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GENERATION Z AND ARTIFICIAL INTELLIGENCE – RESEARCH DIRECTIONS IN MANAGEMENT SCIENCE: A SCIENTOMETRIC ANALYSIS BASED ON SCOPUS

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The aim of the article is to identify current and emerging research directions in management science in the area of topics linking artificial intelligence and Generation Z. The article uses scientometric analysis. Publications included in the Scopus database combining the topics of artificial intelligence and Generation Z in the area of management sciences were analysed. VOSviewer software was used for scientometric analysis. The study covered the period from 2018 to 2025 (up to and including 9.04.2025). The most frequent keywords were "social media" and "technology acceptance model". Through a combination of cluster analysis and critical review, five research themes were identified in each cluster: Gen Z's intention to use a technology, influenced by perceived ease of use; Generation Z's trust and satisfaction in the use of AI tools; the impact of using augmented reality, artificial intelligence-enabled chatbots, and social media on the purchasing behaviour of Generation Z; robot implementation during the COVID-19 pandemic, often focusing on comparing customer experiences across Generations X, Y and Z; the adaptation of metaverse and service robots technologies by Generation Z in a virtual reality. The authors also identified emerging research directions. The first of them is the use of psychology theory in understanding Generation Z's attitudes towards AI (in different relationship spheres, e.g. work, school). The second is the study of Generation Z representatives' relationships with other users in a virtual metaverse, understood as a digital space where users can interact with other users.

Keywords: management, generation Z, artificial intelligence, scientometric analysis

1. INTRODUCTION

A great deal of research carried out in various areas of different sciences has been devoted to Generation Z (Gen Z) and artificial intelligence (AI). With this in mind, the present authors decided to explore the directions of ongoing research in management and quality studies linking artificial intelligence and Generation Z.

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A generation is a group of people born in the same time frame or in the same year, whose upbringing is influenced by the same historical, political, economic and social events, as well as fashion or music (Eyerman, Turner, 1998; Schewe, Meredith, 2004, D'Acunto et al., 2025). Representatives of a given generation share common characteristics, values, preferences, attitudes and purchasing behaviour (Schewe, Meredith, 2004). There is no consensus classification of cohorts by years of birth in the literature (D'Acunto et al., 2025). Researchers often cite the classification of generations proposed by Dimock (2019), who distinguished the following: The Silent Generation/The Greatest Generation (1928-1945), Baby Boomers (1946-1964), Generation X (1965-1980), Generation Y or Millennials (1981-1996), and Generation Z or Centennials or IGen (1997-2012). A broader classification of cohorts often cited in the literature was presented by McCrindle (2025b): Builders (1925-1945), Baby Boomers (1946-1964), Generation X (1965-1979), Generation Y (1980-1994), Generation Z (1995-2009), Generation Alpha (2010-2024), and Generation Beta (2025-2039).

Representatives of Generation Z are those who were born into the digital world. There is no consensus in the literature regarding the year of birth of representatives of this generation. While researchers adopt different years, 1995 is most often indicated as the first year of birth for Generation Z, with 2009 being the final year (e.g. Bassiouni, Hackley, 2014; Hampton, Keys, 2017; Kamenidou et al., 2019). Generation Z's identity has been shaped by the rise of digitalisation, financial transformation, concerns about climate change and COVID-19 (McKinsey, 2024), which can be explained by Gen Z's concerns about job stability and the rising cost of living (Misra et al., 2022). Generation Z make up 22% of the global population and 27% of the global workforce (McCrindle, 2025a).

Being digitally literate (Priporas et al., 2017) and using it extensively on a daily basis in every aspect of life (Seyfi et al., 2024) allows members of Generation Z not only to navigate the virtual world efficiently, but also to communicate with others, e.g. social media users, and to share a variety of information (Van den Bergh, Pallini, 2018). Generation Z consumers often look online for information, including news and opinions before making a purchase. TikTok is the most visited social media app by Gen Z (60% of over one billion users) (McKinsey, 2024). Generation Z consumers like to follow influential people whose opinions are important to them and whom they trust (Kim et al., 2022). Generation Z's consumption and purchasing behaviour is sustainable and influential for other generations (Lisboa et al., 2022). Representatives of the first true natives to the digital era, these digital natives (McKinsey, 2024) use their phones more than 6 hours a day (Statista, 2023).

The main characteristics of Generation Z people most frequently identified in academic studies include: belonging to a naturally social generation; preferring to work on multiple tasks at the same time; desiring independence in work environments; constantly engaging in learning; seeking to do something good in the world; being the first true natives to the digital era; enjoying interactions with other people; "Googling" most of their questions; needing to be constantly updated and requiring

stimulation to hold their attention; tending to be more careful with their expenses; not limiting themselves to a single stereotype, but instead exploring various ways of expressing themselves and developing their personal identities over time; being radically inclusive; not distinguishing between friends they meet online and friends in the physical world; believing in the importance of dialogue and accepting differences of opinion with the institutions in which they participate; applying a more practical and analytical approach in their decision-making (D'Acunto et al., 2025).

Taking into account that the concept of artificial intelligence is often misinterpreted and, in addition, often misused, reference should be made to the work of McCarthy, Minsky, Turing, Feigenbaum, Hinton, R.J. Schalkoff, Haugeland, or Rich, Knight and Nair, among others. According to McCarthy (2007), artificial intelligence is "the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable". Minsky (1968) defined AI as "the science of making machines do things that would require intelligence if done by men", while Turing (The Alan Turing Institute, 2025) as "a machine or system performs tasks that would ordinarily require human (or other biological) brainpower to accomplish". The European Union defines AI as human-designed software systems operating in a physical or digital dimension. These systems indicate to humans the best actions they should take in order to achieve their goals. The systems operate by interpreting collected structured or unstructured data, using knowledge or processing information derived from this data (European Commission, 2019). A milestone in the development of AI was undoubtedly the release of Chat GPT by OpenAI in 2022 (Generative Pretrained Transformer).

The aim of the article is to identify the main and emerging research directions in management science in topics linking artificial intelligence and Generation Z. To achieve this objective, the authors use publications indexed in the Scopus database and the VOSviewer software as a tool commonly used in academic research for analysing citations, content and networks. VOSviewer software allows key researchers and patterns to be identified, and collaborations between researchers, universities and countries to be explored, while providing insights into the dynamics and development of research. In addition, keyword analysis makes it possible to identify clusters related to artificial intelligence and Gen Z, providing a basis for further exploration of this area.

The authors formulated the following research questions:

1) What is the scope of publications in the area combining AI and Gen Z indexed in the Scopus database, and where were they affiliated?
2) Which authors, according to the Scopus database, can be considered the most productive and which authors are best known in the area combining AI and Gen Z topics in the management sciences?
3) According to the Scopus database, what are the main research problems in the area of linking AI and Gen Z topics in the management sciences?

This article provides an analysis of the current scientific discussion on AI and Gen Z research and establishes the basis for future research.

2. METHODOLOGY

The analysed publications were obtained from the Scopus database, which is a comprehensive citation database with influential and multidisciplinary articles. The analysis that was performed was the result of restrictions introduced to the advanced search in the Scopus database on April 9, 2025. The following string was used for the search: TITLE-ABS-KEY ("Generation Z" OR "Z Generation" OR "gen Z" OR "Z gen" OR "Generation Zers" OR "gen Zers") AND ("AI" OR "artificial intelligence" OR "intelligence artificial"). Using "TITLE-ABS-KEY" entails searching by title, abstract and keywords. This type of search means that a publication will

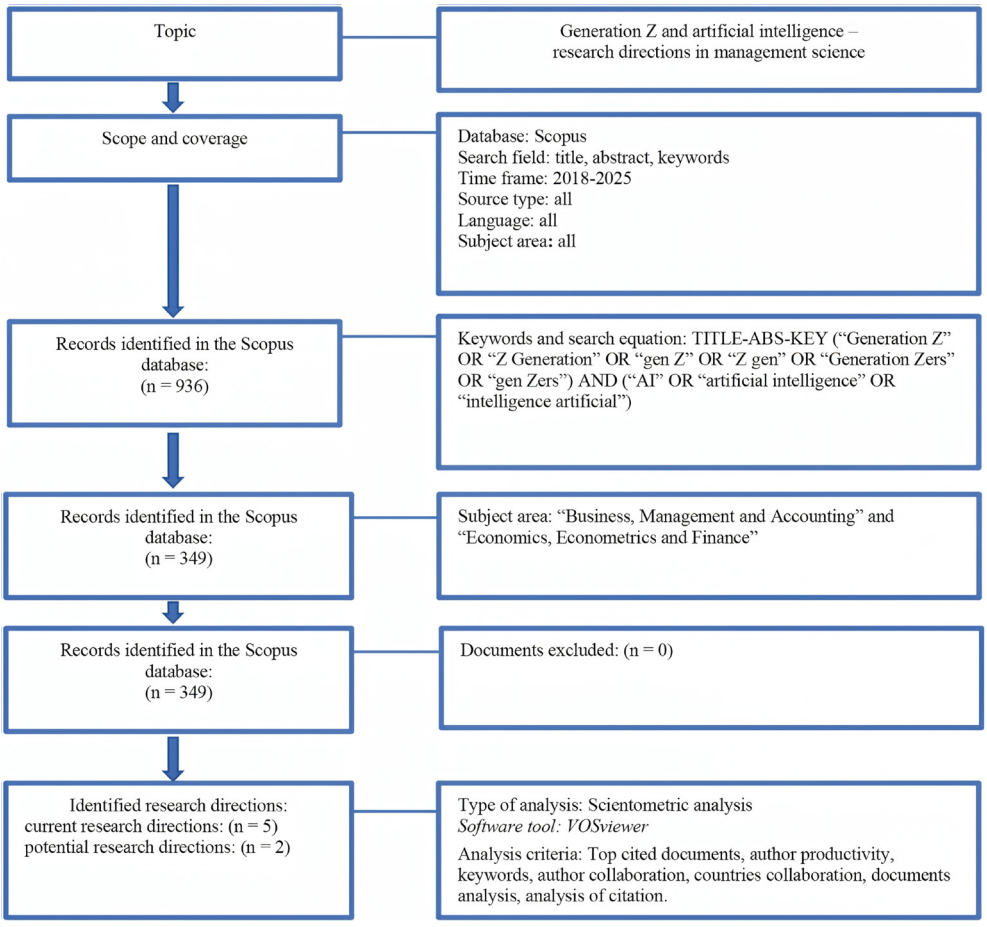

Fig. 1. Stages and assumptions of the conducted scientometric study (own elaboration)

be identified when certain defined terms appear in the title, keywords or abstracts, which can ensure that the data are as comprehensive as possible (fig. 1).

Without applying any restrictions, the search in the database resulted in 936 documents. Considering the fact that the search scheme "TITLE-ABS-KEY" contains the probability of obtaining a very wide set of publications from various fields of science, the obtained results were analysed based on the criterion "subject area". The dominant group of publications (52% of all results) concerned on "Computing science" and "Mathematics". Since the authors intended to conduct an analysis within the scope of management sciences, the search was limited to: "Business, Management and Accounting" and "Economics, Econometrics and Finance". The effect of introducing the restriction was to obtain 349 results. After manual review, all 349 publications were identified for further analysis, regardless of language, document type or publication stage. The sources of publications are indicated in table 1.

Table 1. Source types of 349 documents (data as at 9 April 2025)

Source type	Number of publication
Journal	266
Book	39
Conference proceeding	27
Book series	16
Trade journal	1

Source: own elaboration.

Of the 349 publications, 315 were published and had the status "final" and 34 publications were still in print. The main language of publications was English (346). The remaining 3 publications were written in Russian (1), Spanish (1), and Romanian (1). The authors most frequently published their research results in: Young Consumers (11), Studies in Systems Decision and Control (8), Springer Proceedings in Business and Economics (6), International Journal of Contemporary Hospitality Management (6), Journal of Theoretical and Applied Electronic Commerce Research (5), Journal of Retailing and Consumer Services (5), Cogent Business and Management (5).

The research method adopted was scientometric analysis. Scientometrics is a field that uses quantitative methods and models to study science, technology, and innovation (Dhiman et al., 2023). The scientometric method is used in research assessment, science policy, and the study of scientific communication and knowledge production. It utilises specialized software tools, databases, and data sources such as citation indexes (e.g. Scopus, WoS), publication repositories, and research information systems (Gunaseelan, 2023).

The scientometric analysis was used to objectively map the scientific knowledge area while the critical review aimed to identify the research themes and the

corresponding challenges based on scientometric results. The definition of scientometrics was first proposed by Mulchenko as "quantitative study of the research on the development of science" (Zhong et al., 2019). It can be considered as a technique that includes measuring research impact, understanding the citation process, mapping the knowledge structure and evolutions in a domain based on the large-scale scholarly dataset (Börner et al., 2003).

In this article, VOSviewer software (version 1.6.20) was used for scientometric analysis. VOSviewer software is widely used in bibliometric analysis, especially in thematic analysis and cluster analysis (Shah et al., 2019; Llanos-Herrera, Merigo, 2019). Using VOSviewer researchers can analyse a wide range of bibliometric networks consisting of publications, authors, journals, authors, organizations or countries (van Eck, Waltman, 2010). The software enables five types of bibliometric mapping analysis to be applied: co-authorship, keyword co-occurrence, citation, bibliographic coupling, and co-citation. In keyword analysis, VOSviewer uses text mining to analyse the content of titles, keywords, and abstracts. In this way, researchers can find different clusters of closely related elements that are marked with the same colour in the graphs. The larger the item, the greater its significance and popularity with respect to the other items (Perianes-Rodriguez et al., 2016).

3. SCIENTOMETRIC ANALYSIS – RESULTS

After data collection, all documents were inputted as the research data, as explained in the VOSviewer manual (van Eck, Waltman, 2023). Next, four techniques were performed: co-author analysis, co-words analysis, co-citation analysis. Without applying any time limits, it was found that all documents were published between 2018 and 2025 (in 2025 by 9 April 2025 – fig. 2).

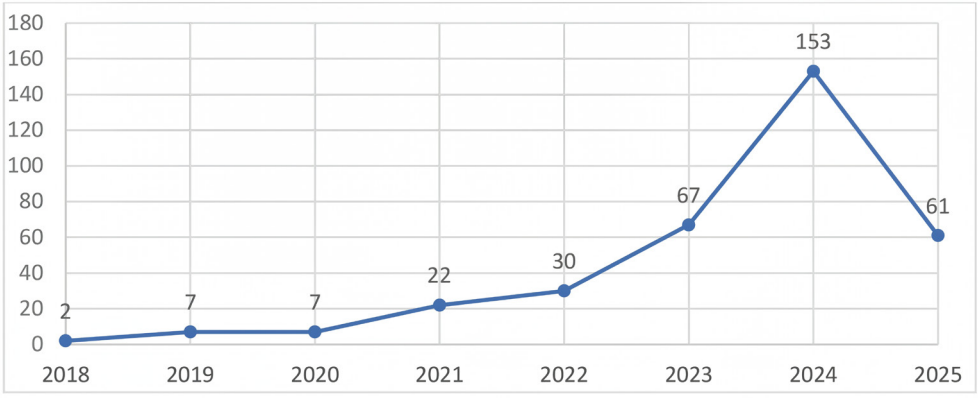

Fig. 2. Number of documents by year in 2018-2025 (data as at 9 April 2025)

(own study based on Scopus)

Figure 2 presents more than double the number of publications in 2023 and 2024 compared to the previous year. The data for 2025 only includes publications from the first quarter. Assuming that topics combining artificial intelligence and Generation Z are still very relevant, it can be assumed that more scientific papers will be published in 2025 than in 2024.

In 2023, the research mainly focused on marketing topics, particularly the impact of social media on purchasing decisions (Jhawar et al., 2023), using of metaverse in socializing (Sowmya et al., 2023), and the impact of the COVID-19 pandemic (Merdin-Uygur, Ozturkcan, 2023). Many of the studies published in 2024 focus on the role of artificial intelligence in consumers' preferences (Ho, Chow, 2024), the increase in consumer intention to use chatbots (Dinh, Park, 2024) and metaverse tourism (Zhang, 2024). In turn, the most recent publications (Q1 2025) refer to the technology acceptance model in online shopping (Lai et al., 2025) or virtual influencers as a growing trend in digital marketing (Kholkina et al., 2025).

Table 2 presents the most productive authors in terms of number of publications in the area of AI and Gen Z.

Table 2. The top 9 most productive authors in 2018-2025 (data as at 9 April 2025)

Author	Institution	Country	Number of publication
Mandal, S.	Amrita School of Business	India	4
Yulita, H.	Bunda Mulia University	Indonesia	4
Aujirapongpan, S.	Silpakorn University	Thailand	3
Chintaluri, M.G.	GITAM University	India	3
Christian, M.	Bunda Mulia University	Indonesia	3
Nguyen, N.T.	Vietnam National University	Vietnam	3
Raman, R.	Amrita School of Business	India	3
Rosman, D.	Bina Nusantara University	Indonesia	3
Sunarno, S.	Universitas Persada YAI Jakarta	Indonesia	3

Source: own elaboration based on Scopus.

Based on the data extracted from the Scopus database, it is not possible to identify researchers who are far ahead of others in terms of the number of publications in topics combining artificial intelligence and Gen Z. The top two places (4 publications each) are occupied by Santanu Mandal (Amrita School of Business, Coimbatore,

India) and Henilia Yulita (Bunda Mulia University, North Jakarta, Indonesia). A further seven scientists were authors or co-authors of 3 papers. Analysing the subsequent rankings of the number of publications per person, as many as 50 scientists were authors or co-authors of two publications in the area under study. Many authors had only one publication in the subject area under study. This may be due to the topics of artificial intelligence and Generation Z being relatively new to research.

The next stage of the analysis was to identify documents by affiliation. Table 3 presents only those academic units (universities) with an affiliation of 5 or more papers on the research topic analysed.

Table 3. Documents by affiliation in 2018-2025 (data as at 9 April 2025)

Institution	Country	Number of publication	Years
Symbiosis International (Deemed University)	India	10	2021-2024
Bina Nusantara University	Indonesia	9	2019-2023
Universiti Putra Malaysia	Malaysia	7	2022-2024
Sunway University	Malaysia	7	2023-2025
Viet Nam National University Ho Chi Minh City	Vietnam	6	2021-2025
Amity University	India	5	2023-2024
Szkola Głowna Gospodarstwa Wiejskiego in Warsaw	Poland	5	2023-2025
International University - Vietnam National University	Vietnam	5	2021-2024
Taylor's University Malaysia	Malaysia	5	2023-2025
Christ University	India	5	2020-2025

Source: own elaboration based on Scopus.

The analysis of the data in table 3 allowed us to identify the 10 scientific entities to which authors/co-authors of publications in the area of AI and Gen Z were most frequently affiliated. At the same time, it can be noticed that the most frequent affiliations were to Asian countries: India, Malaysia, and Vietnam. This is also confirmed by the data presented in figure 3.

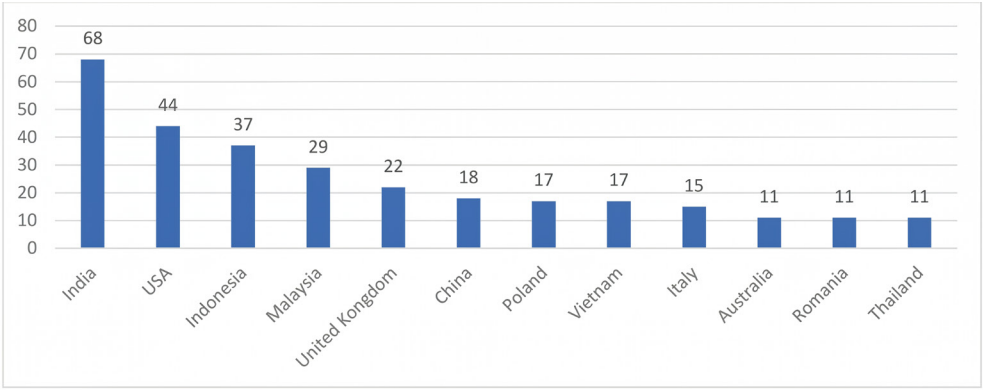

Fig. 3. Documents by country in 2018-2025
(data as at 9 April 2025) (own study based on Scopus)

Figure 3 presents only those countries where there were more than 10 publications affiliated to research institutions during the study period. The data confirm previous findings that the largest number of publications on AI and Gen Z indexed in the Scopus database during the study period came from Asia. Among European countries, authors/co-authors most frequently affiliated publications to research institutions located in the United Kingdom (22), Poland (17), Italy (15), and Romania (11).

The above conclusions led the authors to conduct an in-depth analysis of the publications affiliated to Polish universities indicated in the Scopus database relating to AI and Gen Z. The earliest publications in this group date back to 2022. The most productive authors from Poland in the Scopus database were Ewa Jaska, Piotr Pietrzak, and Agnieszka Werenowska (SGGW, Warsaw). The largest number of affiliations of published papers in the studied topics was identified in: Szkoła Główna Gospodarstwa Wiejskiego in Warsaw (5 documents) and the University of Economics in Katowice (2 documents).

With the development of information communication technology and the growth of academic exchanges, collaboration between researchers is increasing, both within a particular country and internationally. Therefore, the next step of the analysis was to identify co-authorship. This looked at the co-occurrence of authors and countries, made it possible to identify the existence of collaboration on a micro or macro level and also to identify influential authors. The file retrieved with bibliographic data from 349 documents was entered into the VOSviewer software in order to analyse the links of the resulting bibliography list for the defined subject area. Due to the large number of publications, any author who had at least two publications in the field under study was accepted for analysis. The following settings were used: type of analysis: ‘Co-authorship’, unit of analysis: ‘Author’, counting method: ‘Full counting’, minimum number of documents of an author: ‘2 documents’ (fig. 4).

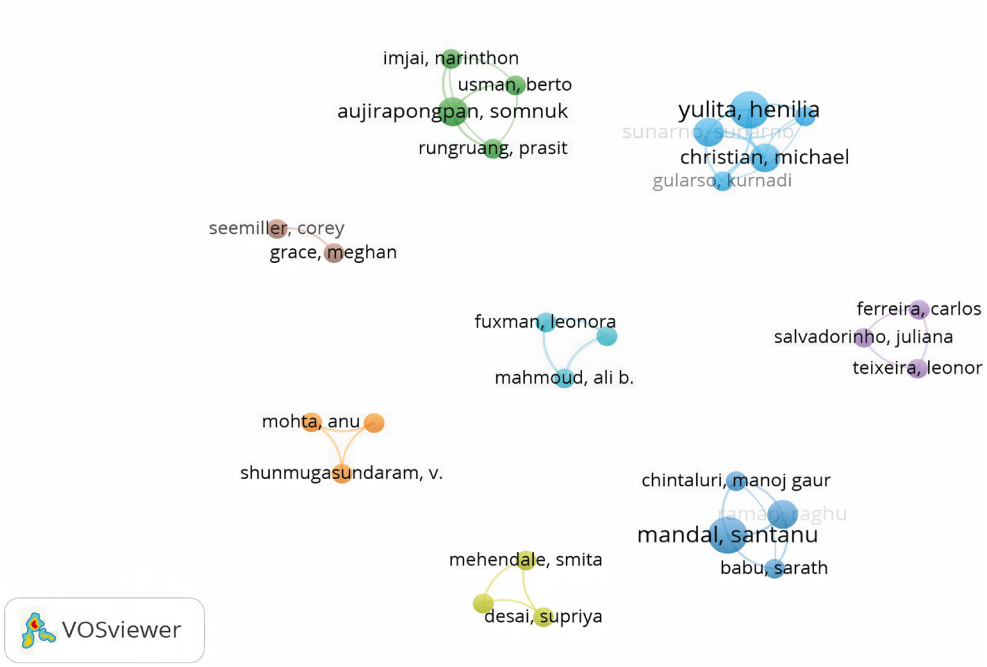

Fig. 4. Co-authorship – network visualization (own study based on Scopus)

Of the 999 authors, 59 met the thresholds. To maintain data transparency, the names of those researchers who were authors/co-authors of at least two publications and the link strength was greater than 2 (Total link strength > 2) were included on the map. The analysis resulted in 8 clusters, illustrating the collaborative teams (collaborative networks) and the main authors in these research groups. The three largest clusters with the following lead authors can be identified: (1) Henilia Yulita, (2) Santanu Mandal, and (3) Somnuk Aujirapongpan. There is a lack of leading authors as connectors between researchers from different countries. This group of researchers did not have permanent links between each other and the research very often took the form of collaboration between universities located in the same country. The researchers did not form extensive co-authorship networks, which is evidenced by the lack of connections between clusters.

In the next step, the scope of international cooperation was analysed. The following settings were used in VOSviewer: type of analysis: 'Co-authorship', unit of analysis: 'Country', counting method: 'Full counting', minimum number of documents of a country: '5 documents'. As a result of the analysis of 72 countries, 25 met the thresholds (fig. 5).

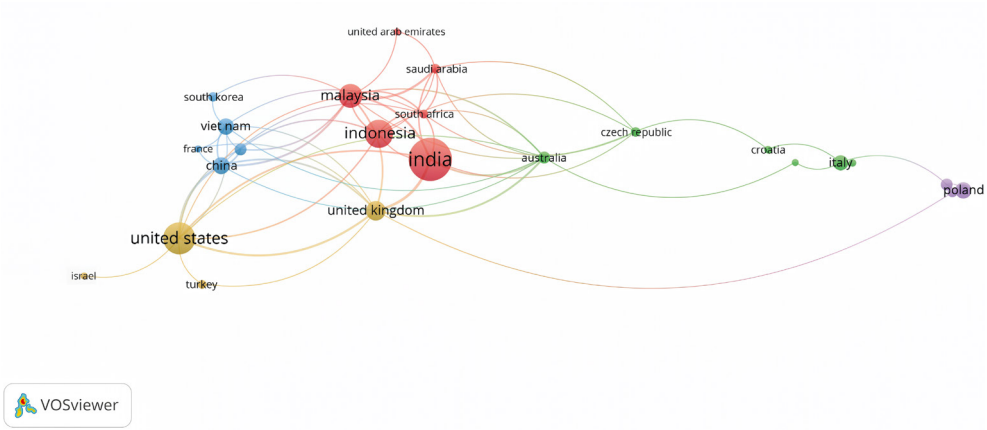

Fig. 5. Co-authorship by country – network visualization (own study based on Scopus)

Observing the relationships and international collaborations between researchers from different countries is helpful in understanding the current state of research. In figure 5, the largest 'circles' are marked by those countries with the most AI and GEN Z publications affiliated to universities (confirming the data presented earlier in fig. 3). However, in terms of the number of citations of publications from a given country, a different relationship is noticeable. The most cited publications were those affiliated to universities in the USA, followed by India (2nd place), 3rd United Kingdom, 4th Australia, and 5th Malaysia. The most frequent collaborations with researchers from other countries were by researchers from: 1. Malaysia, 2. United Kingdom, 3. China (in the order indicated). At the same time, it is necessary to confirm previous conclusions about the lack of intensive international cooperation in the area studied. The most intensive cooperation can be identified as co-authorship of publications by scientists from: 1. India and the United Kingdom (link strength = 8, i.e. 8 joint papers); 2. China and the USA (link strength = 6, i.e. 6 joint papers). The results of the analysis show that collaboration between different research communities in the field of AI and Gen Z should be strengthened in the future, especially internationally.

Analysing the collaborations of Polish researchers in this subject area, 6 publications in the Scopus database were identified as a result of international collaborations. Apart from the collaboration with scientists from Albania (2 papers), the strength of the remaining links was 1. This indicates that scientists from Poland wrote with researchers from Hungary, Portugal, Romania, and Serbia in the studied period, with one joint publication each.

In the next step, a co-citation analysis was carried out. This part identified co-cited sources and co-cited authors. Again, the bibliographic data file downloaded from the Scopus database for the given subject area was entered into VOSviewer. The following settings were used: type of analysis: 'Co-citation', counting method: 'Full

counting', unit of analysis: 'Cited authors'. Due to the huge number of cited authors and sources, the authors limited their conclusions and resigned from graphical illustration. The most frequently cited authors were M. Sarstedt, C.M. Ringle, J.F. Hair, V. Venkatesh, F.D. Davis, and Y.K. Dwivedi. The most frequently cited sources were journals:

1) Computers in Human Behavior,
2) Journal of Business Research,
3) Journal of Retailing and Consumer Services,
4) Sustainability,
5) MIS Quartely.

Referring to citations, it is worth indicating the most frequently cited publications among the 349 selected in the Scopus database in the subject area being studied here (tab. 4).

Table 4. The top 5 cited articles among the 349 articles in 2018-2025 (data as at 9 April 2025)

No.	Total citations	Article	Authors and year
1	189	Metaverse tourism for sustainable tourism development: Tourism Agenda 2030	Go, Kang, 2023
2	122	"We aren't your reincarnation!" workplace motivation across X, Y and Z generations	Mahmoud et al., 2021
3	117	Digital-only banking experience: Insights from gen Y and gen Z	Armelia Windasari, 2022
4	105	Service robots and COVID-19: exploring perceptions of prevention efficacy at hotels in generation Z	Romero, Lado, 2021
5	101	Four generational cohorts and hedonic m-shopping: association between personality traits and purchase intention	Lissitsa, Kol, 2021

Source: own elaboration based on Scopus.

The next stage involved a co-words analysis. This part included a keyword co-occurrence network and keyword evolution network. Again, the data file for the given subject area was entered into VOSviewer. For identifying leading keywords, it was assumed that the minimum number of occurrences of a word was 5. This assumption was made in order to intensify the weighting of the words and to enable the identification of elements on the map – an overabundance of keywords on the map would lead to multiple overlaps and make identification impossible. The

following settings were used: type of analysis: 'Co-occurrence', counting method: 'Full counting', unit of analysis: 'Author keywords', minimum number of occurrence of a keyword: 5. Number of keywords to be selected – 32 keywords. The observed relationships between the keywords are presented in figure 6.

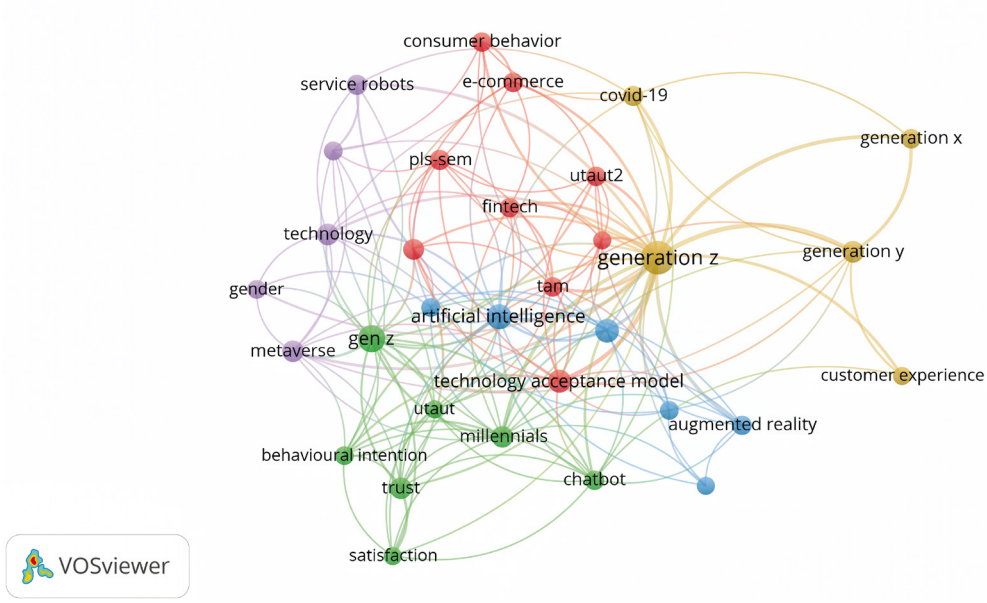

Fig. 6. Co-occurrence – network visualization (own study based on Scopus)

The use of the VOSviewer software made it possible to show the relationships between the 32 keywords in 5 colour-differentiated clusters. When diagnosing the co-occurrence of keywords (fig. 6), it should be noted that the terms 'social media' and 'technology acceptance model' occurred most frequently, in addition to 'Generation Z' (or 'Gen Z') and 'artificial intelligence'. It is also important to highlight the weighting of the keywords 'Millennials' and 'Generation Y', which means that researchers often equated Generation Z with these generations. It can also be confirmed that the keyword network map clearly indicates a high fragmentation of research topics in the area linking artificial intelligence and Generation Z in management science. On the other hand, bearing in mind the increasing number of publications in the Scopus database and the huge number of keywords (a total of 1241 authors keywords in 349 documents), it is possible to indicate an increase in researchers' interest, the development of the subject area analysed, and links to many research fields.

An analysis of the keywords shown in the next figure (fig. 7.) provides an indication of current research trends.

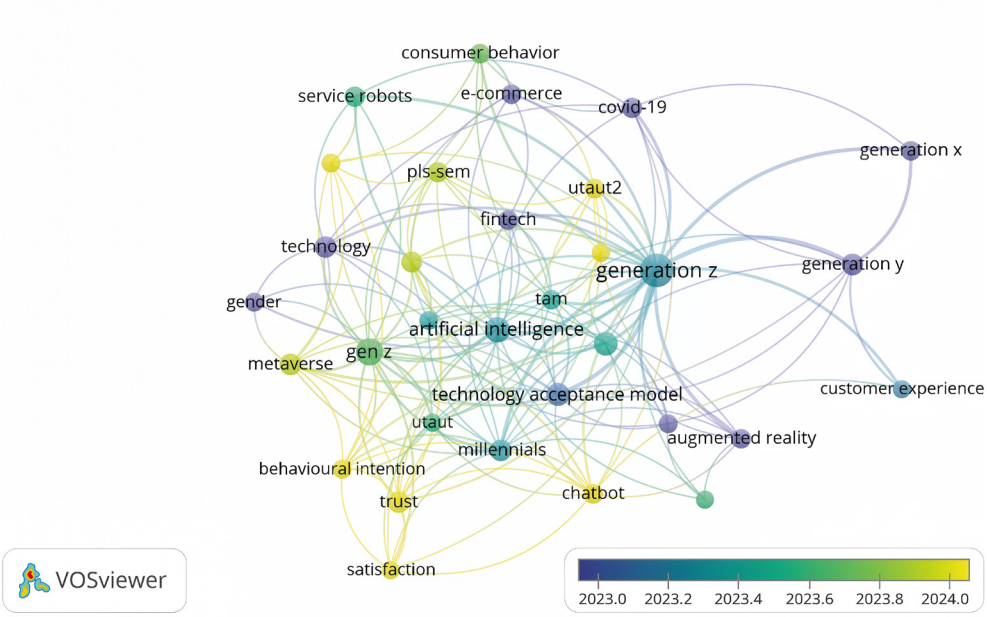

Fig. 7. Co-occurrence – overlay visualization (own study based on Scopus)

When analysing the overlay visualisation (fig. 7) for the occurring words, it is important to mention that the topic of artificial intelligence in relation to Generation Z is new and has only been researched for a few years, although it has been consistently expanded with new concepts. Keywords used by researchers in recent publications are 'metaverse', "trust" and "purchase intention".

The analysis revealed the co-occurrence of clustered keywords in research on AI and Gen Z in management science. Keywords are meaningful words that are used as a reference point and help to describe content and understand concepts in a specific field of research (Olawumi, Chan, 2018). A network of keyword clusters was formed from 1241 keywords. With a minimum of five co-occurring keywords, 32 significant keywords co-occurred and a total of five noticeable clusters were identified (as shown in fig. 6 and tab. 5). On this basis, the authors attempted to identify the main research directions in the area under study.

Selected documents were analysed on the basis of 'occurrence' (the number of occurrences of a keyword), 'link strength' (number of co-occurrences of two keywords), 'total link strength' (number of all occurrences of a keyword with other keywords) and links between clusters.

Table 5. Keywords belonging to selected clusters

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
– Behavioral intention – Consumer behavior – E-commerce – Fintech – PLS-SEM – Purchase intention – TAM – Technology acceptance model – UTAUT2	– Behavioural intention – Chatbot – Gen Z – Millennials – Satisfaction – Trust – UTAUT	– Artificial intelligence – Augmented reality – Customer engagement – Influencer marketing – Social media – Social media marketing	– Covid-19 – Customer experience – Generation X – Generation Y – Generation Z	– Gender – Metaverse – Service robots – Technology – Technology adoption

Source: own elaboration based on Scopus.

In figure 6, cluster 1 (red) includes the highest number of keywords. The largest circles are marked by two terms: 'technology acceptance model' (16 occurrences), "purchase intention" (10 occurrences). At the same time, the term TAM (7 occurrences) appears, which is in fact an abbreviation of the previously mentioned 'technology acceptance model'. The content analysis makes it possible to indicate that a frequent theme in this cluster was a Gen Z's intention to use a technology, influenced by perceived ease of use. A recurrent research topic was the impact of artificial intelligence tools on the purchase intentions of members of Generation Z in online shopping, using an adapted technology acceptance model (TAM). This topic was explored by Bunea et al. (2024), who indicated that the ease of integration of AI into everyday life and the perceived usefulness of AI tools increase the purchase intentions of Generation Z. Within the described cluster, researchers used the PLS-SEM methodology (total link strength = 10), that is, 'partial least squares structural equation modelling' as a statistical technique for modelling and estimating complex relationships between variables (e.g. Pandey et al., 2024; Vitezić, Perić, 2021). Within this cluster, several studies can be found that adopted both the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM) as a theoretical basis, as well as customer satisfaction (Srivastava et al., 2024).

In cluster 2 (green), the most frequent words, apart from 'Gen Z', were 'Millennials' (Occurrence = 12) and 'trust' (Occurrence = 11). The concept of 'behavioural intention' (in British English spelling) also reappears, also appearing in cluster 2 as 'behavioral intention' (in American English spelling). This disturbs the clarity of the

analysis of the research topics in both clusters. It should therefore be assumed that the topics of clusters 1 and 2 are closely linked. The similarity of topics in these clusters is also indicated by the concept of UTAUT (cluster 2), i.e. a model that explains how likely people are to accept and use new technologies, and in cluster 1 by UTAUT2, an extended version of it. As 'technology acceptance model' was the dominant concept in cluster 1, 'trust' can be considered the keyword that distinguishes cluster 2. As a result, a recurring object of study was the trust and satisfaction of Generation Z in the process of using AI tools. Joshi (2025) examined the key determinants of behavioural intention, user satisfaction, and chatbot adoption among student populations within Generation Z and Millennials. In contrast, Medina-Molina et al. (2025) studied Internet users from Generation Z and Millennials. Their findings confirm that the perception of AI as a life-enhancing tool, along with satisfaction and trust, are essential for generating interest in AI adoption.

Cluster 3 (marked in blue in fig. 6) is dominated by the keyword 'social media' (18 occurrences), in addition to 'artificial intelligence'. This is the only keyword that co-occurred at least once with every other keyword included in this cluster. At the same time, the term 'augmented reality' occurred frequently (7 occurrences). The content analysis of the documents made it possible to identify a recurring research issue in this cluster: the impact of using augmented reality, artificial intelligence-enabled chatbots, and social media on the purchasing behaviour of Generation Z (e.g. Ameen et al., 2022). Ameen et al. (2023) provide a valuable review as a background on Gen Z's consumer psychology and interactions with new-age technologies. In turn, Indiran et al. (2024) researched incorporating virtual reality (VR) and augmented reality (AR) technologies to meld the digital and in-store experiences.

Cluster 4 (yellow) combines keywords occurring in numerous studies on robot implementation during the COVID-19 pandemic (e.g. Romero, Lado, 2021), often focusing on comparing customer experiences across Generations X, Y and Z (Lissitsa, Kol, 2021). At the same time, comparing the behaviours of Generations Z and Y was more often co-occurring (link strength = 12) than comparing Generations Z and X (link strength = 7). Authors exploring this topic have conducted research using examples from such areas as the hospitality industry (Mandal et al., 2019), the food service industry (Gupta, Pande, 2023) or banking (Armelia Windasari et al., 2022).

Another cluster 5 (purple) is located on the edge of the map, and its central points are the words 'technology' (11 occurrences) and 'metaverse' (also 11 occurrences). The publications with co-occurring keywords included in cluster 5 were related to research on the adoption of metaverse-based technologies and service robots by Generation Z in a virtual reality. Mandal et al. (2024) explored the enabler role of perceived usefulness, enjoyment, and ease of use from metaverse tourism on Gen Z engagement. In contrast, Milanesi et al. (2024) investigated Gen Z consumers' intentions to use digital fashion items in the metaverse. These researchers also investigated the influence of the gender of the Generation Z respondent on the variables analysed.

In summary, the keywords selected for analysis linked to each other a total of 162 times, and the number of total occurrences of a keyword with the other words (total link strength) was 276 (fig. 6). Thus, the average number of common occurrences of two keywords was most often 1 or 2. In addition, the high number of keyword links occurring in different clusters indicates that many of the authors combined different research problems. As a result, many research topics were repeated within different clusters.

4. CONCLUSIONS

The study provides an overview of existing research in the management sciences in an area combining the topics of artificial intelligence and Generation Z. Using scientometric analysis to analyse citation patterns and publication data, the study provides an objective assessment to identify influential publications, key researchers and current and future research directions. An analysis of the publications collected in the Scopus database indicates that research combining Generation Z and artificial intelligence is a relatively new research topic, with a significant increase in 2024, therefore demonstrating the high research potential of this area. By analysing the most productive and cited authors, their countries of origin and international collaborations, it is possible to see the regional disparities that exist in research in the area analysed. In this study, the most productive authors were from Asia.

The highest number of publications per author was 4 (S. Mandal and H. Yulita). There are no dominant authors who link researchers from different countries, but it is possible to identify the three largest teams with the following authors: (1) H. Yulita, (2) S. Mandal and (3) S. Aujirapongpan. The most cited publications were those affiliated to universities in the USA, followed by (2) India, (3) United Kingdom, (4) Australia and (5) Malaysia. The most frequent collaborations with researchers from other countries were researchers from Malaysia, the United Kingdom, China. These results confirm that collaboration between different researchers on topics linking AI and Gen Z should be strengthened internationally.

The study also identified influential journals, such as Computers in Human Behavior, Journal of Business Research, Journal of Retailing and Consumer Services, Sustainability, and MIS Quartely. Keyword analysis identified 32 keywords grouped into 5 clusters. The most frequently appearing keywords were "social media" and "technology acceptance model". Considering the time factor, the keywords evolved from "e-commerce" and "Covid-19" to "metaverse", "trust", and "purchase intention".

Analysing all the results obtained on the basis of bibliographic data sets from the Scopus database, it should be stated that the issues related to artificial intelligence and Generation Z are new, relevant and constantly developing. Based on the analyses performed using VOSviewer software, it can be observed that publications

related to AI and Gen Z are undertaken by many scientists. The bibliometric maps generated with the software show many clusters with a small number of elements, i.e. few authors who have co-authorship links. Furthermore, the connection strength in most of the above data sets is equal to 1, which indicates a small number of publications (equal to 1) co-authored by the same set of researchers. This construction of the maps indicates a large dispersion of publications, which makes it difficult to rigorously indicate the leading research trends, apart from the unambiguous statement that the analysed data set regarding papers in the field of management sciences concerned issues related to marketing in the field of AI and Gen Z. Based on the research, including the analysis of keywords of individual clusters, the authors attempted to indicate the leading research directions in each cluster:

1) Cluster 1 – Gen Z's intention to use a technology, influenced by perceived ease of use,
2) Cluster 2 – Generation Z's trust and satisfaction in the use of AI tools,
3) Cluster 3 – the impact of using augmented reality, artificial intelligence-enabled chatbots, and social media on the purchasing behaviour of Generation Z,
4) Cluster 4 – robot implementation during the COVID-19 pandemic, often focusing on comparing customer experiences across generations: X, Y and Z,
5) Cluster 5 – adaptation of metaverse and service robots technologies by Generation Z in a virtual reality.

The study provides a basis for attempting to indicate emerging research directions:

6) Currently, in the analysed publications, there are few studies focusing on explaining the behaviour of Generation Z representatives towards AI tools in the workplace. The use of psychological theory in understanding the attitudes of Generation Z towards AI as employees and in the workplace is a potential direction of research in this area. A sub-area of this direction may be research assessing the impact of using AI tools on the mental health of Generation Z employees. Another sub-area could be research assessing the level of trust Generation Z employees have in decisions made by artificial intelligence compared to decisions made by humans.
7) The second potential research direction will be studies focusing on the relationships of Generation Z representatives with other users in the virtual space of the metaverse. This will concern combining augmented reality (AR), virtual reality (VR), social media, online games and cryptocurrencies. A sub-area of this research direction may focus on studying the use of the metaverse by Generation Z representatives, both at work and in their private life.

Now that technology is increasingly permeating everyday life and work, it is important to understand the extent to which Generation Z trusts automated systems and algorithms compared to traditional human decisions. The results of this research may answer the question of whether Generation Z is more likely to accept AI-based decisions or whether it still prefers a human approach, especially in

contexts requiring empathy, ethics or subjective judgement. This knowledge will be crucial for developing management strategies, implementing new technologies in the workplace, and building trust in artificial intelligence systems.

It is important to acquire knowledge about how users utilise virtual environments, what forms of communication and interaction are most popular, and what benefits and challenges are associated with functioning in such an environment. It is also important to examine how the metaverse affects the quality of interpersonal relationships, whether it promotes deeper bonds, or whether it will contribute to a shift away from interpersonal contact in favour of virtual contact. This research can help us understand whether the metaverse will become a natural extension of social media or whether it requires new approaches and regulations to fully realise its potential in building interpersonal relationships.

According to the authors, the indicated current areas of scientific research will be developed successively. The indicated emerging directions of research may become directions explored by researchers to a greater extent than they are currently. The results of the research can help future researchers identify key areas that require further research, address current challenges, and explore emerging trends in the field. At the same time, international cooperation between researchers in the field of AI and Gen Z should be strengthened in the future.

The authors are aware of the limitations of the study. These include its time-consuming nature, focusing on documents collected in one database, marginalizing domestic (Polish) publications, and omitting publications unavailable in electronic version. An undoubted barrier when analysing the co-occurrence of keywords is the spelling of the same concepts (in British/American English) and the use of Gen Z abbreviations instead of the full term Generation Z. All these entries are interpreted differently and categorized as separate concepts by the VOSviewer software.

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POKOLENIE Z I SZTUCZNA INTELIGENCJA – KIERUNKI BADAŃ W NAUKACH O ZARZĄDZANIU: ANALIZA SCJENTOMETRYCZNA NA PODSTAWIE SCOPUS

Streszczenie

Celem artykułu jest identyfikacja obecnych i wyłaniających się kierunków badań w naukach o zarządzaniu w obszarze tematyki łączącej sztuczną inteligencję i pokolenie Z. W pracy wykorzystano analizę scjentometryczną. Analizie zostały poddane publikacje zamieszczone w bazie danych Scopus łączące tematykę sztucznej inteligencji i pokolenia Z w obszarze nauk o zarządzaniu. Do analizy scientometrycznej wykorzystano oprogramowanie VOSviewer. Badaniem objęto okres od 2018 do 2025 r. (do 9.04.2025 włącznie). Najczęściej pojawiającymi się słowami kluczowymi były „media społecznościowe"

i „model akceptacji technologii". Dzięki połączeniu analizy klastrów i krytycznego przeglądu zidentyfikowano pięć tematów badawczych w poszczególnych klastrach: zamiar korzystania z technologii przez pokolenie Z pod wpływem postrzeganej łatwości użytkowania; zaufanie i satysfakcja pokolenia Z z korzystania z narzędzi sztucznej inteligencji; wpływ korzystania z rzeczywistości rozszerzonej, chatbotów obsługujących sztuczną inteligencję i mediów społecznościowych na zachowania zakupowe pokolenia Z; wdrażanie robotów podczas pandemii COVID-19, często koncentrujące się na porównywaniu doświadczeń klientów między pokoleniami X, Y i Z; adaptacja technologii metawersum i robotów usługowych przez pokolenie Z w wirtualnej rzeczywistości. Autorki wskazały także wyłaniające się kierunki badań. Pierwszym z nich jest wykorzystanie teorii psychologii w zrozumieniu postaw pokolenia Z względem sztucznej inteligencji (w różnych obszarach relacji, np. w pracy, szkole). Drugim natomiast jest badanie relacji przedstawicieli pokolenia Z z innymi użytkownikami w wirtualnej przestrzeni metawersum, rozumianej jako cyfrowa przestrzeń, w której użytkownicy mogą wchodzić w interakcje z innymi użytkownikami.

Słowa kluczowe: zarządzanie, sztuczna inteligencja, pokolenie Z, analiza scjentometryczna