboration

Author's Name	Title
A Tlili, R Huang, B Shehata, D Liu, J Zhao, etc. (2022)	Is Metaverse in education a blessing or a curse: a combined content and bibliometric analysis
A Othman, K Chemnad, AE Hassanien, A Tlili, CY Zhang, etc. (2024)	Accessible Metaverse: A Theoretical Framework for Accessibility and Inclusion in the Metaverse
Y Wang, Z Su, N Zhang, R Xing, D Liu, TH Luan, X Shen (2022)	A survey on Metaverse: Fundamentals, security, and privacy
L Yang, ST Ni, Y Wang, A Yu, JA Lee, P Hui (2024)	Interoperability of the Metaverse: A Digital Ecosystem Perspective Review
X Zhang, Y Chen, L Hu, Y Wang (2022)	The Metaverse in education: Definition, framework, features, potential applications, challenges, and future research topics
R Muhammad Sohail Jafar, W Ahmad, Y Chen (2024)	Metaverse in Human Behavior: The Role of Telepresence and Flow Experience on Consumers' Shopping Behavior in the Metaverse
Y Zhao, J Jiang, Y Chen, R Liu, Y Yang, X Xue, S Chen (2022)	Metaverse: Perspectives from graphics, interactions and visualization
Y Liang, X Zhang, H Wang, M Liu (2024)	Users' willingness to adopt Metaverse drawing on flow theory: An empirical study using PLS-SEM and FsQCA
H Wang, H Ning, Y Lin, W Wang, S Dhelim, etc. (2023)	A survey on the Metaverse: The state-of-the-art technologies, applications, and challenges
J Zheng, JZ Zhang, AKM Au, VC Storey, H Wang, Y Yang (2024)	Shaping innovation pathways: Metaverse application configurations in high-technology small, medium-sized enterprises
T Huynh-The, QV Pham, XQ Pham, TT Nguyen, Z Han, DS Kim (2023)	Artificial Intelligence for the Metaverse: A survey
TR Gadekallu, T Huynh-The, W Wang, G Yenduri, P Ranaweera, etc. (2022)	Blockchain for the Metaverse: A review

Based on the analysis using VOSviewer, 1503 words related to digital change were found through co-occurrence analysis. To generate more specific keywords in the title and abstract keywords analysis, the occurrence of keywords is limited to 3. From this limitation of nine occurrences, 93 keywords were obtained, divided into 11 clusters, as shown in Table 8.

Table 8. Keywords Clustering

Cluster	Keywords
Cluster 1	Blockchain, case, challenges, co-creation, era, future direction, individual, metaverse perspective, metaverse platform, potential, reality technology, section, spatial analytic, survey, virtual space, visual experience
Cluster 2	Behaviour, brand, customer experience, enterprises, entertainment, exploratory study, extended reality, gaming industry, medium, metaverse market, metaverse world
Cluster 3	Advantage, competitive advantage, great potential, information system, literature, metaverse service, quality, research proposition, scholar, tourism, type
Cluster 4	Area, art, customer, future research direction, hospitality, metaverse research, overview, satisfaction
Cluster 5	Agenda, hype, interact, meta, mix, multidisciplinary perspective, policy, practice, research agenda.
Cluster 6	Avatar, decision, holistic vision, new virtual reality, person, platform, process, term, term metaverse
Cluster 7	Digital asset, e-commerce, level, metaverse retailing, possibility, retail Metaverse, tool
Cluster 8	Change, characteristic, digital business, theoretical framework, time, virtual world challenge, visual representation
Cluster 9	Digital twin, future research agenda, literature review, medium enterprise, metaverse experience, synthesis
Cluster 10	Integrative framework, metaverse application, systematic literature review, topic
Cluster 11	Behavioural intention analysis, medium-sized company, organization, part

The results of the Network Visualization Analysis show that many small nodes represent the keywords generated from the analysis, as shown in Figure 2. This visualization shows that there are still many research gaps that exist today. A lot of metaverse-related research is needed to fill these research gaps. For example, the behavioural node "profit" is not yet connected to the behavioural model node "company". Much research is needed to explain the causality of each node. Explaining the causal relationships generated by this research will generate scientific knowledge to understand, explain, and control the Metaverse.

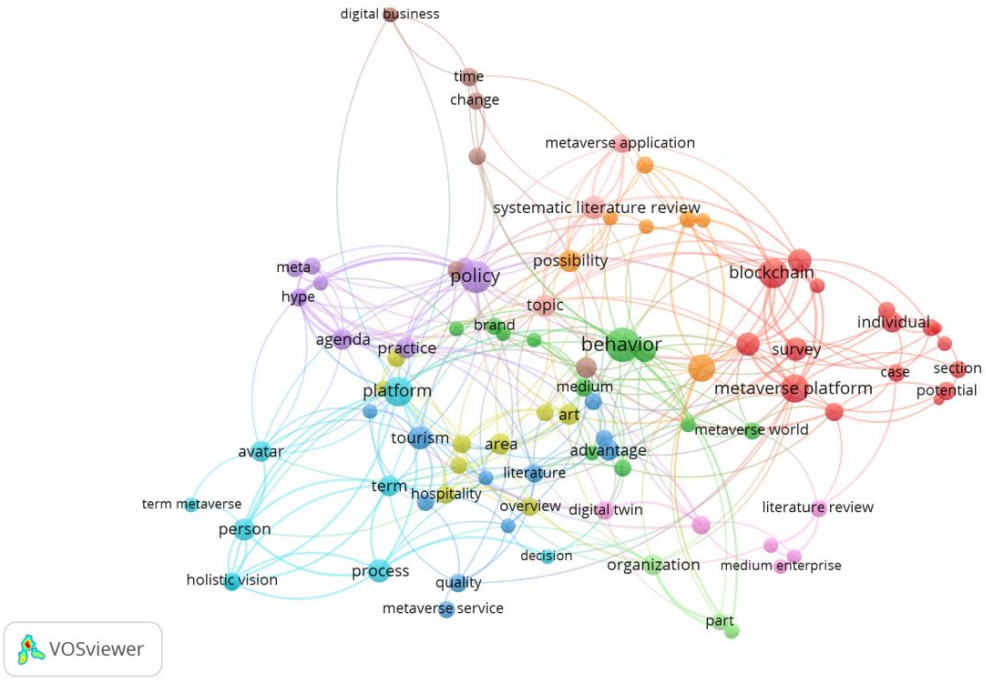

Fig 2. Network Visualization in Entrepreneurship in the Age of the Metaverse

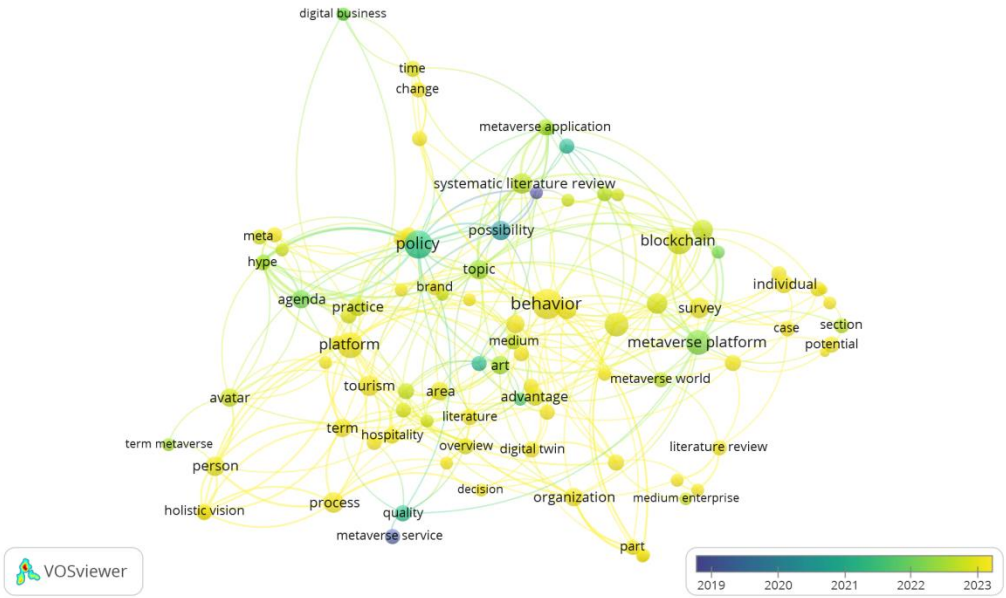

Fig 3. Overlay Visualization in Metaverse

Figure 3 shows that most of the themes have bright yellow nodes. This yellow indicates that most published articles are from 2022 to 2023. Through the results of this analysis, it can be concluded that the theme's connection to the Metaverse is one of the most recent themes. According to Overlay Visualization, the theme related to the Metaverse is the most recent study. According to previous data, research related to the Metaverse has grown significantly since 2021.

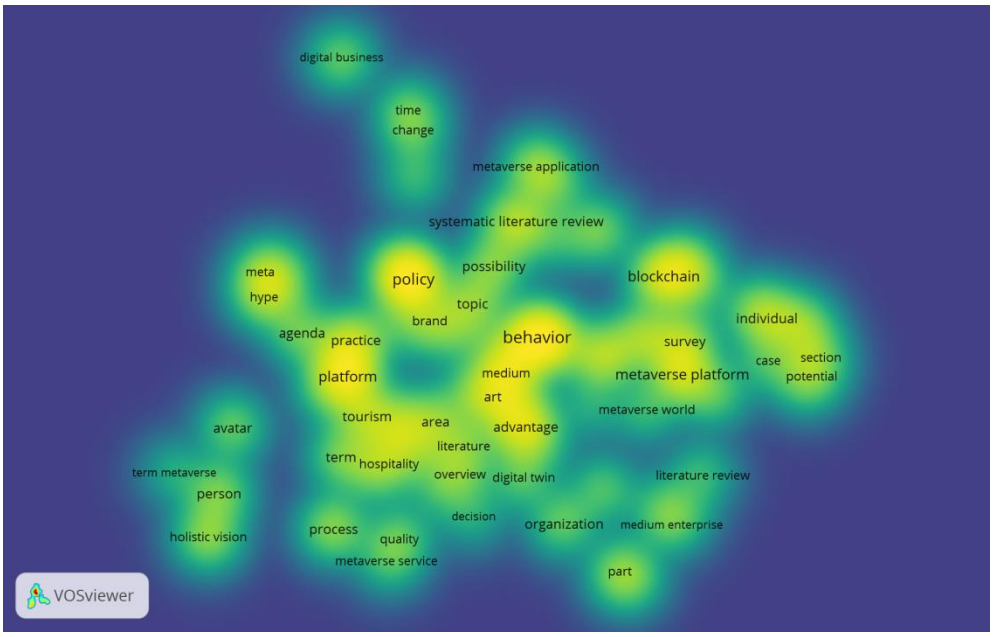

Fig 4. Visualisasi Kepadatan di Metaverse

Figure 4 shows research related to the Metaverse, with most of the focus on behaviour, as seen from the intensity of the yellow colour in the density visualization output. Few publications have examined the gaps in subthemes such as platform, policy, process, and tourism. This gap must be filled through further research to enrich the discourse and expand the scope of research on behaviour in the context of the Metaverse.

5. Conclusion

Bibliometric analysis shows that scientific mapping related to the development of entrepreneurship research in the metaverse era still has many research gaps. This gap is an opportunity for future researchers to conduct further studies related to entrepreneurship in the context of the metaverse era. Several themes are recommended for research on entrepreneurship in the metaverse era.

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