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Role of Artificial Intelligence in Shaping Customer Satisfaction: A Systematic Literature Review and Bibliometric Analysis

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Abstract

Aim: The purpose of this study was to provide a comprehensive assessment of the current state of knowledge about the role of artificial intelligence in shaping customer satisfaction, especially satisfaction with AI-based services and products.

Methodology: To achieve this aim a literature review was conducted following the systematic literature review method, using the PRISMA guidelines. The bibliometric analysis and visual exploration of the literature review were carried out using VOSviewer software.

Results: The research results allowed to conclude that over the last five years research into the application of artificial intelligence in the field of customer service and products has undergone a distinct evolution. Research is mainly on front-office activities, while the back-office activities are quite rarely discussed.

Implications and recommendations: Due to its novelty, the interest in this topic is still growing and the number of publications will probably increase dynamically in the coming period. In order to discover the research gaps it is worth deepening the presented analyses by content analysis as the next step of the planned research.

Originality/value: The literature review revealed the current state of research in the area, while identifying important cognitive gaps that may set potentially interesting directions for future scientific exploration.

Keywords: artificial intelligence, customer satisfaction, systematic literature review (SLR), management

1. Introduction

Today artificial intelligence (AI) is encroaching on a growing number of areas of human life, supporting science and technology as well as everyday activities. Its expansion is so dynamic that it is difficult to find an area where AI is not having an impact. AI tools (and especially generative artificial intelligence, GAI) are diffusing rapidly not only among large companies but also among small and medium enterprises (SMEs) (Kshetri et al., 2024). A broad range of AI technologies could boost productivity levels and elevate economic results, and its impact is highest in industries that inherently involve frequent contact with large numbers of customers, and produce vast amounts of customer transaction data and customer attribute data (Davenport et al., 2020). The financial return achieved by organizations largely depends on the level of customer satisfaction with the AI-based products and services offered. On the one hand, many studies emphasise that higher customer satisfaction leads to greater customer loyalty (Bhat et al., 2024; Biscaia et al., 2017), positive customer behavioural responses, i.e. intention or decision to stay, increase the usage of service, repeat buying, positive word-of-mouth communications, new customer acquisition (Gholipour Soleimani & Einolahzadeh, 2018; Marcos & Coelho, 2022; Zhou & Chang, 2024), and finally the growth of organizational profits that provides a level of competitive advantage (Brill et al., 2019). On the other hand, dissatisfaction with the quality of service, products or the customer's relationship with the organization can lead to the lesser likelihood of repeated purchases (Lu et al., 2015), brand abandonment, negative reviews and, consequently, a drop in revenue. Therefore, customer satisfaction with AI-based products and services is becoming less of an added value as a condition for profitability.

According to Davenport et al. (2020), AI's applications are revolutionising and changing consumer behaviour. Despite the rapid development of AI tools, little is known about how customers perceive interactions with AI-driven products and services, and which factors most influence their satisfaction, which constitutes a research gap. Whilst the first work in this area has already appeared, there is a lack of in-depth knowledge about what mechanisms affect customer confidence in products and services

based on AI algorithms, where the limit of their acceptance lies and how this translates into customer satisfaction. In view of the above, the purpose of this study was to provide a comprehensive assessment of the current state of knowledge on the role of artificial intelligence in shaping customer satisfaction, especially satisfaction with AI-based services and products. In order to achieve this goal, a systematic literature review (SLR) was conducted since its scientific rigour allows for minimising bias in literature searches, increases the replicability of studies, and improves their quality and transparency (Tranfield et al., 2003). According to current knowledge, there are already literature reviews devoted to the possibility of using AI in marketing (Davenport et al., 2020; Kshetri et al., 2024; Rabby et al., 2021; Ziakis & Vlachopoulou, 2023) and even one SLR concerning the role of AI in customer engagement (Gupta & Khan, 2024). However, there is no SLR dedicated to the problem of shaping customer satisfaction in the context of using products and services based on AI technology. The study was designed to fill this research gap, therefore it is not new *per se*, yet its novelty lies in the adopted methodological approach and within an accepted time frame. The SLR in Gupta and Khan (2024) covered the period 2012-2022. Although the first versions of the AI tools were already being developed in 2018-2019, the official launch of Chat-GPT did not take place until 30 November 2022. After 2022 a significant development of AI-based tools has taken place, which makes the analysis and study of customer satisfaction with solutions created during this period particularly justified and cognitively valuable. In the context of the stated purpose of the work and the identified research gap, the following research questions were addressed in this study:

- **RQ1.** What are the current publication trends on the ways and factors shaping customer satisfaction with use of AI-based products and services with regard to authors, journals and countries, and in particular what are the most influential works and authors in this area?
- **RQ2.** What are the main directions of research and research themes in the explored topic?

The article integrates a bibliometric analysis and a systematic literature review to identify trends in the role of AI in shaping customer satisfaction.

2. Methodology

To achieve the established research objective, a systematic literature review (SLR) was used, in particular the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines (Page et al., 2021). The PRISMA method of SLR follows three stages of identification, screening, and inclusion as fundamental in the organization of this paper. To ensure sufficient coverage of the literature review, two main literature databases were examined, namely Scopus and Web of Science Core Collection. A comprehensive literature search was conducted from May to June 2024, preceded by the preliminary search aiming (due to the ambiguity of the understanding of the concept of artificial intelligence and the mechanisms behind it) to establish keywords that would comprehensively describe AI concepts used later in SLR. This first initial search was carried out on 17 May 2024 using only the Scopus database. Taking into account the obtained results, words concerning the examples of AI technologies used in research (i.e. expert systems, neural networks (applying machine learning or deep learning techniques), fuzzy logic, genetic, cognitive, evolutionary or other algorithms etc.) were omitted in the final search. Due to their continuous development, it would be difficult to draw up a closed list of AI technologies, and moreover, in the vast majority of cases the term ‘artificial intelligence’ was used in addition to (or instead of) keywords describing a specific technology. Finally, as a search string in research the following was used (the main keywords such as expansion and acronyms were linked with Boolean operators):

(“artificial intelligence” OR “AI”) AND (“customer* satisfaction” OR “consumer* satisfaction” OR “client* satisfaction” OR “buyer* satisfaction”).

2.1. Identification Phase

The study started on the WoS and Scopus databases simultaneously by running a query on the search string indicated above. An automatic literature search was employed, which yielded 1,463 papers from Scopus and 871 from WoS. The search was conducted without setting restrictions on the publication period, however in the next step conference proceedings, book series, books, and other publications were excluded. Only journal articles were included in the systematic literature review, with the objective of ensuring high quality studies through the peer-review process carried out by academic journals, and additionally, articles written in languages other than English were also excluded. For each publishing location an automated scan was applied, yet criteria of inclusion were slightly different in both searched databases, depending on the available filters (in WoS "Business, Management, Business Finance" and in Scopus "Business, Management, Accounting"). All inclusion and exclusion criteria used in the first stage of the study are presented in Table 1. After removing records marked as ineligible, the results were compared to remove duplicate records. Finally, after database connection, 250 records were accepted for further analysis.

Table 1. Criteria of inclusion and exclusion

<table>
<tr><th>Criteria of exclusion</th><th colspan="2">Criteria of inclusion</th></tr>
<tr><td colspan="3">1st stage</td></tr>
<tr><td rowspan="2">conference proceedings, book series, books, and other publications;
duplicates</td><td>WoS</td><td>Scopus</td></tr>
<tr><td>Limited to: Topic
Limited to: article
Limited to: English
Limited to: Business, Management, Business Finance</td><td>Limited to: Article title, Abstract, Keywords
Limited to: article
Limited to: English
Limited to: Business, Management and Accounting</td></tr>
<tr><td colspan="3">2nd stage</td></tr>
<tr><td>no access to full text of article;
research that discussed topics other than AI and customer satisfaction</td><td colspan="2">full-text articles;
publication that truly focus on keywords</td></tr>
</table>

Source: own research.

2.2. Screening

The bibliographic description (title, abstract, keywords, authors' names and affiliations, journal's name, and year of publication) of the identified records were exported to an MS Excel spreadsheet. In the next step, working in subgroups but separately, two independent reviewers screened the titles and in particular the abstracts, to check if they relate substantively to the planned research topic and include the required keywords, i.e. AI and customer satisfaction. At this stage, the following data extraction criteria were adopted: the satisfaction concept was applied only to external customers (consumers, patients, and any other users of AI-based products and services, excluding employees from this group) and individuals (consumers, not institutional recipients). Articles in which customer satisfaction forecasting was an explanatory variable were also excluded. Each reviewer voted on whether the article met the inclusion and exclusion criteria. The authors worked in pairs, and an inter-rater reliability index was calculated for each pair. For articles from the WoS database developed by the first pair of researchers, Cohen's Kappa index was 0.77, while for articles from the Scopus database, analysed by the second pair of researchers, Cohen's Kappa index was 0.67. In both cases, this indicated a very good unanimity. The average value of the index was 0.72. From the perspective of further analysis and reliability of the study, this is a very good result, confirming the high quality of the data extraction process and minimising the error due to the subjectivity of the evaluators. During this phase, disagreements between the reviewers were discussed in pairs and resolved by consensus. If no agreement could be reached, the views of other reviewers were taken into account. At this stage, 153 articles were accepted for further processing.

In the next step, due to budget constraints, only open access articles or those that could be obtained at no cost through library systems were included, thus reducing the number of the studies to 116. The reviewers then performed an eligibility assessment by carefully screening the full texts of the remaining papers independently. To ensure that differences in synthesis result from the content of the articles and not from errors in extraction, the authors used a unified coding sheet built in Excel. The following information was extracted from the full texts: type and purpose of the article, definition/conceptualisation of the main research topics, scales used to evaluate AI-based tools and measure customer satisfaction, theoretical framework, research methodology, antecedents and consequences of customer satisfaction, mediators and moderators used in the models, type of data collected in the study, research conclusions, research limitations, and directions for future research. The reviewers also assessed the quality of the work based on the bibliographic parameters (IF, CiteScore) of journals and an overall quality assessment using a Likert scale (from 1 – low-quality article to 5 – very good-quality article). The same method of reaching consensus was adopted here. Each reviewer assessed whether the paper met the quality, and inclusion and exclusion criteria, papers that did not meet the quality criteria were discussed, and then all the conflicts went to the moderation process. In addition to exclusion criteria, the quality of the included articles was also assessed, thus the number of the included articles remained at 57. This rigorous process of voting secured the validity of the findings reported. The method used to identify and select the literature was explicit, reproducible and without a priori assumptions on the relevance of the literature selected.

2.3. Inclusion and Data Extraction

Finally, *n* = 57 records were considered for bibliometrics and content analysis. The systematic flowchart based on the PRISMA methodology for identifying the records considered for the literature review is presented in Figure 1.

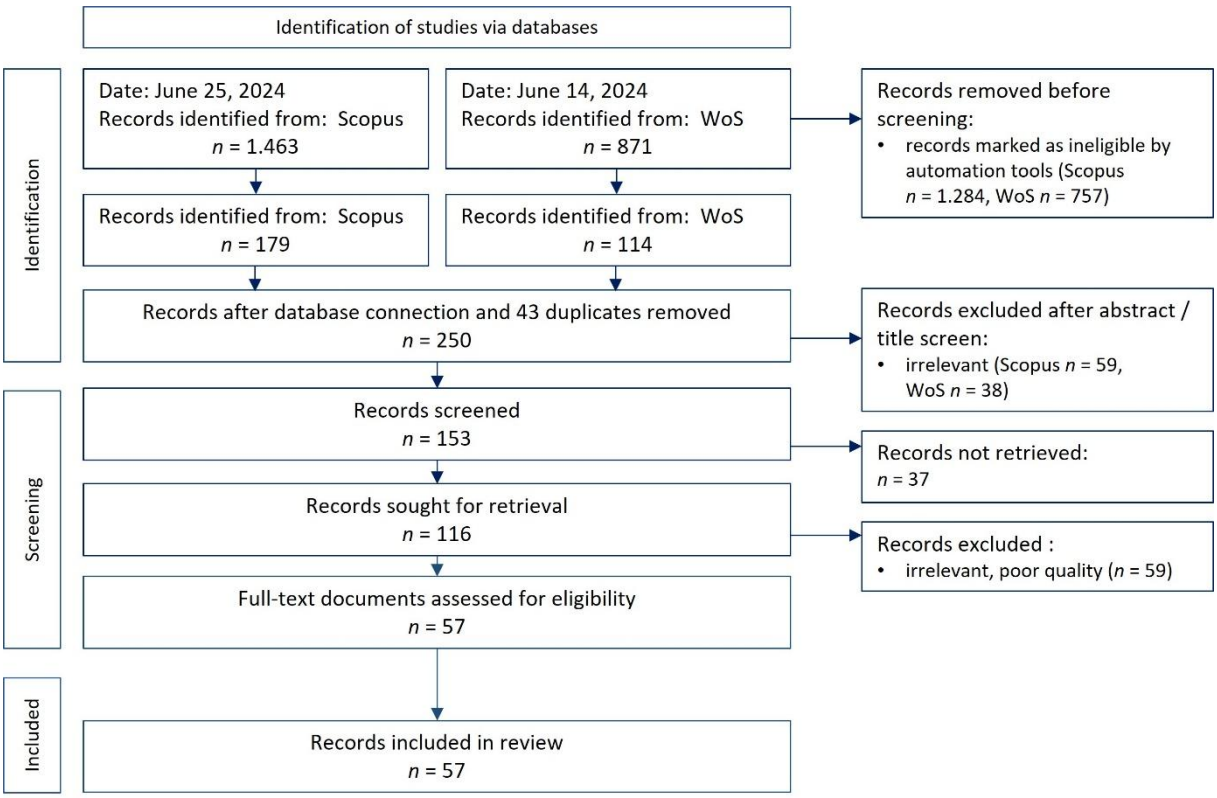

Fig. 1. Systematic flowchart based on the PRISMA methodology for identifying the records considered for the literature review

Source: own research.

In the next step the MS Excel spreadsheet was modified by adding the items for which data were sought. This was preceded by the creation of a basic data extraction form using the research questions. The data extracted were the basis for answering the research questions.

3. Results

3.1. Descriptive Statistics

In order to answer the first research question, a bibliometric analysis of the articles included in the database was performed. Figure 2 presents the distribution of the studies according to the number of articles published per year and total citations for publications in particular years. The research did not limit the time of publication of the articles, but it was clear that, apart from the first article from 2005, the increase in interest in the research topic did not start until 2019. Since 2020 there has been a marked increase in the number of publications, suggesting a growing interest in the topic, and this increase in publications may be related to new technological trends. The highest number of citations was for articles published in 2021 (almost 800), which were among the earliest works on the subject, possibly suggesting that they were not only highly influential but also potentially groundbreaking. Most likely their prominence stems from the novelty of the topic, which attracted significant scholarly interest at the time. The dynamics of publication declined somewhat in 2023, probably due to the testing of a new tool (CHAT GPT-3) launched in 2022, and its capabilities. In general, there was a growing trend of interest in the topic (it should be noted that this study period ended in mid-2024, hence further publications can be expected in the research area under discussion), however the growing tendency could be observed. In conclusion, the topic is both relevant and developing rapidly as evidenced by the increasing number of publications, however it is not surprising that the impact of publications (measured by the number of citations) was greatest for articles from 2021 and earlier, which had been on the market relatively longest, whereas a lag effect can be observed for publications appearing later years (it might be assumed that the accumulation of citations is yet to occur here). To sum up, the recent years (2022-2024) were characterised by a large number of publications, but their scientific impact is yet to emerge.

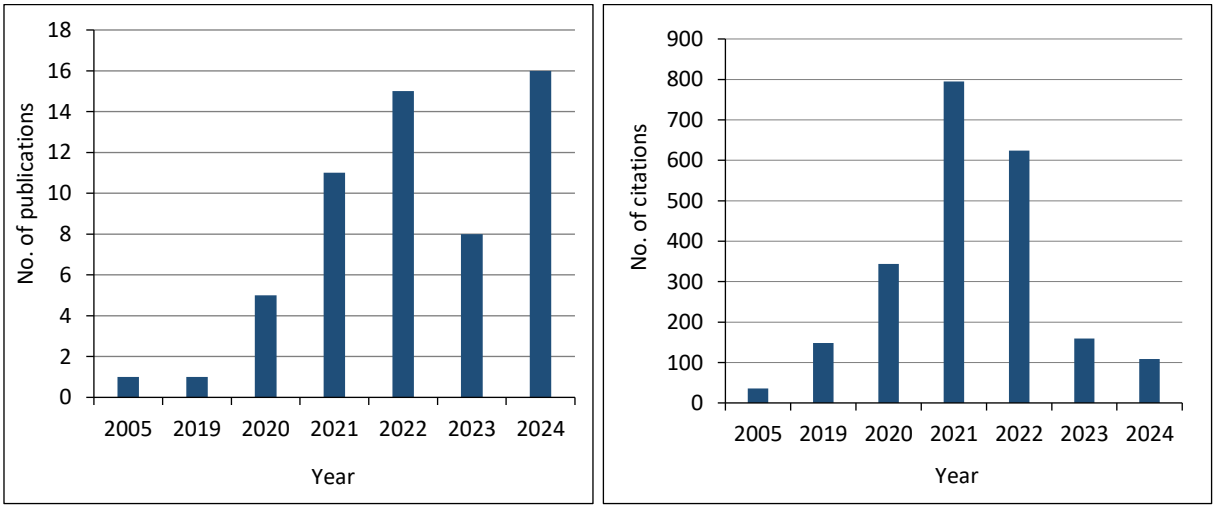

Fig. 2. Number of publications and citations per year

Source: own research.

Based on the number of articles published, the most relevant journals were identified (see Table 2), providing information on the type of journal that focusses on AI's influence on customer satisfaction.

Table 2. Ranking of journals based on the number of articles on AI and customer satisfaction

Rank	Journal	Articles	Thematic gr.		
			1	2	3
1	Journal of Retailing and Consumer Services	9	x		
2	Journal of Marketing	2	x		
2	European Journal of Marketing	2	x		
2	Foresight	2			X
2	Industrial Management and Data Systems	2		x	
2	International Journal of Hospitality Management	2		x	
2	International Journal of Production Research	2		x	
2	International Journal of System Assurance Engineering and Management	2		x	
2	Journal of Business Research	2		x	
2	Journal of Hospitality Marketing & Management	2	x	x	
2	Journal of Strategic Marketing	2	x		
2	WSEAS Transactions on Business and Economics	2		x	
3	Cogent Business and Management	1		x	
3	Electronic Commerce Research	1			X
3	Electronic Commerce Research and Applications	1			X
3	Humanities and Social Sciences Communications	1			X
3	Information Technology and Tourism	1			X
3	Innovative Marketing	1	x		
3	International Journal of Bank Marketing	1	x		
3	International Journal of Consumer Studies	1	x		
3	International Journal of Information Management	1		x	
3	International Journal of Research in Marketing	1	x		
3	International Journal of Retail and Distribution Management	1		x	
3	International Marketing Review	1	x		
3	Journal of Business Research	1		x	
3	Journal of Distribution Science	1		x	
3	Journal of Information Technology Management	1		x	
3	Journal of Marketing Analytics	1	x		
3	Journal of Marketing Management	1	x	x	
3	Journal of Research in Interactive Marketing	1	x		
3	Journal of Service Research	1	x		
3	Journal of Tourism Futures	1			X
3	Nankai Business Review International	1		x	
3	Psychology and Marketing	1	x		
3	Revista de Administracao Mackenzie	1		x	
3	Service Industries Journal	1	x		
3	Technological Forecasting and Social Change	1			X
3	Technology in Society	1			X
	Total	57	16	16	8

Note: 1 means 1st thematic group (marketing, with a strong emphasis on marketing strategies, consumer behaviour, marketing innovation, retailing or sales), 2 – 2nd thematic group (general management or in particular management area), 3 – 3rd thematic group (trend forecasting, social and technological transformations or information technology)

Source: own research.

Most articles were published in the *Journal of Retailing and Consumer Services* (*n* = 9) focusing on consumer behaviour research, retail marketing and services. Most publications can be found in the journals of two thematic groups:

- in the field of marketing, with a strong emphasis on marketing strategies, consumer behaviour, marketing innovation, retailing or sales (approximately 42 % of journals), and
- in general management or in particular management areas (e.g. strategic management, hospitality management, distribution management, production management, etc.) – also approximately 42%.

Two journals fell into both groups (*Journal of Hospitality Marketing & Management* and *Journal of Marketing Management*), hence the total percentage of journals exceeded 100% which may cause

confusion. The third and definitely the smallest thematic group comprised journals focused on trend forecasting, social and technological transformations, or information technology (approximately 21%). Most of the journals have a relatively applied profile, and many of them publish research that is useful for business practitioners, with topics close to market practice and customer management strategies rather than purely technological or theoretical analyses.

3.2. Bibliometric Analysis

The data set of 57 publications consisted of 231 keywords taken from the author-supplied keyword list. Co-occurrence analysis using VOSviewer v. 1.6.20 was conducted on keywords repeating a minimum of two times and it was observed that with these settings only 30 keywords met the criteria. Increasing the minimum number of keyword repetitions drastically reduced the number of words meeting the requirements (for example, with 3 occurrences only 12 keywords met the threshold, with 4 only 7, and with 5 only 3), which implies a great diversity of the research area and therefore a huge potential for exploration. As there is no universal recommendation for setting a minimum number of co-occurrences of keywords, and the choice of a minimum co-occurrence threshold should be adapted to the number of documents analysed and the purpose of the study, it was decided, given the relatively small data set, to adopt a threshold at which at least two co-occurrences appear. Two author's keywords ('covid 19' and 'scale development') were excluded to create a visualisation map due to their limited relevance to the main subject matter of this paper. The examination of the co-occurrence network visualisation map (Figure 3) showed that four clusters (colour-coded in the figure) were formed, pointing to distinct but related research areas:

- 1st (green) cluster *"Artificial intelligence and the anthropomorphisation of technology"*,
- 2nd (blue) cluster *"Artificial intelligence and customer service quality"*,
- 3rd (yellow) cluster *"Customer satisfaction and AI-driven digital assistants"*,
- 4th (red) cluster *"Chatbots, e-commerce and customers reaction".*

During the clustering process an additional restriction was imposed, related to minimum cluster size. Each cluster had to contain at least 5 keywords. Their description is presented in Table 3.

Four clusters described below were identified.

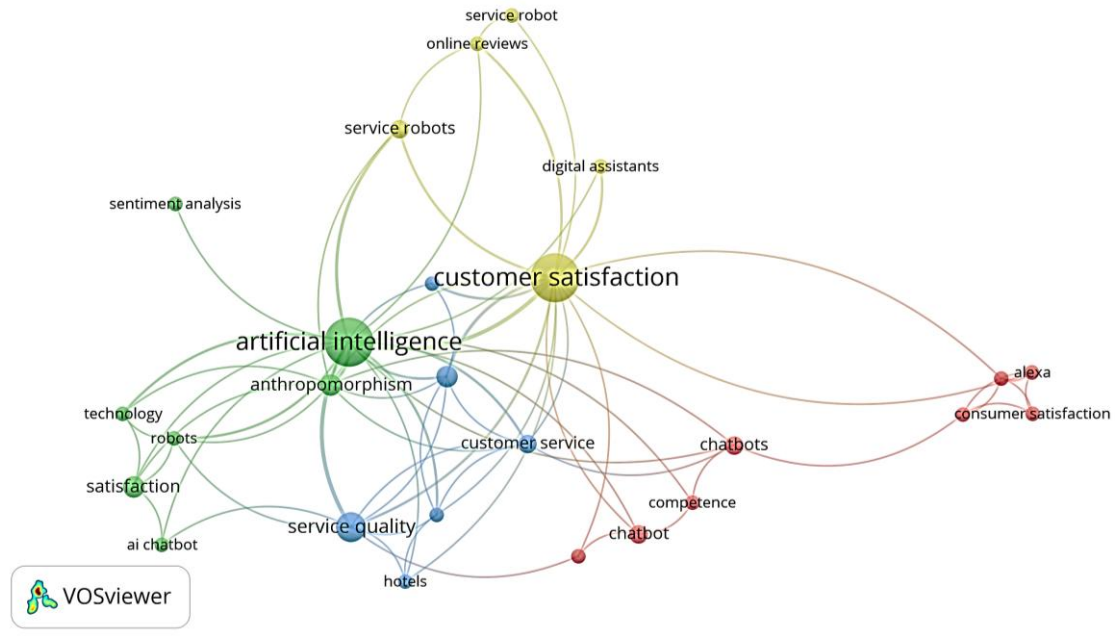

Fig. 3. Keywords co-occurrence – clusters

Source: own research.

Table 3. Main topics in the included studies – four clusters perspective

No.	Cluster name	Main topics
1 green	Artificial intelligence and the anthropomorphisation of technology	The focal point of this thematic area is artificial intelligence as a technology that is increasingly adopting anthropomorphic features (human characteristics are attributing to it in order to increase customer acceptance). Research in this area explore how personalisation and humanisation of AI affect perceived user satisfaction. Another important aspect is AI-driven chatbots and robots, the use of which is considered in the context of human-machine interaction. Researchers are looking at how different forms of AI technology affect customer relationships, for example through their ability to analyse sentiment or make decisions in a way that resembles human intelligence. The topic also raises ethical questions about the boundaries between technology and humans, and how consumer expectations of 'intelligent' machines affect their satisfaction. The cluster has the most strong links between keywords compared to others. Many of two analysed words co-occurred twice and more. Below is the link strength for words pairs for it is least 2: 'AI & anthropomorphism' (3)[1]; 'AI & customer development' (2); 'AI & robots' (2); 'AI & technology' (2) This may indicate that the topics discussed are fairly coherent. It is clear that sentiment analysis is only linked to AI. This shows that sentiment analysis is not linked to consumer satisfaction or any type of research other than strictly marketing-related.
2 blue	Artificial intelligence and customer service quality	This area of research focusses on the application of AI technology in the service industry - particularly in the context of service quality. One of the central themes is the impact of AI on the perceived quality of service (from responsiveness to accuracy of recommendations to empathetic communication). Customers are increasingly interacting with intelligent systems to replace traditional service (e.g. in hotels), raising questions for researchers about whether technology can effectively replace humans without compromising customer satisfaction. The issue of trust becomes particularly relevant here. Customer satisfaction seems to be built by trusting that AI makes the right decisions, acts in the customer's interests and can respond appropriately to the customer's needs. Distrust, on the other hand, can lead to a negative opinion of service quality and a refusal to use them. The keywords co-occur with each other, although their associations are not very strong. 'Service quality' is at the centre of this cluster. It co-occurs with nine other keywords that appeared at least two times in the examined papers. The blue cluster focusses more on the quality of services provided, mainly in the hotel industry. The frequency of co-occurrence of 'blue' paired keywords is lower than in the green cluster. The link strength is one for each couple of the blue keywords.
3 yellow	Customer satisfaction and AI-driven digital assistants	The analysis of how customer support technologies (such as service robots and digital assistants) affect the customer experience is an important part of this research area. An interesting thread here is also the role of online reviews, which not only influence purchasing decisions, but also provide a source of data for the development and improvement of AI technologies. Customer satisfaction in this context is considered through the prism of the efficiency, speed and relevance of the interactions offered by digital systems (AI-driven digital assistants and service robots). This cluster is coherent and most keywords within a cluster co-occur at least twice in the examined papers, e.g. 'customer satisfaction & service robot(s)' (3); 'customer satisfaction & digital assistants' (2); 'customer satisfaction & online reviews' (2). This suggests that these pairs appear more often together in scientific texts and are the subject of research.
4 red	Chatbots, e-commerce and customers reaction	E-commerce, as an environment particularly susceptible to automation and personalisation, is becoming a testing ground for AI applications. Research in this cluster investigates both the effectiveness of technology implementation and consumer reactions (e.g. levels of trust, engagement and loyalty to brands using AI). This research area looks at how chatbots affect an organization's perception of competence, communication effectiveness and consumer purchasing decisions. Competence in this context does not only refer to the technical prowess of the bots, but also to their ability to understand context, have a natural conversation with a human and make decisions in line with user expectations. A frequent research object in this cluster is Alexa (as an integration of AI technology into the consumer's everyday life, both in the home and shopping context). In this cluster, none of the words that comprise it have a dominant position. The keywords 'Alexa' and 'chatbots', which are themselves a type of AI, are more strongly associated with customer satisfaction than with AI (green cluster). This confirms the study of these relatively new technological solutions in the context of customer satisfaction. It is also worth mentioning that the topic of 'Alexa' has only appeared in recent years (see Figure 4). This shows that this topic is relatively new and still poorly researched. It can therefore be assumed that this research topic will develop in the coming years.

Source: own research.

[1] The number in brackets indicates the value of the 'link strength' indicator, which provides information on the number of common occurrences of the analysed keywords.

The link strength is strong between some central keywords from the green and yellow clusters. For example, the link strength between 'AI & customer satisfaction' totals 5 and between 'AI & service robots' is 3. Similar strong relationships exist between the green and blue clusters, where the link strength 'AI & service quality' is the most numerous and at 5, while it equals 2 for each of the pairs 'AI & customer loyalty' and 'AI & service quality'.

To explore how identified keywords are connected, degree centrality (DC), betweenness centrality (BC) and closeness centrality (CC) were measured. These are the most popular measures and crucial indexes for analysing network connections (Chang et al., 2023; Mukhtar et al., 2024; Zhang & Luo, 2017). The Gephi 0.10.1 software was used in the analyses. Degree Centrality shows the contextual popularity of a term and is measured by the total amount of direct links with the other nodes (Zhang & Luo, 2017). The highest normalised DCs are for 'artificial intelligence' *nDC* = 0.704 and 'customer satisfaction' *nDC* = 0.630, which is not surprising as they were the keywords used in the search string. Next, the most numerous connections with other keywords were found for 'service quality' and 'anthropomorphism' (for both *nDC* = 0.370), 'customer service' (*nDC* = 0.296) and 'customer experience' (*nDC* = 0.259). These can be interpreted as popular concepts present in various areas of research. A high DC suggests that these terms are the starting point for many research topics, however the vast majority of keywords on the network have a very low *nDC* (below 0.25). This means that they very rarely occur in combination with others and are weakly correlated, which is typical for large and diverse research domains. Most researchers deal with very narrow, niche or highly specialised topics that are rarely linked to others, yet many of these weakly connected nodes may represent new, emerging ideas that have not yet gained widespread popularity or connections.

Betweenness centrality measures "one node undertaking 'mediation' role in a network" (Zhang & Luo, 2017, p. 301), showing how often a given keyword appears on the shortest paths between nodes in the network. The highest BC values in the network corresponded to the keywords (for 'artificial intelligence' *BC* = 0.316 and for 'customer satisfaction' *BC* = 0.201), which confirms their role as intermediaries between topics. The top five are rounded off by words such as 'anthropomorphism' (*BC* = 0.178), 'service quality' (*BC* = 0.113) and 'robots' (*BC* = 0.054), however the latter has a significantly lower *BC* value than the others. 'Anthropomorphism' and 'service quality' are interesting and important, placed on communication paths, but the strength of the links between them and their neighbours is lower than in the case of the base keywords used in the search string. In particular, the first of them may be a topic in the formative stage, where connections are numerous, but not yet well established and strong. The vast majority of keywords obtained low betweenness centrality values, which indicates their limited mediating role in the co-occurrence network, but also suggests strong thematic specialization and clear separation of thematic clusters.

Closeness centrality shows the average distance from a given keyword to all other keywords in the network. The highest CC have again 'artificial intelligence' (*CC* = 0.816) and 'customer satisfaction' (*CC* = 0.721), and then 'anthropomorphism' (*CC* = 0.620), 'service quality' (*CC* = 0.585), hence they occupy a central position in the co-occurrence network and are closely related to most other terms. They function as core concepts, connecting different areas and contributing to the coherence of the research field. The *CC* value analysis also showed that most keywords achieve values around 0.5, which confirms that the research field under analysis is diversified but rather internally connected.

To assess the thematic distance between clusters, a matrix of Euclidean distances between the centres (centroids) of keyword clusters, as shown on the VOSviewer map, was calculated. The smallest distance ($d_{euc}(1,3) = 0.514$) and thus the strongest relationship was observed between clusters 1 and 3. These two clusters represent topics that are most closely related and complement each other. Both refer to the factors shaping customer satisfaction from AI-based product, although in cluster 3 the focus is on the efficiency, speed and relevance of the interactions offered AI-driven digital assistants and service robots, while in cluster 1 satisfaction (or lack thereof) resulting from interactions with AI products that exhibit human-like characteristics (both in terms of appearance and behaviour) is the focus of attention. Clusters 3 and 4 ($d_{euc}(3,4) = 0.820$), and 2 and 4 ($d_{euc}(2,4) = 0.842$) are characterised by

moderate proximity. The e-commerce cluster, dominated by research on chatbots (cluster 4), is thematically quite closely related to customer experience and the satisfaction that follows it (cluster 3) and the service quality (cluster 2). Clusters 2 and 1 ($d_{euc}(2,1) = 1.006$), and 2 and 3 ($d_{euc}(2,3) = 1.095$) are somewhat more thematically distant. Cluster 2 focuses strongly on shaping and evaluating AI-driven service quality and its role in shaping customer satisfaction, while in cluster 1 the perspective is completely different. Here, the focus is on the impact of the anthropomorphisation of technology and its impact on customer satisfaction. The most diverse are cluster 1 and cluster 4 ($d_{euc}(1,4) = 1.143$), with the greatest in their thematic profiles.

The co-occurrence network visualisation map in relation to year of publication is shown in Figure 4. Although the research issue under discussion has been explored for a relatively short period of time (less than 5 years), a clear evolution (related to the evolution of the capabilities of tools based on artificial intelligence) can be observed. In the initial phase – up to 2020 – the research focused on analysing how AI technology can support customer service and its potential impact on service quality. This was an exploratory phase, identifying the underlying relationship between AI and customer satisfaction (Prentice, Dominique Lopes et al., 2020; Söderlund, 2020) and the perceived potential for using chatbots (and generally AI) as tools to support, often in the hotel industry, sometimes only from a theoretical point of view (Ruel & Njoku, 2021 ; Sulaiman et al., 2020). It should be noted that the first surveys showed a great deal of distrust and caution towards the new tools, and that the comparison of customer satisfaction with the services provided tended to fall in favor of humans. According to Prentice, Dominique Lopes et al. (2020) the reliability, empathy, and assurance of the employees made unique, positive variances in overall service quality, while AI service quality had a negative effect on the overall assessment of service quality. However, customers' preference for AI service usage appeared to be an interesting moderator of customer perceptions and attitudes toward AI (Prentice, Weaven et al., 2020). The first, highly influential work on digital assistants also dates from this period (Brill et al., 2019), although the decisive development of the subject comes from later years.

The release of the first AI-based chatbot versions in mid-2020 naturally caught the interest of researchers in these technologies. This resulted in an incremental number of publications in 2021 addressing the development and practical applications of chatbots, and also exploring customer feedback on AI interactions. During this time there also appeared first articles on evaluating the communication effectiveness of AI systems, chatbot's usability and responsiveness and their impact on user emotions and further on customer satisfaction (J. S. Chen et al., 2021; S. H. Chen et al., 2021; Gelbrich et al., 2021). Toward the end of this period, researchers' interest began to shift towards the psychological and behavioural aspects of AI. Poushneh (2021) considered how humanising voice assistants (VA) – through personality traits – transforms customer experience through customers' perceived control, focused attention during voice interaction with VA, and exploratory behaviour. A key to customers satisfaction was found to be a perceived customer's control. Gelbrich et al. (2021) wondered to what extent digital assistants can provide emotional support to customers in technology-based services and it was found that assistants offering empathetic responses can increase customer satisfaction and loyalty to the service provider.

The period 2022-2023 also brought an increased interest in the humanising AI and chatbots (Q. Chen et al., 2022; Crolic et al., 2021; Jansom et al., 2022; Rizomyliotis et al., 2022; Xu et al., 2023), with the emerging research on anthropomorphism and customer loyalty to brands using AI (Crolic et al., 2021). An in-depth analysis was initiated of how users perceive machines (a variety of service robots) and what characteristics determine the positive or negative perception of AI in customer interactions.

The most recent publications, from 2024 (marked in yellow), show a clear thematic shift towards specific technologies and market products, such as 'Alexa'. Current research is no longer focused on just the general role of AI, but primarily on the personalisation of the customer experience, interactions with specific AI-driven tools such as voice assistants (Kim & Kim, 2024; Poushneh et al., 2024; Rawool et al., 2024), chatbots (Cai et al., 2024; Liang et al., 2024; Xie et al., 2024; Zhou & Chang,

2024), AI-integrated social media platforms (Bilal et al., 2024), AI digital employees (Le et al., 2024), and their impact on consumer satisfaction. The development of technology has led researchers to investigate the practical and market-based aspects of using AI in everyday customer service.

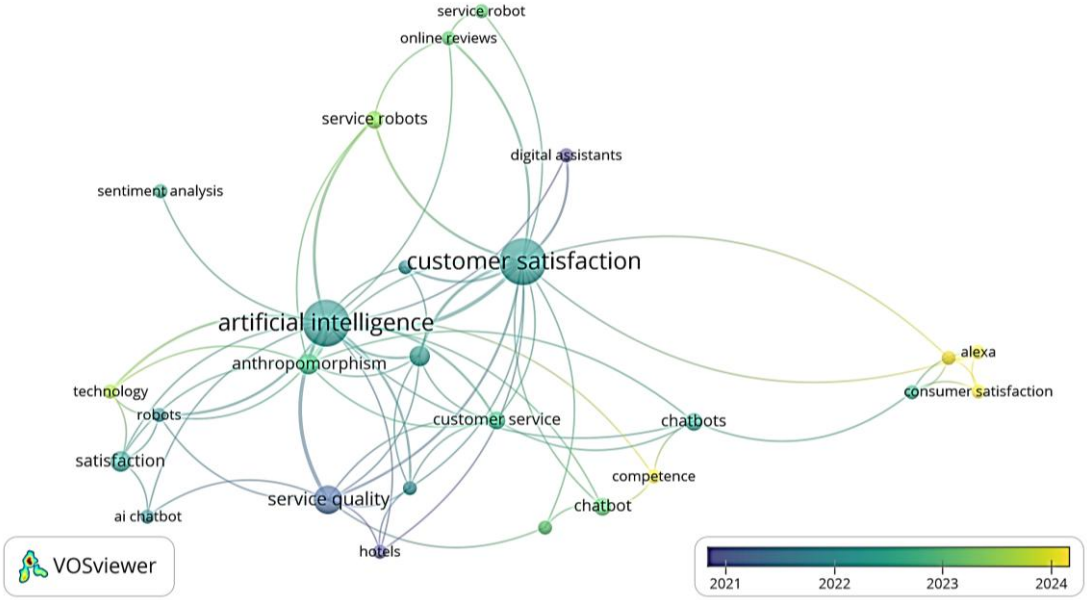

Fig. 4. Keywords co-occurrence map in relation to year of publication

Source: own research.

Figure 5 presents the distribution of the analysed papers in a two-dimensional arrangement: country versus the number of documents published. In terms of geographical areas, the countries with the greatest scientific contribution – such as the United States and China – stand out for their ability to generate and develop technological innovations in the field of AI that dominate globally as leaders in the implementation of AI solutions. Asian emerging economies with technological potential (e.g. Vietnam, India and Taiwan) still have a lower participation in scientific production, which highlights a structural inequality in the distribution of knowledge.

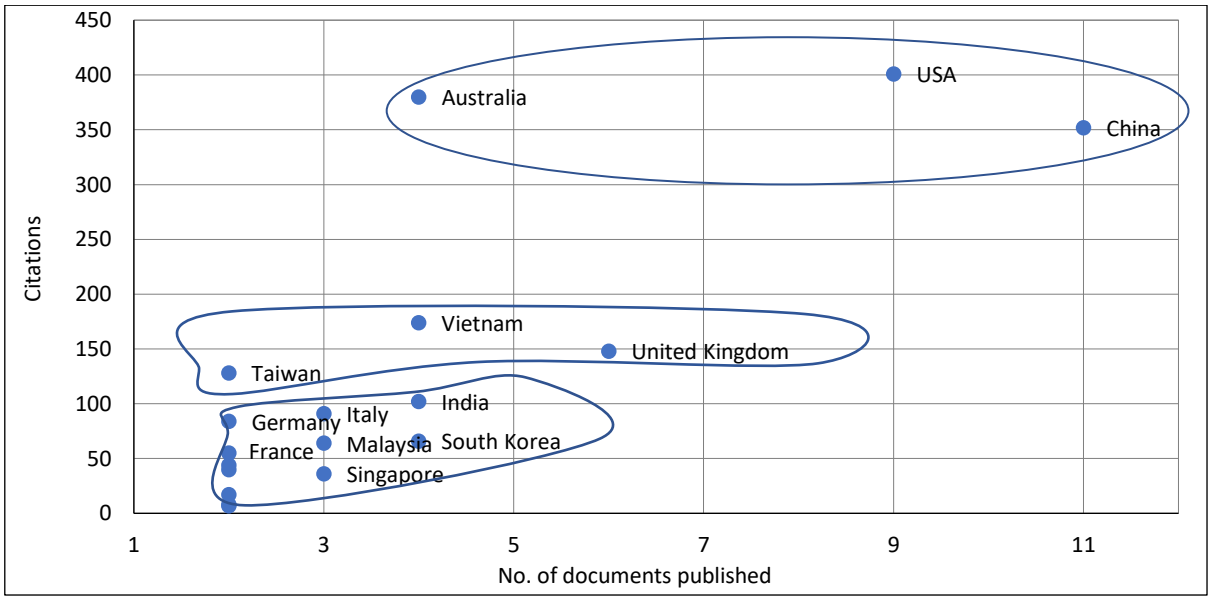

Fig. 5. The distribution of the analysed texts in a two-dimensional arrangement: country – number of citations

Source: own research.

Clustering analysis according to Euclidean distance and clustering using central linkages (Figure 6) was performed for two variables, namely the number of published documents and the numbers of citations, which confirms the existence of three main clusters. Due to the small sample size (less than 200 measurements), hierarchical analysis was used. The first cluster consists of leading states (China, USA, and Australia). Taiwan, Vietnam, and the United Kingdom formed the second cluster, with distance closer to the third cluster than to the first cluster. The distances between countries from the third cluster are very small, which could confirm their similar level of AI development. Generally, any European country is not a leading position according to the number of citations. However, some caution should be exercised when interpreting bibliometric data, as leaders are countries with large populations and areas, and theoretically this results in a greater number of publications. It should also be noted that only English-language publications were included in the analysis, which automatically excludes other potentially good and indexed publications, e.g. in German.

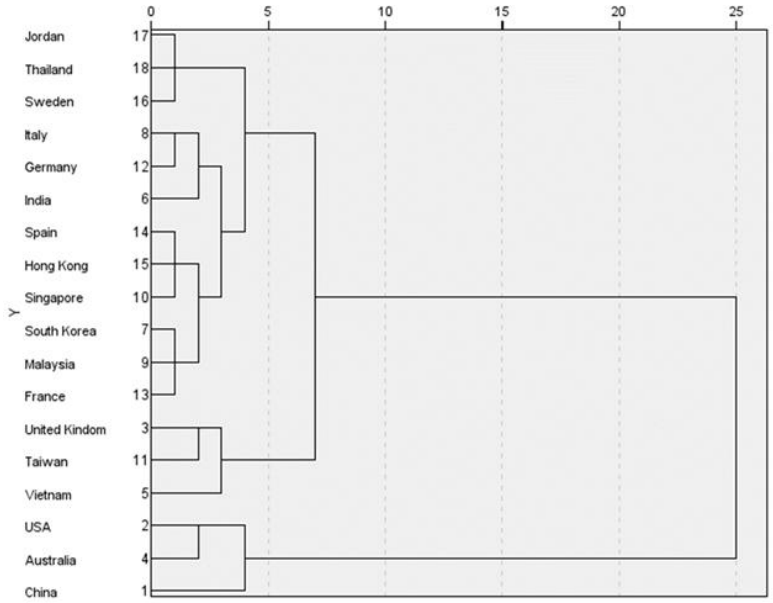

Fig. 6. Dendrogram using central linkage, combined clusters (scaled distances)

Source: own research.

Table 4. The most cited studies

Rank	Authors	Title	Journal	Citations
1	(Crolic et al., 2021)	Blame the Bot: Anthropomorphism and Anger in Customer–Chatbot Interactions	Journal of Marketing	216
2	(Prentice, Dominique Lopes et al., 2020)	The impact of artificial intelligence and employee service quality on customer satisfaction and loyalty	Journal of Hospitality Marketing and Management	154
3	(Brill et al., 2019)	Siri, Alexa, and other digital assistants: a study of customer satisfaction with artificial intelligence applications	Journal of Marketing Management	148
4	(Poushneh, 2021)	Humanizing voice assistant: The impact of voice assistant personality on consumers' attitudes and behaviors	Journal of Retailing and Consumer Services	146
5	(J. S. Chen et al., 2021)	Usability and responsiveness of artificial intelligence chatbot on online customer experience in e-retailing	International Journal of Retail and Distribution Management	125
6	(Prentice, Weaven et al., 2020)	Linking AI quality performance and customer engagement: The moderating effect of AI preference	International Journal of Hospitality Management	123
7	(Eren, 2021)	Determinants of customer satisfaction in chatbot use: evidence from a banking application in Turkey	International Journal of Bank Marketing	119
8	(Garvey et al., 2023)	Bad News? Send an AI. Good News? Send a Human	Journal of Marketing	109
9	(Moriuchi et al., 2021)	Engagement with chatbots versus augmented reality interactive technology in e-commerce	Journal of Strategic Marketing	98
10	(Gelbrich et al., 2021)	Emotional support from a digital assistant in technology-mediated services: Effects on customer satisfaction and behavioral persistence	International Journal of Research in Marketing	72
11	(Dora et al., 2022)	Critical success factors influencing artificial intelligence adoption in food supply chains	International Journal of Production Research	72

Source: own research.

The most influential studies are described in Table 4, with the most cited in the discussed topic article by Crolic et al. (2021), which raised an interesting issue of robots' anthropomorphism and its influence on customer reactions. Another significant study by Prentice, Dominique Lopes et al. (2020) discussed the impact of the quality of AI services and employees on customer satisfaction and loyalty. C. Prentice should be also recognised as a most influential author, who has published three other papers in the research area under discussion (Prentice & Nguyen, 2021; Prentice, Weaven et al., 2020) and has the highest total number of citations (324). (Brill et al., 2019) and (Poushneh, 2021) focused on analysing the satisfaction of customers using digital voice assistants. Other influential studies focussed on the factors that influence customer satisfaction when using chatbots in different market contexts and in various situations of use (Eren, 2021; J. S. Chen et al., 2021; Moriuchi et al., 2021).

4. Conclusion

The purpose of this study was to provide a comprehensive assessment of the current state of knowledge about customer satisfaction with AI-based services and products. The systematic analysis of the literature conducted according to the guidelines of the method contributed to the achievement of the set goal, as well as to filling the indicated research gap. Thus the study makes a significant contribution both in academic terms and organizational practice. It offers an in-depth reflection, emphasising the importance of many aspects of AI with respect to a very important issue, which is consumer satisfaction.

This research had several limitations. Articles indexed only in two databases (Scopus and WoS Core Collection) were included in the literature review, which may be a source of bias due to the potential exclusion of relevant studies from less-known sources. Despite the adoption of certain rules and teamwork in the process of evaluating the quality of articles excluded and accepted for research, there still exists the risk of subjectivity and exclusion of works that potentially make a major contribution to the development of the explored research field. Moreover, data analysis and synthesis of results may also reflect subjective viewpoints, and the use of specific keywords in a bibliographic search could have limited the range of results. The inclusion of synonyms and related terms (especially in the field of AI) could have helped identify more relevant studies, thus broadening the analysis and enriching the conclusions. Finally, the decisions made in the process of analysing the co-occurrence of keywords may also have influenced the research results obtained. These reasons might have limited the scope of the results and the representativeness of the conclusions.

Scientific studies in the discussed area, due to its novelty and developmental nature, are still growing and their number will probably increase in the coming period. Therefore, one should also indicate future directions of research in the field of literature analysis. First of all, it is worth expanding the research beyond the selected resources of Scopus and WoS Core Collection and include other databases, as well as 'grey literature', which in the case of such a popular topic may prove valuable. Second, the list of keywords can be extended. Moreover, to avoid subjectivity in the selection of articles, additional, objective criteria may be introduced, allowing for conducting an in-depth analysis of the selection. Finally, bibliographic analysis should be deepened by content analysis, which is the next step in the authors' planned research. The results of this study may be useful to researchers in gaining a deeper understanding of a given topic and its scientific context, for positioning their research within the context of the existing knowledge, and for determining directions for further research. To a lesser extent, the results of such a review are targeted at decision-makers and practitioners, however it may be also helpful for customer experience designers, digital service analysts, and managers implementing AI in service processes.

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Rola sztucznej inteligencji w kształtowaniu satysfakcji klienta: systematyczny przegląd literatury oraz analiza bibliometryczna

Streszczenie

Cel: Celem niniejszego badania jest kompleksowa ocena obecnego stanu wiedzy na temat roli sztucznej inteligencji w kształtowaniu satysfakcji klienta, w szczególności satysfakcji z usług i produktów opartych na sztucznej inteligencji.

Metodyka: Zmierzając do realizacji celu, przeprowadzono przegląd literatury zgodnie z metodą systematycznego przeglądu literatury, korzystając z wytycznych PRISMA. Analiza bibliometryczna i wizualna eksploracja przeglądu literatury zostały przeprowadzone przy użyciu oprogramowania VOSviewer.

Wyniki: Uzyskane wyniki badań pozwalają stwierdzić, że w ciągu ostatnich pięciu lat badania nad zastosowaniem sztucznej inteligencji w dziedzinie obsługi klienta i produktów przeszły wyraźną ewolucję. Uwaga badaczy skupia się głównie na działaniach typu *front-office*, podczas gdy działania typu *back-office* są omawiane raczej rzadko.

Implikacje i rekomendacje: Poruszana tematyka, jako stosunkowo nowa, znajduje się nadal w fazie rozwoju, a liczba artykułów w tym obszarze będzie prawdopodobnie dynamicznie wzrastać w nadchodzącym okresie. Aby odkryć interesujące luki badawcze, warto pogłębić przedstawione analizy o analizę treści, która jest kolejnym krokiem zaplanowanych badań.

Oryginalność/wartość: Dokonany przegląd literatury ukazuje aktualny stan badań w danym obszarze, identyfikując jednocześnie istotne luki poznawcze, które mogą wyznaczać potencjalnie interesujące kierunki przyszłych eksploracji naukowych.

Słowa kluczowe: sztuczna inteligencja, satysfakcja klienta, systematyczny przegląd literatury, SLR, zarządzanie