

*Review*

UDC: 658.8:004.738.5:004.946.5:004.78:025.4.036

DOI: <https://doi.org/10.32676/n.11.1.4>**A BIBLIOMETRIC ANALYSIS OF VIRTUAL INFLUENCERS AS A TREND  
IN DIGITAL MARKETING: INSIGHTS FROM WOS****Assoc. Prof. Iva Gregurec, PhD<sup>1</sup>****Larisa Hrustek, mag. oec.<sup>2</sup>****Magdalena Kuštelega, mag. oec.<sup>3</sup>****ABSTRACT**

With the development of digital technology, virtual influencers are becoming an important part of a rapidly growing trend in digital marketing. The purpose of this paper, based on the conducted desk research, is to analyze publications related to virtual influencers based on data obtained from the WoS platform. This paper employs typical bibliometric analysis to identify research productivity, types of documents and sources, publication languages, geographical distribution of publications, and identifies the most active organizations, authors, keywords, along with a citation analysis. The results show that the concept of virtual influencers began to be researched in 2020, but also that in 2023, a significant increase in the scientific literature was recorded. This research is one of the few attempts to analyse virtual influencers, which is certainly one of the future trends, using bibliometric analysis based on previously published articles, and the first one using the VOSviewer software for visualization of results.

**KEYWORDS:** virtual influencers, artificial intelligence, digital marketing, bibliometric analysis, VOSviewer

**JEL CLASSIFICATION:** M31, M37

**1. Introduction**

The concept of virtual influencers is becoming increasingly important in today's world. Especially when it is considered that by January 2024, more than 5.04 billion users of social networks existed which represented 62.3% of the world's population (DataReportal, 2024) and the numbers are increasing daily. With the increase of social media usage, the number of virtual influencers has also expanded significantly in recent years (Grand View Research, 2024). However, the question arises as to how and why the concept of the virtual influencer has emerged (Um, 2023a). The key to the success of virtual influencers lies in live streaming, but also several limiting factors related to the fact that influencers are human beings who need

<sup>1</sup>University of Zagreb Faculty of Organization and Informatics, e-mail: [iva.gregurec@foi.unizg.hr](mailto:iva.gregurec@foi.unizg.hr).

<sup>2</sup>University of Zagreb Faculty of Organization and Informatics, e-mail: [larisa.hrustek@foi.unizg.hr](mailto:larisa.hrustek@foi.unizg.hr).

<sup>3</sup>University of Zagreb Faculty of Organization and Informatics, e-mail: [magdalena.kustelega@foi.unizg.hr](mailto:magdalena.kustelega@foi.unizg.hr).

© 2025 Iva Gregurec, Larisa Hrustek & Magdalena Kuštelega. This is an open access article licensed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (CC BY-NC-ND 4.0). For more information, see <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

to fulfill basic life needs such as the need to eat, drink, sleep, socialize in the physical environment and other accompanying activities that are not closely related to their work should be pointed out. It is precisely from these limiting factors that the need for companies to create virtual influencers arose, which very quickly became an integral part of the digital marketing mix in the form of branding (Appel et al., 2020).

Social networks have become an integral part of daily lives, satisfying social, information, and entertainment needs. So, platforms like Instagram, TikTok, Twitter, and Facebook allow users to publish their content, stay informed about others, and follow trends, brands, and celebrities - from athletes and actors to singers. According to that, a new category of celebrities has emerged in this digital landscape, and they are called influencers. These individuals are experts who carefully curate their public image through personal branding, which becomes visible through their online presence (Arsenyan and Mirowska, 2021a). In general, influencers are particularly used in the context of social media marketing. They can be hired by marketers and companies to represent and promote brands, but they can also act independently to achieve specific personal goals (Belanche et al., 2024a). However, several researchers confirm that the credibility and authenticity of the content they share are being questioned (Hrustek, 2023). Many companies saw their opportunity in virtual influencers who are not real people, but digitally created influencers who maintain their influential status through consistent imagery and persuasive effectiveness based on the functionality of humans in combination with audio-visual characteristics (Arsenyan and Mirowska, 2021a).

Virtual influencers are computer-generated individuals designed to attract as many followers as possible on different online platforms (Koles et al., 2024a). In other words, they are avatars based on artificial intelligence and designed with the help of computer graphics software. Behind their work is a team of experts and digital agencies who have ensured that the virtual influencers take on a soul, i.e. human traits and develop a lifestyle characteristic of real people. All the above steps are carefully designed to capture the interest of the potential audience and keep them on social networks for as long as possible, so that potential consumers have time to become aware of the importance of the brand offered by the company (Koles et al., 2024a). The first computer-generated social media virtual influencer on Instagram is Miquela Sousa, also known as Lil Miquela, created in 2017 by Brud media agency. Miquela has the characteristics of a “real human” but she is neither a human person nor a robot (Robinson, 2020a). It is important to highlight that the concept of virtual influencers is gaining increasing prominence as a trend in digital marketing, driven both by advancements in digital technology and by their ability to offer followers benefits comparable to those of human influencers. (Lim and Lee, 2023a). But also this concept is still a relatively new and unexplored, but rapidly growing and very important field (Um, 2023a) which should be further explored especially because the virtual version of influencers can threaten the effectiveness of human ones and replace them.

The upcoming chapter introduces the theoretical background for conducting bibliometric analysis on virtual influencers as a prominent trend in digital marketing. The third chapter presents the research methodology, followed by the fourth chapter, which shows the research findings, including descriptive statistics, visual analyses, research implications, and limitations. The paper concludes with a summary of the conducted research.

## 2. Theoretical background of bibliometric analysis of virtual influencers as a trend in digital marketing

In recent times, people's lives have been engulfed by intriguing changes in human behavior, especially among generations Z and Alpha. These tech-savvy generations have seamlessly integrated social networks into their lives from an early age. However, a notable challenge arises from the blurring of boundaries between the virtual and the real world (Choi et al., 2023a). Many individuals within these generations do not recognize the differences between online experiences and offline reality (Chiu & Ho, 2023a). In response to this evolving landscape, companies are adapting their marketing strategies to this generation of consumers. One of the most intriguing trends is the development of virtual influencers. As mentioned in a paper by Robinson, this term refers to computer-generated personalities who wield influence across digital platforms.

Virtual influencers represent computer-created and designed digital entities that look completely like people, which are integrated into human networks and which communicate with their users (Mirowska & Arsenyan, 2023a), (Stein et al., 2022a) to achieve certain higher goals of those who created them (Koles et al., 2024a). These virtual influencers assume various roles and perform distinct tasks when interacting with people, adapting to the context and goals at hand.

With the expansion of digital spaces, the role of virtual influencers is becoming increasingly important. Although virtual influencers are fictional characters, they arouse interest and attention among users due to their attractive appearance, human characteristics and the way they communicate with them on social networks (Na et al., 2023a). The research paths pursued by authors in this field can be categorized into several fundamental groups. Most authors deal with the influence that virtual influencers have on their followers. In this context, the authors examine the feelings, relationships and interactions of consumers (Stein et al., 2022a), (Mirowska & Arsenyan, 2023a), (Jhawar et al., 2023a), (Liu & Lee, 2022a), (Na et al., 2023a). Some authors devote themselves to researching parasocial relationships with virtual influencers by investigating whether consumers develop feelings, empathy or emotional attachment to virtual influencers (Melnychuk et al., 2024a). In their research, certain authors have highlighted ethical challenges and expressed apprehensions regarding virtual influencers. They advocate for a heightened awareness of moral responsibilities throughout this process (Robinson, 2020a), (Conti et al., 2022a), (D. Kim & Wang, 2023a). As the role of virtual influencers is often seen in the context of content marketing (Suprawan & Pojanavatee, 2022a), (Q. Zhou et al., 2024a), some authors investigated the influence of virtual influencers on purchase intent and purchase decisions (H. Kim & Park, 2024a) i.e. consumer behavior based on purchasing decision-making process. Furthermore, research papers show that the recommendations of virtual influencers are positively related to purchase intent (El Hedhli et al., 2023a). Research also indicates that virtual influencers can engage consumers as effectively as human influencers, however, their artificial nature raises concerns about credibility, potentially undermining the effectiveness of marketing efforts (Lim & Lee, 2023a), (Chiu & Ho, 2023a).

The penetration of virtual influencers into human networks is particularly significant on social media platforms (Stein et al., 2022a) where they often act as an alternative person in brand advertising (Liu & Lee, 2022a) and virtual ambassadors in projects and promotional activities

(Zelenskaya & Rundle-Thiele, 2022a), (Xie-Carson, Benckendorff, et al., 2023a). Virtual influencers are often used for promotion in tourism (Xie-Carson, Magor, et al., 2023a), (Zelenskaya & Rundle-Thiele, 2022a), but also in some other domains. For example, Donald Trump as one of the candidates for the president of the United States of America in 2024, used influencers and images created by artificial intelligence in his campaign (Sainato, 2024).

Despite the emergence of virtual influencers in digital marketing, several unanswered questions persist. First, researchers are still exploring how audiences in digital environment interact with these artificial digital personalities. Additionally, some experts caution against potential risks associated with using virtual influencers in marketing communication connected to ethical issues. So, it should be emphasized that the need for further investigation of this concept certainly exists.

### 3. Methodology

The main goal of this paper is to give a detailed review of the literature published until April 18th, 2024, which dealt with the research of virtual influencers as a current trend in digital marketing. To fulfill the research goal, desk research was conducted.

This paper presents a bibliometric analysis based on the collected data, applying a quantitative and systematic method for identifying, evaluating, and monitoring published papers (Sindhu & Bharti, 2020), which consists of statistical and mathematical methods applied to sets of bibliometric references in scientific literature on a certain topic (Lacković Vincek et al., 2023). Standard bibliometric analysis, combined with descriptive statistics, serves to identify authors, their connections, keywords, citations, journals, organizations, countries, and other criteria, with the aim of uncovering their relationships in a scientific context (Lacković Vincek et al., 2023).

As is already known, data for bibliometrics can be obtained using various databases, including Scopus database and Web of Science (WoS) platform. According to the previous research, bibliometric analyses have been conducted on topics related to this research, such as general concepts of influencers in connection with social networks or digital marketing, but not in the context of virtual influencers. However, as far as the specific bibliometric analysis of virtual influencers is concerned, only two papers were published in the aforementioned relevant databases. One paper, visible in the Scopus database, was published by the author Barbosa in 2024 (Barbosa, 2024). Another, visible in the Web of Science core collection database, was published by the authors Vila-López, Kuster-Boluda, Mora-Pérez and Pascual-Riquelme (Vila-Lopez et al., 2023a). However, in their case, the same search query was not used to search the Web of Science core collection database, and also used visualization tool was not the same. Unrelated to the title of the paper itself, the aforementioned paper focuses on the research of the influencer concept, although in some places the concept of virtual influencers is referred to as well. Therefore, based on insight into the current state, the authors decided to create a bibliometric analysis that includes only the Web of Science core collection database. Considering that this kind of paper in the mentioned database does not exist so far, the contribution of this paper is evident.

So, for the purposes of writing this paper, the WoS database was considered suitable for several reasons. First, the goal was to reduce the possibility of repeating the analysis of the

same studies because the same paper can be in several databases, especially in the Scopus and WoS databases, and this can go unnoticed (Mavric et al., 2021). In addition, WoS database was chosen because it is considered the most selective database (Singh et al., 2021) with the highest impact factors and citation analysis, and is one of the world's leading relevant databases (Pavlič, 2024).

As mentioned earlier, the literature on virtual influencers published until April 18, 2024, was scanned in the Web of Science core collection database. The search term applied to identify the closest matching publication included the search query “virtual influencer” OR “AI influencer” OR “artificial influencer” AND “digital marketing”. The search covered all variations of the relevant terms across all fields. For each document that met the criteria, information such as publication year, language, journal, title, author, affiliation, keywords, document type, and citation count was collected and exported in plain text format. The VOSviewer software (version 1.6.10) was then used to analyze co-authorship, co-occurrence, citations, bibliographic coupling, co-citations, and research topics.

To summarize, a bibliometric analysis was used to show the evolution of virtual influencers as a trend in digital marketing. The research process consisted of the following stages:

1. Research design – As authors through the years were researching the concept of social networks and digital marketing in general, a new trend in scientific papers since 2020 appeared. That term was a virtual influencer and it seemed that it needed more research. So, a bibliometric analysis is the first step for the authors to go deeper into this new research field.
2. Formulating the search strategy and choosing the most convenient database - After combining various keywords and phrases related to the main idea of the paper, the primary keywords for the literature search were identified („virtual influencer“, „AI influencer“, „artificial influencer“, as synonyms, and “digital marketing” as a research area). For this search, two databases recognized as highly relevant in the fields of social sciences and information studies were chosen, Scopus and Web of Science (WoS). In the Scopus database, based on the search query, 9 papers were found, which the authors considered insufficient for bibliometric analysis, and in the WoS platform, 54 papers were found, so further steps included only papers published in the WoS platform.
3. Reviewing initial results – In this phase, all 54 papers were reviewed to filter the data according to specific criteria: the papers had to investigate the concept of virtual influencers and be related to digital marketing. Additionally, related areas such as social media, communication, and consumer behavior were also considered in connection with digital marketing. After examining the titles, abstracts, and main texts of each paper, it was confirmed that all the papers satisfied the defined criteria. Table 1 (which is visible in Supplementary Material) summarizes the searched literature.
4. Data analysis – In this phase, bibliometric mapping in the VOSviewer software was used to perform a descriptive analysis of filtered documents in order to analyze the co-occurrence of keywords, authors, co-citations and analysis of bibliographic matching.
5. Visualization of the results - Using the VOSviewer software, a visualization of the obtained results was created, i.e. a network of papers co-occurrences, co-citations, and bibliographic matching.

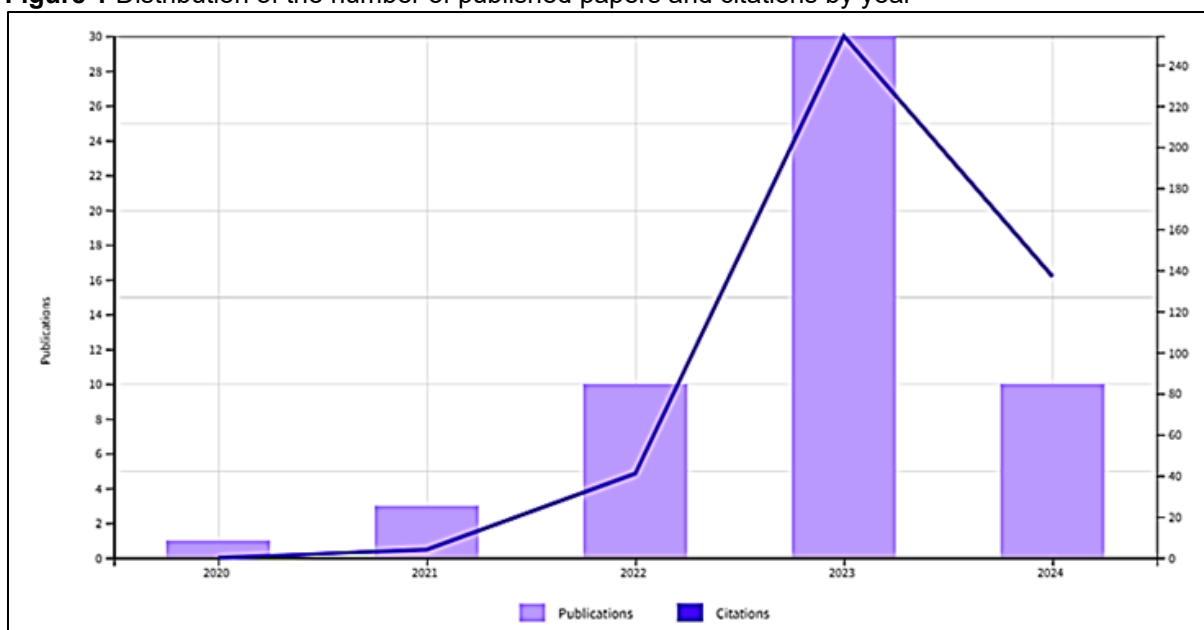
## 4. Research Results

### 4.1. Descriptive statistics results

The main goal of this paper is to give a detailed review of the literature that covers the research topic of virtual influencers as a trend in digital marketing based on data obtained from the Web of Science core collection database. Desk research was conducted in order to achieve the set goal of this paper. According to the research results, a total of 54 publications (Table 1) have been published until April 18th, 2024 and are visible in the Web of Science core collection database. All papers are published in English, written by 127 authors from 23 different countries and 99 affiliations.

Based on the defined search query and the review of 54 filtered papers focused on virtual influencers as a trend in digital marketing, it was found that the first scientific paper on this topic was published in 2020. This paper, titled „Towards an Ontology and Ethics of Virtual Influencers “was authored by Ben Robinson and published in the Australasian Journal of Information Systems. From then until April 18th, 2024, 41 works on this topic have been cited, and the total number of citations of all papers is 436 (without self-citations 249) with an average of 8,07 per item and H-index 12. The highest number of analyzed papers was published in 2023, 30 of them. Also, the highest level of citations was achieved in the same year (2023), when the number of citations reached 254. The most cited paper was authored by Arsenyan, J. and Mirowska, A. The paper, titled „Almost human? A comparative case study on the social media presence of virtual influencers “was published in 2021 in the International Journal of Human-Computer Studies. It has received 81 citations, averaging 20.25 citations per year. Figure 1 graphically presents the distribution of all published papers, the number of citations per year, and the total number of citations since 2020.

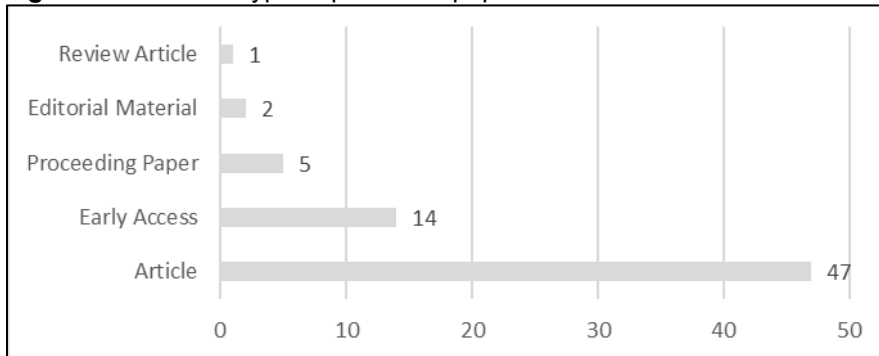
**Figure 1** Distribution of the number of published papers and citations by year



**Source:** Authors' analysis using Clarivate Web of Science data (accessed April 18th, 2024).

All 54 papers published in the WoS core collection database between 2020 and 2024 were written in English. Among these, there were 47 original research articles, 5 conference proceedings, 1 review article, 2 editorial materials, and 14 early access articles (Figure 2).

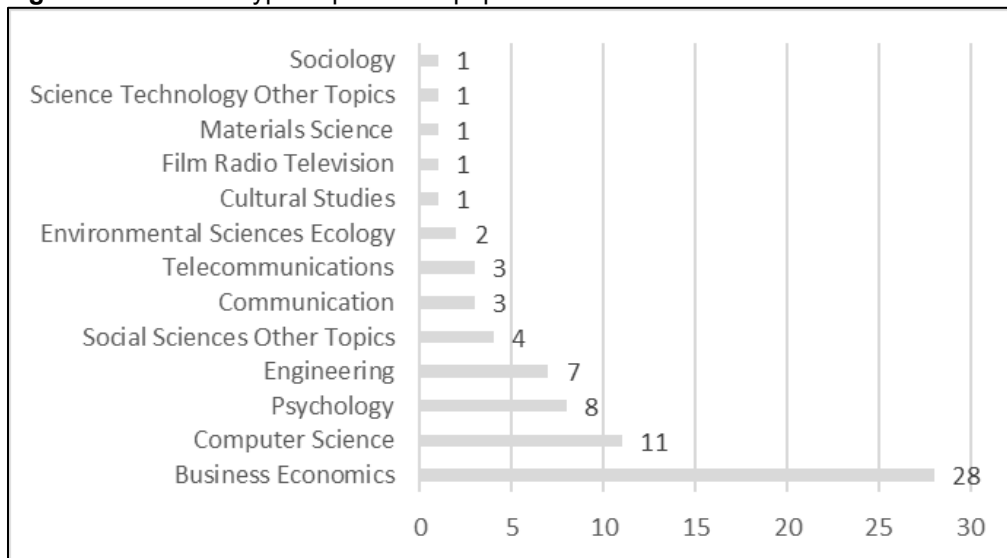
**Figure 2** Document type of published papers



**Source:** Authors' analysis using Clarivate Web of Science data (accessed April 18th, 2024).

39 published papers are indexed in journals with the Social Sciences Citation Index (SSCI), 9 of them in the Emerging Sources Citation Index (ESCI). Also, 9 papers are indexed in the Science Citation Index Expanded (SCI-EXPANDED) category. In the category Conference Proceedings Citation Index – Science (CPCI-S) 3 papers are indexed, 1 in Arts & Humanities Citation Index (A&HCI), while 1 paper is in the Conference Proceedings Citation Index – Social Science & Humanities (CPCI-SSH) category. Based on the area of research, as shown in Figure 3, and bearing in mind the set search query, as well as the fact that the concept of virtual influencers is most closely related to the field of social sciences, the field of economics, as well as the and information and communication field, the results show that scientific papers are mostly related to business economics (28 papers or 39,44%) and computer science (11 papers or 15,49%) research area. Other research areas that include published papers are in psychology, engineering, other topics of social sciences, communication and telecommunications, etc. It should be noted that some papers are included in several research areas.

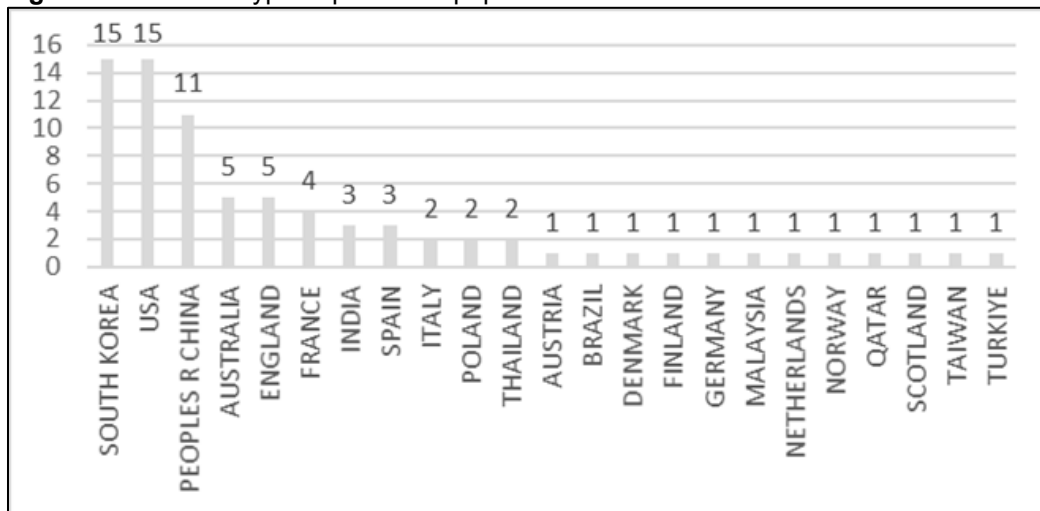
**Figure 3** Document type of published papers



**Source:** Authors' analysis using Clarivate Web of Science data (accessed April 18th, 2024).

Authors from a total of 23 countries researched the topic of this paper. Figure 4 illustrates the distribution of published papers on virtual influencers by countries. The data indicates a global interest in this research area, with contributions from researchers across all continents. Specifically, the USA has published 15 papers, while in Asia, South Korea and the People's Republic of China have published 15 and 11 papers, respectively. European researchers have collectively published 23 papers. This widespread distribution of publications suggests that the phenomenon of virtual influencers is of significant interest worldwide and because of its importance probably will cover more countries in the future. As already mentioned, the most active countries, with 15 publications each, are South Korea and USA. They are followed by the PRC (11 publications), Australia and England (5 publications), France (5 publications), India and Spain (3 publications), Italy, Poland and Thailand (2 publications), and other countries with one publication on the topic of virtual influencers. The most active academic affiliations are Ewha Womans University and Sungkyunkwan University Skku with 3 publications each. Two published papers visible in WoS database have affiliations: Hanyang University, Hong Kong Polytechnic University, Huazhong University of Science Technology, Louisiana State University Shreveport, Louisiana State University System, Neoma Business School, Oklahoma State University Stillwater, Oklahoma State University System, State University System of Florida, Universite de Rennes, University of Florida, University of Queensland and University of Southern California. Other 84 affiliations participated with one published paper each. 11 authors published 2 papers and 116 authors published at least one paper. According to these results, it is evident that this field is still insufficiently researched, but this is likely to change in the future. Therefore, this paper can serve as a backbone for future research on term virtual influencers.

**Figure 4** Document type of published papers



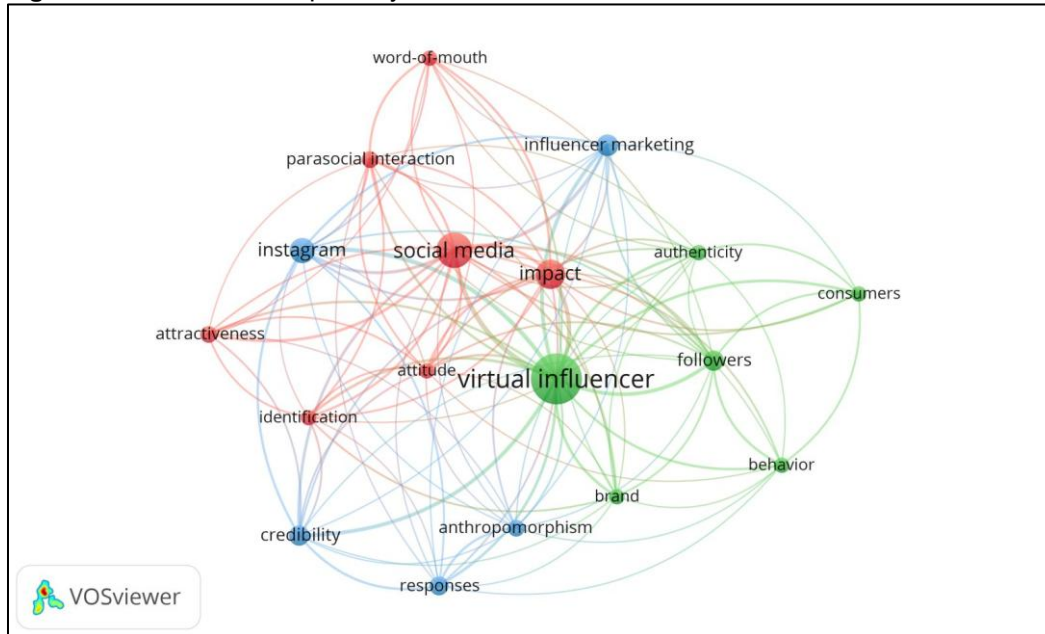
**Source:** Authors' analysis using Clarivate Web of Science data (accessed April 18th, 2024).

#### 4.2. Visualization of bibliometric analysis

This section presents a bibliometric analysis, including keyword co-occurrence, bibliographic coupling to examine connections between published papers and their authors, and citation metrics.

A total of 18 keywords, in the papers included in the bibliometric analysis on the topic of virtual influencers as a trend in digital marketing, which occurred more than five times in the WoS core collection database, are distributed in 3 clusters of different colors with 113 links and total link strength of 262 (see Figure 5).

The first cluster, colored in red, includes 7 keywords (attitudes, attractiveness, identification, impact, parasocial interaction, social media, and word-of-mouth). The second cluster, which is colored green, includes 6 keywords (authenticity, behavior, brand, consumers, followers, and virtual influencers). While the third cluster, colored in blue, includes 5 keywords (anthropomorphism, credibility, influencer marketing, Instagram, and responses). The most frequent keyword, also the core keyword related to search queries, was “virtual influencers” with 34 occurrences, 17 links and a total link strength of 87. This keyword is followed by the “social media” as a keyword with an occurrence level of 19, 17 links between other keywords and a total link strength of 59. “Impact” as the third most frequently used keyword (14 occurrences) has 17 links and a total link strength of 45. “Instagram” is the fourth keyword with 11 occurrences, 13 links and a link strength of 35. This keyword is followed by “influencer marketing” with 9 occurrences, 13 links and a link strength of 28. Other keywords have a lower level of occurrence, links with other keywords and link strength. From the category Business Economics, in the 28 published papers, the keywords Virtual influencer (cluster 2), Influencer marketing (cluster 3) and Social media (cluster 1) stand out the most, which are represented in all three clusters. In addition to the aforementioned three keywords Instagram (cluster 3) and Impact (cluster 1) are two keywords that appear in categories Computer Science, Psychology and Engineering (Figure 5).

**Figure 5** Visualization map of keywords co-occurrence

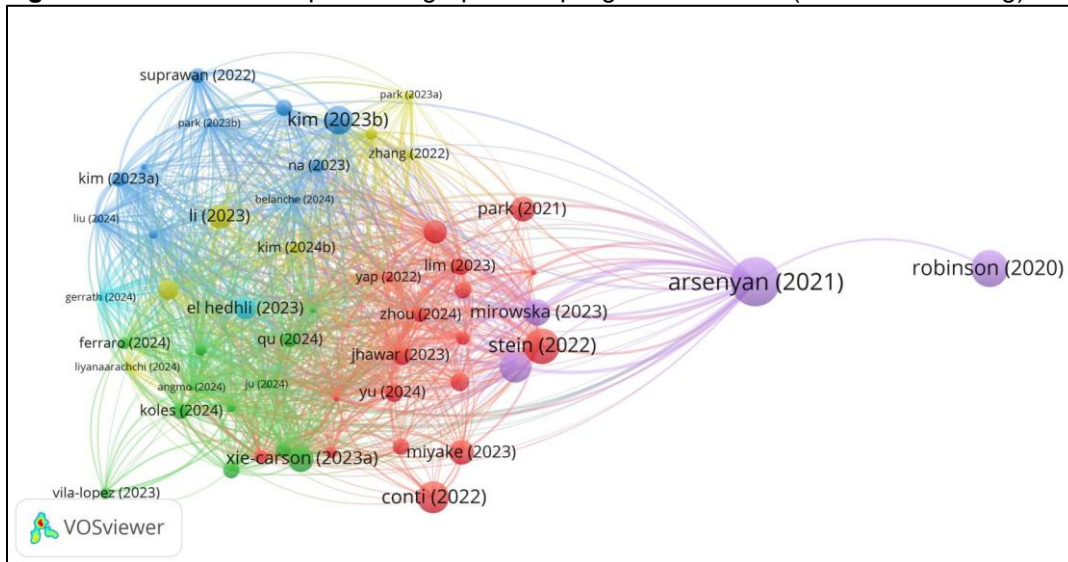
**Source:** Authors' work.

The most prominent thematic area is Business Economics, where the researchers emphasized the exploration of virtual influencers in the context of their influence on the behavior of consumers of different age groups (e.g. generation Z, X, etc.). Also, the opportunities and threats in the process interaction with virtual influencers are researched, as well as the effectiveness of virtual influencers and their engagement and emotion aspects connected with the presence of virtual influencers. The next prominent thematic area of virtual influencers is Communication, focusing on topics such as the creation of marketing content in the interactivity of virtual influencers, their engagement in social networks and in the virtual environment in general, alongside ethical issues related to their appearance. Furthermore, the thematic area of Management follows, where researchers explore the possibilities and roles of virtual influencers in business development, as well as other previously mentioned topics. In the thematic domain of Computer Science Cybernetics, researchers focus on topics such as the expertise, authenticity, and empathy of virtual influencers. The other thematic areas are covered to a lesser extent.

Figure 6 shows that the available papers are grouped into six distinct clusters. This figure identifies the prominent authors who have established the foundational research on virtual influencers and also highlights six clusters that may represent groups of authors addressing similar research challenges in the field of virtual influencers. The first cluster, shown in red, contains 18 papers. The second cluster, colored green, includes 12 papers. The third cluster, marked in blue, consists of 10 papers. The fourth cluster, shown in yellow, contains 7 papers, while the fifth cluster, colored purple, includes 4 papers. While the smallest cluster, the sixth one, has only two papers and is marked in light blue. This visualization shows that the paper "Almost human? A comparative case study on the social media presence of virtual influencers" written by Arsenyan, Jbid and Mirowska, Agata and published in 2021 represents a research base for all other papers published in the field of research on virtual influencers as a trend in

digital marketing. It should also be emphasized, as shown in this visualization and previously mentioned in the paper, that Ben Robinson’s paper (Robinson, 2020a), the first published paper in this research area, laid the foundation for all subsequent studies.

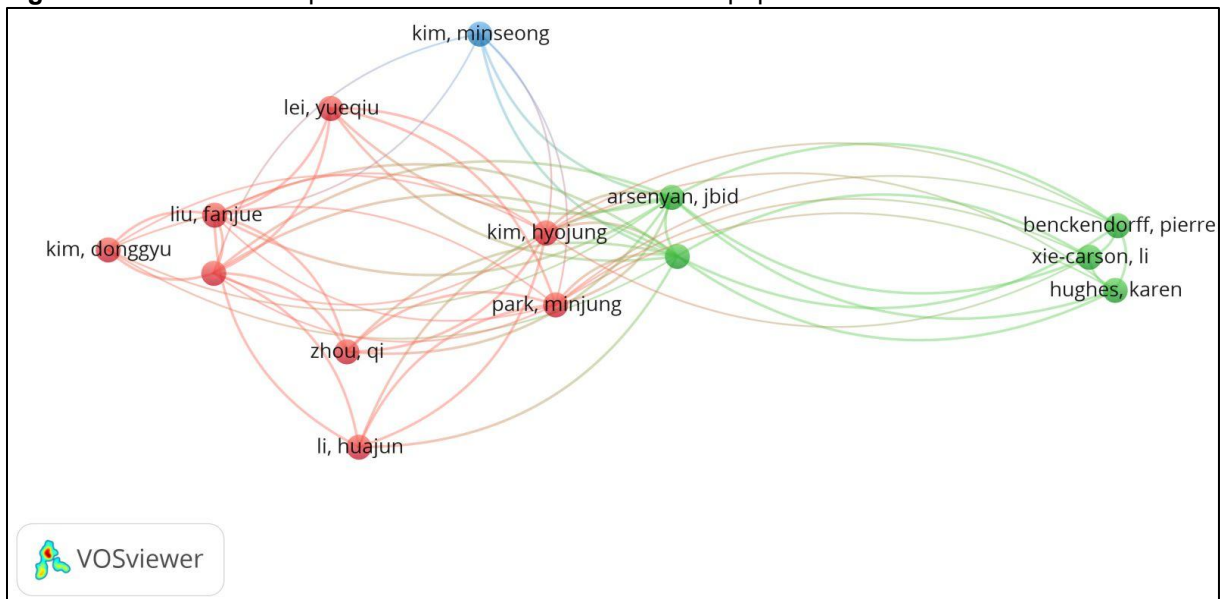
**Figure 6** Visualization map of bibliographic coupling of documents (fractional counting)



Source: Authors’ work.

The author co-citation method in bibliometric analysis helps identify the most influential authors in a given field. As shown in Figure 7, this analysis, based on authors cited in at least two papers, groups the authors into three clusters.

**Figure 7** Visualization map of authors with a minimum of two papers citation



Source: Authors’ work.

The first cluster, which is colored red, includes 8 authors with an average connection of 8.5. The second cluster, colored in green, includes 5 authors, and their average connection is 8.8. And third cluster, colored blue, includes 1 author with a visible connection to 6 other authors. From this visualization it is evident once again that authors Arsenyan, Jbid and Mirowska, Agata are the authors with the most links (13). They are followed by authors from the first cluster Kim, Hyojung and Park, Minjung with a link of 12 other authors they cited. Based on this, it can be concluded that these are the authors who paid the most attention to researching the papers of other relevant authors with more than two works in the field.

## 5. Research implication and limitations

The concept of virtual influencers as a recognized trend with the development of technology includes the integration of the traditional concept of influencer marketing and social networks as one of the elements of the promotional mix of digital marketing. This is also evident from the analysis of the most frequently used keywords in published papers. Based on the examination, the keyword analysis and the main research areas related to virtual influencers, it is evident that there is an impact between the mentioned topics. Since this field combines business and economics with information and communication sciences, as well as psychology, it is evident that virtual influencers represent an interdisciplinary trend that is becoming increasingly important. Although the number of papers is still small, and only a limited number of authors, institutions, and countries are involved in this research area, it is expected that this will change in the future. Until then, the scientific contribution of this paper remains significant.

However, this research has certain limitations. The main limitation is that the bibliometric analysis relies solely on the Web of Science core collection database. Although Web of Science is comprehensive, future studies should include additional scientific databases to provide a more complete analysis and enable comparison of results across different sources. The limitation of the research can also be found in the set search query, because in this way the authors limited themselves.

## 6. Conclusion

Digital technologies, including artificial intelligence, are transforming marketing practices. The boundary between real and digital life is blurred, and people now utilize every available moment to engage in the digital world. As a result, marketing agencies and brand companies are adopting agile approaches to create new content for the social digital environment. In recent years, social networks have become a significant digital space, dominated by influencers. These individuals intertwine everyday life, activities, and brand-related content to shape the awareness and habits of their audience. Innovative directions resulted in new trends in digital marketing and one of example is computer-generated virtual influencers who interact with their users, sharing experiences as human influencers. Interestingly, scientific society began recognizing virtual influencers around 2020 and the first one was created three years before, in 2017. Notably, two authors stand out and they are Robinson, who was the first to delve into this phenomenon, and Arsenyan, the most frequently cited author in this field. It's worth noting that this intriguing topic has captured the attention of several other scientists. The results of the bibliometric analysis point to the fact that virtual influencers are an under-researched term in digital marketing. However, this will certainly change in the future, as it is believed that the use of virtual influencers will increase in other areas of information and

communication sciences as well. The visualization findings indicate that the concept of virtual influencers is closely linked to social media and influencer marketing. Additionally, based on the keywords, it becomes evident that this topic revolves around the impact that virtual influencers exert on their followers or consumers, influencing their behavior. Moreover, researchers are presently re-evaluating the dynamics between virtual influencers and users, highlighting the dubious authenticity, deficient empathy, and questionable credibility of virtual influencers. These issues are expected to become more pronounced, considering the emerging trend of deinfluencing. According to the findings from this paper, future research directions will be focused on expanding this research with additional literature from other relevant sources. In future research, the overview of the field will be expanded through the identification of key research areas and suitable techniques/methods in the implementation of research. Some of the “hot topics” that are in this paper recognized as important in the field of virtual influencers and will occupy future attention can be divided into three key directions: (1) the psychological effects of interacting with virtual influencers, (2) the authenticity and credibility of virtual influencers, (3) technological aspects, regulation and ethical issues for virtual influencers. These main three directions can serve as a foundation for future research, while always considering the ongoing advancements in the technology itself.

## 7. Supplementary Material

**Table 1** Papers published in the Web of Science core collection database on the topic of virtual influencers as a trend in digital marketing - according to the citations of the paper

RANK	PAPER	AUTHOR(S)	JOURNAL / CONFERENCE	YEAR	WoS citations
1	Almost human? A comparative case study on the social media presence of virtual influencers	(Arsenyan and Mirowska, 2021b)	International Journal of Human-Computer Studies	2021	81
2	Towards an Ontology and Ethics of Virtual Influencers	(Robinson, 2020b)	Australasian Journal of Information Systems	2020	39
3	Parasocial interactions with real and virtual influencers: The role of perceived similarity and human-likeness	(Stein et al., 2022b)	New Media & Society	2022	36
4	Virtual Influencers in Online Social Media	(Conti et al., 2022b)	Communications Magazine	2022	27
5	Effects of human versus virtual human influencers on the appearance anxiety of social media users	(Deng & Jiang, 2023)	Journal of Retailing And Consumer Services	2023	26
6	Virtual influencers? Attractiveness effect on purchase intention: A moderated mediation model of the Product-Endorser fit with the brand	(H. Kim & Park, 2023)	Computers in Human Behavior	2023	21
7	Sweet escape: The role of empathy in social media engagement with human versus virtual influencers	(Mirowska and Arsenyan, 2023b)	International Journal of Human-Computer Studies	2023	17
8	All hype or the real deal? Investigating user engagement with virtual influencers in tourism	(Xie-Carson et al., 2023b)	Tourism Management	2023	16
9	I am a virtual girl from Tokyo: Virtual influencers, digital-orientalism and the (Im)materiality of race and gender	(Miyake, 2023)	Journal of Consumer Culture	2023	15

10	Computers as Social Actors? Examining How Users Perceive and Interact with Virtual Influencers on Social Media	(Park et al., 2021)	15th International Conference on Ubiquitous Information Management and Communication (IMCOM)	2021	15
11	Can you sense without being human? Comparing virtual and human influencers endorsement effectiveness	(Li et al., 2023)	Journal of Retailing and Consumer Services	2023	14
12	The next hype in social media advertising: Examining virtual influencers' brand endorsement effectiveness	(Kim et al., 2023)	Frontiers in Psychology	2023	13
13	Stereotyping human-like virtual influencers in retailing: Does warmth prevail over competence?	(El Hedhli et al., 2023b)	Journal of Retailing and Consumer Services	2023	11
14	Virtual influencer marketing: the good, the bad and the unreal	(Mouritzen et al., 2024)	European Journal of Marketing	2024	8
15	Artificial intelligence-generated virtual influencer: Examining the effects of emotional display on user engagement	(Yu et al., 2024)	Journal of Retailing and Consumer Services	2024	7
16	The emergence of virtual influencers: a shift in the influencer marketing paradigm	(Jhawar et al., 2023b)	Young Consumers	2023	7
17	Unveiling Behind-the-Scenes Human Interventions and Examining Source Orientation in Virtual Influencer Endorsements	(Liu and Lee, 2022b)	ACM International Conference on Interactive Media Experiences (IMX)	2022	7
18	"You are a virtual influencer!": Understanding the impact of origin disclosure and emotional narratives on parasocial relationships and virtual influencer credibility	(Lim and Lee, 2023b)	Computers in Human Behavior	2023	6
19	The authentic virtual influencer: Authenticity manifestations in the metaverse	(Koles et al., 2024b)	Journal of Business Research	2024	5

20	The ethics of virtuality: navigating the complexities of human-like virtual influencers in the social media marketing realm	(D. Kim and Wang, 2023b)	Frontiers in Communication	2023	5
21	Impact of Celebrity, Micro-Celebrity, and Virtual Influencers on Chinese Gen Z's Purchase Intention Through Social Media	(Chiu and Ho, 2023b)	Sage Open	2023	5
22	Wildlife Watcher Kylie: co-designing a virtual ambassador for the Koala Watch programme	(Zelenskaya and Rundle-Thiele, 2022b)	Studies in Australasian Cinema	2022	5
23	"Digital Influencer": Development and Coexistence with Digital Social Groups	(Sookkaew and Saephoo, 2021)	International Journal of Advanced Computer Science and Applications	2021	5
24	Mere copycat? The effects of human versus human-like virtual influencers on brand endorsement effectiveness: A moderated serial-mediation model	(Q. Zhou et al., 2024b)	Journal of Retailing and Consumer Services	2024	4
25	Let virtual creatures stay virtual: tactics to increase trust in virtual influencers	(Qu and Baek, 2024)	Journal of Research in Interactive Marketing	2024	4
26	Are Virtual Influencers Friends or Foes? Uncovering the Perceived Creepiness and Authenticity of Virtual Influencers in Social Media Marketing in the United States	(M. Kim and Baek, 2023)	International Journal of Human-Computer Interaction	2023	4
27	Keep it #Unreal: Exploring Instagram Users' Engagement With Virtual Influencers in Tourism Contexts User engagement with virtual influencers	(Xie-Carson, Benckendorff, et al., 2023b)	Journal of Hospitality and Tourism Research	2023	4
28	What Causes Social Media Users to Engage and Mimic Virtual Influencers? The Role of Self-Congruity	(Suprawan and Pojanavatee, 2022b)	Innovative Marketing	2022	4
29	Making Sense? The Sensory-Specific Nature of Virtual Influencer Effectiveness	(X. Zhou et al., 2023)	Journal of Marketing	2023	3

30	Investigating the Effect of Self-Congruity on Attitudes toward Virtual Influencers: Mediating the Effect of Emotional Attachment	(Na et al., 2023b)	International Journal of Human-Computer Interaction	2023	3
31	Predictors Affecting Effects of Virtual Influencer Advertising among College Students	(Um, 2023b)	Sustainability	2023	3
32	Diversity in the digital age: how consumers respond to diverse virtual influencers	(Ferraro et al., 2024)	International Journal of Advertising	2024	2
33	A bibliometric analysis of virtual influencers in the Web of Science	(Vila-Lopez et al., 2023b)	Journal of Marketing Analytics	2023	2
34	Are they humans or are they robots? The effect of virtual influencer disclosure on brand trust	(Muniz et al., 2023)	Journal of Consumer Behaviour	2023	2
35	When digital celebrity talks to you: How human-like virtual influencers satisfy consumer's experience through social presence on social media endorsements	(H. Kim and Park, 2024b)	Journal of Retailing and Consumer Services	2024	2
36	Gen Z Travelers in the Instagram Marketplace: Trust, Influencer Type, Post Type, and Purchase Intention	(Choi et al., 2023b)	Journal of Hospitality and Tourism Research	2023	2
37	Virtual influencers as an emerging marketing theory: A systematic literature review	(Laszkiewicz and Kalinska-Kula, 2023)	International Journal of Consumer Studies	2023	2
38	Green power of virtual influencer: The role of virtual influencer image, emotional appeal, and product involvement	(Jiang et al., 2024)	Journal of Retailing and Consumer Services	2024	1
39	A Study on the Regulatory Fit Effects of Influencer Types and Message Types	(Yi and Lee, 2023)	International Journal of Human-Computer Interaction	2023	1

40	Factors of virtual influencer marketing influencing Generation Y consumers' purchase intention in Malaysia	(Yap and Ismail, 2022)	International Journal of Internet Marketing and Advertising	2022	1
41	Virtual Influencers: The Effects of Controlling Entity, Appearance Realism and Product Type on Advertising Effect	(Zhang and Ren, 2022)	3rd International Conference on Design, Operation and Evaluation of Mobile Communications (MOBILE)	2022	1
42	Fake human but real influencer: the interplay of authenticity and humanlikeness in Virtual Influencer communication?	(Ju et al., 2024)	Fashion and Textiles	2024	0
43	Virtual influencers and data privacy: Introducing the multi-privacy paradox	(Liyanaarachchi et al., 2024)	Journal of Business Research	2024	0
44	Virtual humans as social actors: Investigating user perceptions of virtual humans' emotional expression on social media	(Ham et al., 2024)	Computers in Human Behavior	2024	0
45	Virtually authentic: examining the match-up hypothesis between human vs virtual influencers and product types	(Liu and Lee, 2024)	Journal of Product and Brand Management	2024	0
46	Virtual influencers and pro-environmental causes: The roles of message warmth and trust in experts	(Gerrath et al., 2024)	Journal of Business Research	2024	0
47	Virtual influencer marketing: a study of millennials and gen Z consumer behaviour	(Angmo and Mahajan, 2024)	Qualitative Market Research	2024	0
48	How to engage and attract virtual influencers' followers: a new non-human approach in the age of influencer marketing	(Melnychuk et al., 2024b)	Marketing Intelligence and Planning	2024	0
49	Human versus virtual influences, a comparative study	(Belanche et al., 2024b)	Journal of Business Research	2024	0

50	Unlocking Trust Dynamics: An Exploration of Playfulness, Expertise, and Consumer Behavior in Virtual Influencer Marketing	(J. Kim et al., 2024)	International Journal Of Human-Computer Interaction	2024	0
51	Revisiting the elaboration likelihood model in the context of a virtual influencer: A comparison between high- and low-involvement products	(S. (Steven) Park et al., 2023)	Journal of Consumer Behaviour	2023	0
52	The Interplay Between Human Likeness and Agency on Virtual Influencer Credibility	(S. Park and Sung, 2023)	Cyberpsychology Behavior and Social Networking	2023	0
53	Why You Should Give Your Virtual Influencer a Friend	(Rizzo et al., 2023)	Harvard Business Review	2023	0
54	Real or Not, Doesn't Matter, As Long As You Are Hot: Exploring the Perceived Credibility of an Instagram Virtual Influencer	(Awdziej et al., 2022)	Regional Conference of the European-Marketing-Academy	2022	0

**Source:** Authors' work based on Clarivate Web of Science, Copyright Clarivate 2023., April 18th, 2024.

## Literature

- Angmo, P., & Mahajan, R. (2024). Virtual influencer marketing: A study of millennials and gen Z consumer behaviour. *Qualitative Market Research*, 27(2), 280-300. <https://doi.org/10.1108/QMR-01-2023-0009>
- Appel, G., Grewal, L., Hadi, R., & Stephen, A. T. (2020). The future of social media in marketing. *Journal of the Academy of Marketing Science*, 48(1), 79–95. <https://doi.org/10.1007/s11747-019-00695-1>
- Arsenyan, J., & Mirowska, A. (2021). Almost human? A comparative case study on the social media presence of virtual influencers. *International Journal of Human-Computer Studies*, 155. <https://doi.org/10.1016/j.ijhcs.2021.102694>
- Awdziej, M., Plata-Alf, D., & Tkaczyk, J. (2022). Real or Not, Doesn't Matter, As Long As You Are Hot: Exploring the Perceived Credibility of an Instagram Virtual Influencer. In M. Awdziej & J. Tkaczyk (Eds.), *Extending Boundaries: The Impact of the Digital World on Consumers and Marketing* (pp. 33-46). Kozminski Univ.
- Barbosa, B. (2024). Virtual Influencers: A Bibliometric Analysis. In: *Using Influencer Marketing as a Digital Business Strategy* (pp. 163-188). IGI Global. <https://doi.org/10.4018/979-8-3693-0551-5.ch008>
- Belanche, D., Casalo, L., V., & Flavian, M. (2024). Human versus virtual influences, a comparative study. *Journal of Business Research*, 173. <https://doi.org/10.1016/j.jbusres.2023.114493>
- Chiu, C. L., & Ho, H.-C. (2023). Impact of Celebrity, Micro-Celebrity, and Virtual Influencers on Chinese Gen Z's Purchase Intention Through Social Media. *Sage Open*, 13(1). <https://doi.org/10.1177/21582440231164034>
- Choi, M., Choi, Y., & Lee, H. (2023). Gen Z Travelers in the Instagram Marketplace: Trust, Influencer Type, Post Type, and Purchase Intention. *Journal of Hospitality & Tourism Research*, 48(6), 1020-1034. <https://doi.org/10.1177/10963480231180938>
- Conti, M., Gathani, J., & Tricomi, P. P. (2022). Virtual Influencers in Online Social Media. *IEEE Communications Magazine*, 8(60), 86–91). <https://doi.org/10.1109/MCOM.001.2100786>
- DataReportal (2024). Global Social Media Statistics. DataReportal – Global Digital Insights. Available at: <https://datareportal.com/social-media-users> (8.7.2025).
- Deng, F., & Jiang, X. (2023). Effects of human versus virtual human influencers on the appearance anxiety of social media users. *Journal of Retailing and Consumer Services*, 71. <https://doi.org/10.1016/j.jretconser.2022.103233>
- El Hedhli, K., Zourrig, H., Al Khateeb, A., & Alnawas, I. (2023). Stereotyping human-like virtual influencers in retailing: Does warmth prevail over competence? *Journal of Retailing and Consumer Services*, 75. <https://doi.org/10.1016/j.jretconser.2023.103459>
- Ferraro, C., Sands, S., Zubcevic-Basic, N., & Campbell, C. (2024). Diversity in the digital age: How consumers respond to diverse virtual influencers. *International Journal of Advertising*, 43(8), 1342–1365. <https://doi.org/10.1080/02650487.2023.2300927>
- Gerrath, M. H. E. E., Olya, H., Shah, Z., & Li, H. (2024). Virtual influencers and pro-environmental causes: The roles of message warmth and trust in experts. *Journal of Business Research*, 175. <https://doi.org/10.1016/j.jbusres.2024.114520>
- Grand View Research (2024). Virtual Influencer Market Size, Share & Growth Report, 2030 (GVR-4-68040-175-0; Issue GVR-4-68040-175-0, pp. 1–150). Available at: <https://www.grandviewresearch.com/industry-analysis/virtual-influencer-market-report> (8.7.2025).

- Ham, J., Li, S., Looi, J., & Eastin, M. S. (2024). Virtual humans as social actors: Investigating user perceptions of virtual humans' emotional expression on social media. *Computers in Human Behavior*, 155. <https://doi.org/10.1016/j.chb.2024.108161>
- Hrustek, L. (2023). Utjecaj marketinškog sadržaja na ponašanje i osjećaje potrošača. 1–16. Available at: <https://www.croris.hr/crosbi/publikacija/prilog-skup/804655> (8.7.2025).
- Jhawar, A., Kumar, P., & Varshney, S. (2023). The emergence of virtual influencers: A shift in the influencer marketing paradigm. *Young Consumers*, 24(4), 468-484. <https://doi.org/10.1108/YC-05-2022-1529>
- Jiang, K., Zheng, J., & Luo, S. (2024). Green power of virtual influencer: The role of virtual influencer image, emotional appeal, and product involvement. *Journal of Retailing and Consumer Services*, 77. <https://doi.org/10.1016/j.jretconser.2023.103660>
- Ju, N., Kim, T., & Im, H. (2024). Fake human but real influencer: The interplay of authenticity and humanlikeness in Virtual Influencer communication? *Fashion and Textiles*, 11(1). <https://doi.org/10.1186/s40691-024-00380-0>
- Kim, D., & Wang, Z. (2023). The ethics of virtuality: Navigating the complexities of human-like virtual influencers in the social media marketing realm. *Frontiers in Communication*, 8. <https://doi.org/10.3389/fcomm.2023.1205610>
- Kim, E. (Anna), Kim, D., Zihang, E., & Shoenberger, H. (2023). The next hype in social media advertising: Examining virtual influencers' brand endorsement effectiveness. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1089051>
- Kim, H., & Park, M. (2023). Virtual influencers? Attractiveness effect on purchase intention: A moderated mediation model of the Product-Endorser fit with the brand. *Computers in Human Behavior*, 143. <https://doi.org/10.1016/j.chb.2023.107703>
- Kim, H., & Park, M. (2024). When digital celebrity talks to you: How human-like virtual influencers satisfy consumer's experience through social presence on social media endorsements. *Journal of Retailing and Consumer Services*, 76. <https://doi.org/10.1016/j.jretconser.2023.103581>
- Kim, J., Kim, M., & Lee, S.-M. (2024). Unlocking Trust Dynamics: An Exploration of Playfulness, Expertise, and Consumer Behavior in Virtual Influencer Marketing. In INTERNATIONAL JOURNAL OF HUMAN-COMPUTER INTERACTION. TAYLOR & FRANCIS INC. <https://doi.org/10.1080/10447318.2023.2300018>
- Kim, M., & Baek, T. H. (2023). Are Virtual Influencers Friends or Foes? Uncovering the Perceived Creepiness and Authenticity of Virtual Influencers in Social Media Marketing in the United States. *International Journal of Human-Computer Interaction*, 40(18): 5042–5055. <https://doi.org/10.1080/10447318.2023.2233125>
- Koles, B., Audrezet, A., Moulard, J. G., Ameen, N., & McKenna, B. (2024). The authentic virtual influencer: Authenticity manifestations in the metaverse. *Journal of Business Research*, 170. <https://doi.org/10.1016/j.jbusres.2023.114325>
- Lacković Vincek, Z., Gregurec, I., & Kovšca, V. (2023). Exploring the trend of the research on Logistics 4.0. *Logforum*, 19(3), 359–409. <https://doi.org/10.17270/J.LOG.2023.859>
- Laszkiewicz, A., & Kalinska-Kula, M. (2023). Virtual influencers as an emerging marketing theory: A systematic literature review. *International Journal of Consumer Studies*, 14(6), 2479–2494. <https://doi.org/10.1111/ijcs.12956>
- Li, H., Lei, Y., Zhou, Q., & Yuan, H. (2023). Can you sense without being human? Comparing virtual and human influencers endorsement effectiveness. *Journal of Retailing and Consumer Services*, 75. <https://doi.org/10.1016/j.jretconser.2023.103456>

- Lim, R. E., & Lee, S. Y. (2023). “You are a virtual influencer!”: Understanding the impact of origin disclosure and emotional narratives on parasocial relationships and virtual influencer credibility. *Computers in Human Behavior*, 148. <https://doi.org/10.1016/j.chb.2023.107897>
- Liu, F., & Lee, Y.-H. (2022). Unveiling Behind-the-Scenes Human Interventions and Examining Source Orientation in Virtual Influencer Endorsements. In Proceedings of The 2022 ACM International Conference on Interactive Media Experiences, IMX 2022 (Pp. 175–192). Assoc Computing Machinery. <https://doi.org/10.1145/3505284.3529962>
- Liu, F., & Lee, Y.-H. (2024). Virtually authentic: Examining the match-up hypothesis between human vs virtual influencers and product types. *Journal of Product and Brand Management*, 33(2), 287-299. <https://doi.org/10.1108/JPBM-03-2023-4418>
- Liyanaarachchi, G., Mifsud, M., & Viglia, G. (2024). Virtual influencers and data privacy: Introducing the multi-privacy paradox. *Journal of Business Research*, 176. <https://doi.org/10.1016/j.jbusres.2024.114584>
- Mavric, B., Ögretmenoğlu, M., & Akova, O. (2021). Bibliometric Analysis of Slow Tourism. *Advances in Hospitality and Tourism Research (AHTR)*, 9(1), Article 1. <https://doi.org/10.30519/ahtr.794656>
- Melnychuk, H.-A., Arasli, H., & Nevzat, R. (2024). How to engage and attract virtual influencers’ followers: A new non-human approach in the age of influencer marketing. *Marketing Intelligence & Planning*, 42(3), 393-417. <https://doi.org/10.1108/MIP-06-2023-0251>
- Mirowska, A., & Arsenyan, J. (2023). Sweet escape: The role of empathy in social media engagement with human versus virtual influencers. *International Journal of Human-Computer Studies*, 174. <https://doi.org/10.1016/j.ijhcs.2023.103008>
- Miyake, E. (2023). I am a virtual girl from Tokyo: Virtual influencers, digital-orientalism and the (Im)materiality of race and gender. *Journal of Consumer Culture*, 23(1), 209-228. <https://doi.org/10.1177/14695405221117195>
- Mouritzen, S. L. T., Penttinen, V., & Pedersen, S. (2024). Virtual influencer marketing: The good, the bad and the unreal. *European Journal of Marketing*, 58(2), 410-440. EMERALD GROUP PUBLISHING LTD. <https://doi.org/10.1108/EJM-12-2022-0915>
- Muniz, F., Stewart, K., & Magalhaes, L. (2023). Are they humans or are they robots? The effect of virtual influencer disclosure on brand trust. *Journal of Consumer Behaviour*. <https://doi.org/10.1002/cb.2271>
- Na, Y., Kim, Y., & Lee, D. (2023). Investigating the Effect of Self-Congruity on Attitudes toward Virtual Influencers: Mediating the Effect of Emotional Attachment. *International Journal of Human-Computer Interaction*, 40(18), 5534–5547. <https://doi.org/10.1080/10447318.2023.2238365>
- Park, G., Nan, D., Park, E., Kim, K. J., Han, J., & del Pobil, A. P. (2021). Computers as Social Actors? Examining How Users Perceive and Interact with Virtual Influencers on Social Media. In S. Lee, H. Choo, & R. Ismail (Eds.), Proceedings of the 15th International Conference on Ubiquitous Information Management and Communication (IMCOM 2021). IEEE. <https://doi.org/10.1109/IMCOM51814.2021.9377397>
- Park, S. (Steven), Wei, X., & Lee, H. (2023). Revisiting the elaboration likelihood model in the context of a virtual influencer: A comparison between high- and low-involvement products. *Journal of Consumer Behaviour*. <https://doi.org/10.1002/cb.2290>
- Park, S., & Sung, Y. (2023). The Interplay Between Human Likeness and Agency on Virtual Influencer Credibility. *Cyberpsychology Behavior and Social Networking*, 16(10): 764-771. <https://doi.org/10.1089/cyber.2023.0060>

- Pavlič, I. (2024). Electrodermal Activity in Tourism Research – Bibliometric Analysis. *International Journal of Marketing Science*, 7(1), 99–116.
- Qu, Y., & Baek, E. (2024). Let virtual creatures stay virtual: Tactics to increase trust in virtual influencers. *Journal of Research in Interactive Marketing*, 18(1), 91-108. <https://doi.org/10.1108/JRIM-09-2022-0280>
- Rizzo, G. L. C., Berger, J., & Ordenes, F. V. (2023). Why You Should Give Your Virtual Influencer a Friend. *Harvard Business Review*, 101(9-10): 26-28.
- Robinson, B. (2020). Towards an Ontology and Ethics of Virtual Influencers. *Australasian Journal of Information Systems*, 24. <https://doi.org/10.3127/ajis.v24i0.2807>
- Sainato, M. (2024, March 4). AI-generated images of Trump with Black voters being spread by supporters. The Guardian. Available at: <https://www.theguardian.com/us-news/2024/mar/04/trump-ai-generated-images-black-voters> (8.7.2025).
- Sindhu, P., & Bharti, K. (2020). Mapping customer experience: A taxonomical study using bibliometric visualization. *Journal of Information and Knowledge Management Systems*, 51(4), 592–617. <https://doi.org/10.1108/VJKMS-11-2019-0178>
- Singh, V. K., Singh, P., Karmakar, M., Leta, J., & Mayr, P. (2021). The journal coverage of Web of Science, Scopus and Dimensions: A comparative analysis. *Scientometrics*, 126(6), 5113–5142. <https://doi.org/10.1007/s11192-021-03948-5>
- Sookkaew, J., & Saepho, P. (2021). “Digital Influencer”: Development and Coexistence with Digital Social Groups. *International Journal of Advanced Computer Science and Applications*, 12(12), 326–332.
- Stein, J.-P., Breves, P. L., & Anders, N. (2022). Parasocial interactions with real and virtual influencers: The role of perceived similarity and human-likeness. *New Media & Society*, 26(6). <https://doi.org/10.1177/14614448221102900>
- Suprawan, L., & Pojanavatee, S. (2022). What Causes Social Media Users to Engage and Mimic Virtual Influencers? The Role of Self-Congruity. *Innovative Marketing*, 18(4): 148-160. [https://doi.org/10.21511/im.18\(4\).2022.13](https://doi.org/10.21511/im.18(4).2022.13)
- Um, N. (2023). Predictors Affecting Effects of Virtual Influencer Advertising among College Students. *Sustainability*, 15(8). <https://doi.org/10.3390/su15086388>
- Vila-Lopez, N., Kuster-Boluda, I., Mora-Perez, E., & Pascual-Riquelme, I. (2023). A bibliometric analysis of virtual influencers in the Web of Science. *Journal of Marketing Analytics*, 13, 145–161. <https://doi.org/10.1057/s41270-023-00262-2>
- Xie-Carson, L., Benckendorff, P., & Hughes, K. (2023). Keep it #Unreal: Exploring Instagram Users’ Engagement with Virtual Influencers in Tourism Contexts User engagement with virtual influencers. *Journal of Hospitality & Tourism Research*, 48(6). <https://doi.org/10.1177/10963480231180940>
- Xie-Carson, L., Magor, T., Benckendorff, P., & Hughes, K. (2023). All hype or the real deal? Investigating user engagement with virtual influencers in tourism. *Tourism Management*, 99. <https://doi.org/10.1016/j.tourman.2023.104779>
- Yap, Y. R., & Ismail, N. (2022). Factors of virtual influencer marketing influencing Generation Y consumers’ purchase intention in Malaysia. *International Journal of Internet Marketing and Advertising*, 17(3-4), 437–458. <https://doi.org/10.1504/IJIMA.2022.10048839>
- Yi, M. R., & Lee, H. (2023). A Study on the Regulatory Fit Effects of Influencer Types and Message Types. *International Journal of Human–Computer Interaction*, 40(18), 5161–5173. <https://doi.org/10.1080/10447318.2023.2232213>

- Yu, J., Dickinger, A., So, K. K. F., & Egger, R. (2024). Artificial intelligence-generated virtual influencer: Examining the effects of emotional display on user engagement. *Journal of Retailing and Consumer Services*, 76. <https://doi.org/10.1016/j.jretconser.2023.103560>
- Zelenskaya, M., & Rundle-Thiele, S. (2022). Wildlife Watcher Kylie: Co-designing a virtual ambassador for the Koala Watch programme. *Studies in Australasian Cinema*, 16(2-3), 93-108. <https://doi.org/10.1080/17503175.2022.2148413>
- Zhang, L., & Ren, J. (2022). Virtual Influencers: The Effects of Controlling Entity, Appearance Realism and Product Type on Advertising Effect. In G. Salvendy & J. Wei (Eds.), *Design, Operation and Evaluation of Mobile Communications* (13337: 298–305). Springer International Publishing AG. [https://doi.org/10.1007/978-3-031-05014-5\\_25](https://doi.org/10.1007/978-3-031-05014-5_25)
- Zhou, Q., Li, B., Li, H., & Lei, Y. (2024). Mere copycat? The effects of human versus human-like virtual influencers on brand endorsement effectiveness: A moderated serial-mediation model. *Journal of Retailing and Consumer Services*, 76. <https://doi.org/10.1016/j.jretconser.2023.103610>
- Zhou, X., Yan, X., & Jiang, Y. (2023). Making Sense? The Sensory-Specific Nature of Virtual Influencer Effectiveness. *Journal of Marketing*, 88(4): 84-106 <https://doi.org/10.1177/00222429231203699>