

THE POTENTIAL OF AI IN B2B E-COMMERCE: A STRUCTURED LITERATURE REVIEW

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Abstract

Unlike B2C E-Commerce, the exploration of E-Commerce in the B2B domain has not been as extensive, although B2B business models are expanding, and the number of purely online transactions is steadily increasing. The following application areas highlight the potential of Artificial Intelligence (AI) in B2B commerce for enhancing efficiency and improving the customer experience. Personalization enables individual product recommendations and tailored offers. AI analyzes data to predict customer needs and provide recommendations while automating repetitive tasks such as order processing and customer support. AI-powered systems assist customers in product search and ordering, and aid in dynamic pricing to maximize revenue. This paper summarizes the existing literature through a structured literature review in the context of B2B E-Commerce.

Keywords: Artificial Intelligence, Machine Learning, E-Commerce, Electronic-Commerce, B2B, Business-to-Business

1. INTRODUCTION

As per AgileIntel Research's discoveries, the worldwide B2B E-commerce market was worth of US\$17.9 trillion in 2021, with expectations for it to expand to approximately US\$36.2 trillion by 2026. The COVID-19 pandemic has expedited the adoption of digital solutions, leading to increased technological uptake and investments in B2B companies in the short to medium term. DHL, the international courier firm, predicts that 80% of all B2B sales interactions between suppliers and professional buyers will be conducted through digital channels by 2025 (Statista, 2022).



Fig. 1. Global B2B E-commerce GMV in billion US\$

Source: Statista, B2B E-commerce – In-depth Market Insights & Data Analysis, (2022), p. 16.

The Asia-Pacific region has established a significant lead over Western countries in all aspects of B2B E-commerce adoption, including platform integration, payments, omnichannel strategies, and customer experience. China stands out as the market leader, generating revenues of over US\$5 trillion in 2021, while Japan and India are also major players in the B2B E-commerce landscape (Statista, 2022a).

In summary, the Asia-Pacific region's B2B E-commerce growth is driven by a combination of factors, including an extensive network of low-cost suppliers, swift technology adoption, a large internet user base, and the successful establishment of online marketplaces in response to underdeveloped traditional retail ecosystems. As a result, Asia is currently leading the way in B2B E-commerce adoption, outpacing Western countries in various aspects of this rapidly expanding market.

A survey (Fig. 2) on the most popular sales channels in B2B trade in Germany in 2021 with the question "Which solutions/which sales channels does your company use for sales today?" showed that 56% of the companies surveyed use their webshop as a sales channel.

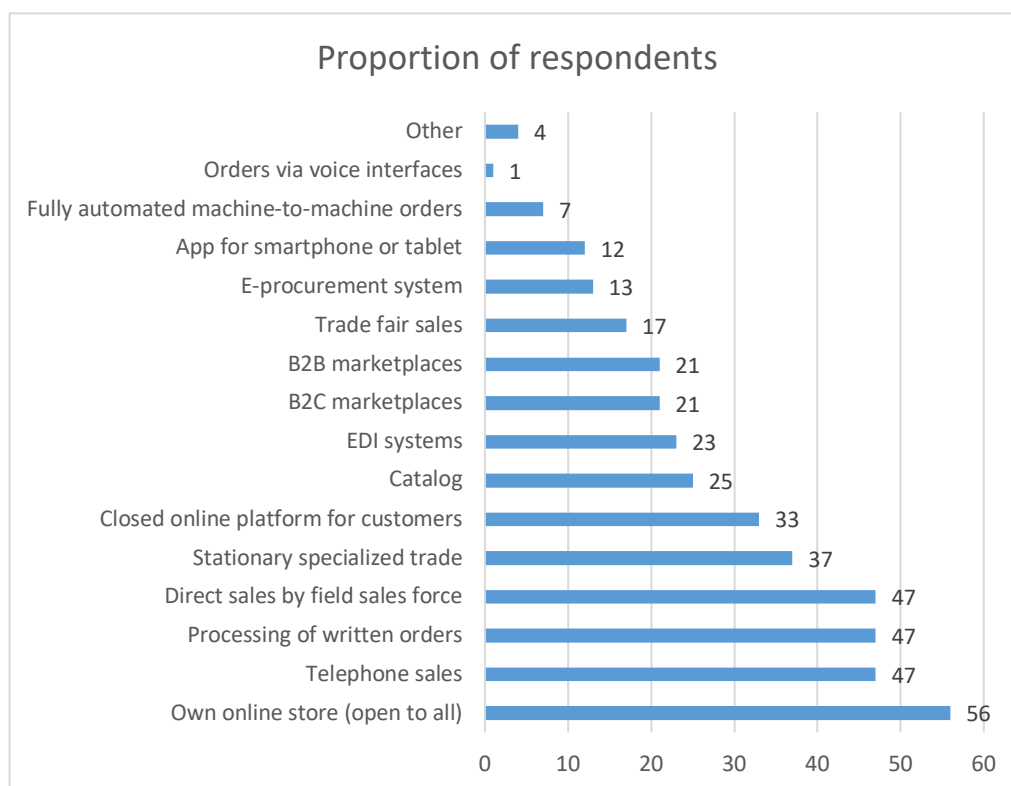


Fig. 2. Which solutions/which sales channels does your company use for sales today?

Source: Creditreform. (12. February 2021). Welche Lösungen / welche Vertriebskanäle nutzt Ihr Unternehmen heute für den Verkauf?

In a survey conducted in 2019 (Fig. 3), participants were asked about their preferences for transferring B2C shopping experiences to the B2B context. The question presented to respondents was: "Which aspects of your online consumer (B2C) shopping experience would you like to see in your online B2B shopping experience? (Select up to 5)" shows that the top three aspects want an easier checkout, 18% want an AI support for decision-making and 20% choose predictive ordering.

The use of AI is an approach to increase efficiency in e-commerce. What sets AI apart from other technologies is its ability to learn, establish connections, and adapt. This unique characteristic enables AI systems to continuously improve and evolve based on the data and experiences they encounter. (Brock & Von Wangenheim, 2019). AI has several advantages for businesses. For example, AI can

analyze large amount of data and help companies learn from it, allowing them to adjust and improve over time. The impact of AI varies depending on the specific type utilized. For instance, in chatbot applications, AI can streamline tasks and enhance efficiency by automating responses and interactions, thereby providing timely and accurate assistance to users. AI chatbots can solve 40-60% of e-commerce business user problems and improve service efficiency (Cheng et al., 2021). Among other things, AI ensures greater personalization in e-commerce (Huang and Rust, 2021), improved attribution of users on multi-sided digital platforms, and price optimization in real-time. The adaptability of AI makes it especially attractive for SMEs (Small and Medium-sized Enterprises) since it allows them to steer clear of being locked into a technology that could eventually become obsolete and costly to replace. AI's capability to evolve and stay relevant over time can provide SMEs with more sustainable and cost-effective solutions for their business needs. (Castillo & Taherdoost, 2023).

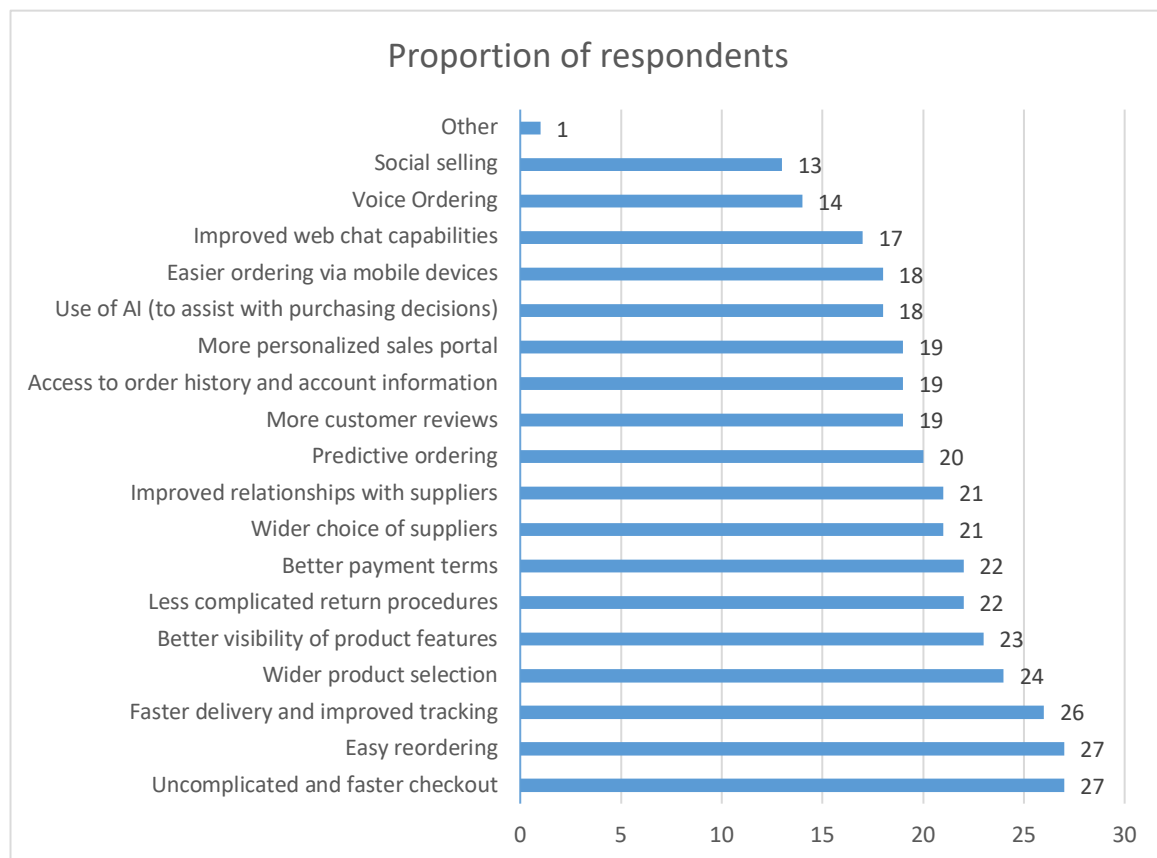


Fig. 3. Which aspects of your online consumer (B2C) shopping experience would you like to see in your online B2B shopping experience?

Source: Sana. (20. August 2019). Welche Aspekte Ihres Online-Käuferlebnisses als Verbraucher (B2C) möchten Sie auch in Ihrem Online-B2B-Käuferlebnis sehen? (Wählen Sie bis zu 5)

In spite of the potential advantages, they stand to gain, a considerable proportion of SMEs have not embraced these technologies. The primary factor contributing to this hesitance is that SMEs face numerous challenges due to their modest size, such as the financial resources nor the technical staff to implement this type of software solutions (Silva & Gonçalves, 2022), which makes it harder for them to adopt and effectively harness digital technologies (Ritter & Pedersen, 2020a).

The use of optimization techniques supported by artificial intelligence can help to optimize B2B e-commerce. The majority of the available literature deals primarily with B2C e-commerce. This study

aims to investigate the current state of the literature on the application potentials of B2B e-commerce in particular.

This will be done by selecting and analyzing relevant studies concerning the integration of AI in e-commerce, with a specific focus on its implementation in B2B (Business-to-Business) contexts. The main aim is to comprehend the benefits that AI introduces to the e-commerce sector and to explore the precise realms and technologies in which AI is utilized. The existing literature is summarized and a comprehensive report is provided. This paper will give an overview on how organizations can use AI in B2B e-commerce and which value-adding mechanisms AI can enable. The initial phase of the study involves gathering and reviewing research papers that investigate the adoption and utilization of AI within organizations since the year 2018. By analyzing these studies, the researchers aim to gain insights into how AI was being implemented and employed in various organizational contexts during that specific time frame. After assessing the relevance and quality of the papers, the remaining studies are analyzed and synthesized, resulting in a framework for understanding the business value of AI. Following the synthesis of information, a comprehensive research agenda is defined, delineating key areas that demand exploration and attention in forthcoming investigations.

2. MATERIALS AND METHODS

2.1. Methods

This section presents the details of how the systematic literature was conducted. The focus was set on analyzing several aspects that influence the functioning of B2B e-commerce initiatives with AI. The review comprised the identification of primary studies, the application of inclusion and exclusion criteria, and the synthesis of the results.

To achieve the study design, the author followed the protocol previously published by Biolchini et al., 2005. Based on his, a systematic literature review was applied through the following procedures:

- Present the proposed research questions (Research Questions).
- Reveal the Investigated Approach and Frameworks for Data Collection (Search Methodology).
- Introduce the adopted criteria for study selection (Article selection).
- Explain the chronological distribution of selected articles (Distribution of studies).
- Introduce the quality assessment of the studies (Quality assessment).
- Utilize the research questions to identify pertinent insights from the chosen articles (Data extraction).

2.2.1. Research Questions

The study was initiated by defining the research questions. The use of AI technologies in B2B e-commerce is surveyed based on two questions. The first topic of interest was what advantages arise for companies when using AI in e-commerce and the second was which specific technologies are used. According to this, the following two research questions were set to guide the review:

RQ1: What benefits can be achieved through the use of AI?

RQ2: Which AI technologies, techniques, and methods were used?

2.2.2. Search strategy

The next step was to select studies to answer the research questions. The selected methodology necessitates the use of diverse databases to ensure a comprehensive and extensive coverage of the literature. This approach aims to enhance the likelihood of including highly relevant articles in the search results and subsequent analysis.

The study included searching the following databases:

- ACM Digital Library

- Google Scholar
- IEEE
- ScienceDirect
- Springer
- Scopus

The search string was a combination of keywords and, depending on the search technology of the database, executed in several individual queries combined using OR:

"Electronic Commerce" "Machine learning" AND "Business to Business" OR "Electronic Commerce" AND "Machine learning" AND "B2B" OR "Electronic Commerce" "Artificial Intelligence" AND "Business to Business" OR "Electronic Commerce" AND "Artificial Intelligence" AND "B2B" OR "E-Commerce" AND "Machine learning" AND "Business to Business" OR "E-Commerce" AND "Machine learning" AND "B2B" OR "E-Commerce" AND "Artificial Intelligence" AND "Business to Business" OR "E-Commerce" AND "Artificial Intelligence" AND "B2B"

Inclusion/Exclusion Criteria

The following set of inclusion and exclusion criteria was applied:

Criterion 1: Papers published within the last 5 years from Jan 1, 2018, were considered.

Criterion 2: Only English was accepted as the language.

Criterion 3: Comparative studies, surveys, feasibility studies, and secondary studies were not considered because secondary studies generally do not provide new research findings.

2.2.3. Article Selection

The databases defined in Section 2.3 with the search string were used to select the studies. After applying the search string, 4,220 articles were found. Duplicate articles were then removed. The titles of 4,220 articles were checked and subsequently, 307 documents remained for an abstract review. Then the full text was reviewed for 111 articles and a further selection was made based on relevance to the research questions. In the end, 44 articles remained for the study.

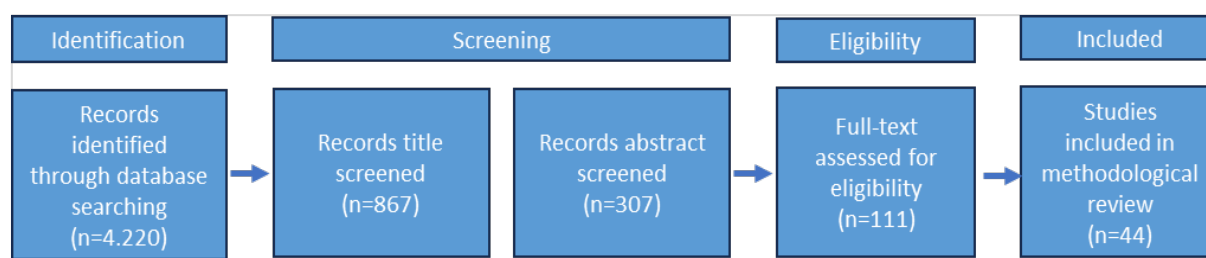


Fig. 4. Article Selection

2.2.4. Distribution of studies

Figure 5 illustrates the annual publication count for the past 5 years, since January 1, 2018 and the principal keywords utilized in the research papers are outlined in Figure 6.

2.2.5. Quality assessment

To value the quality of the papers under consideration the following criteria were applied. Three questions were established, encompassing rigor, significance, validity, and reliability. Each criterion awarded the paper one point. Inclusion in the selection required a minimum of two points.

- Does the paper contain a clear statement of the research objective?

- Is there a discussion of the results?
- Is it an academic paper?

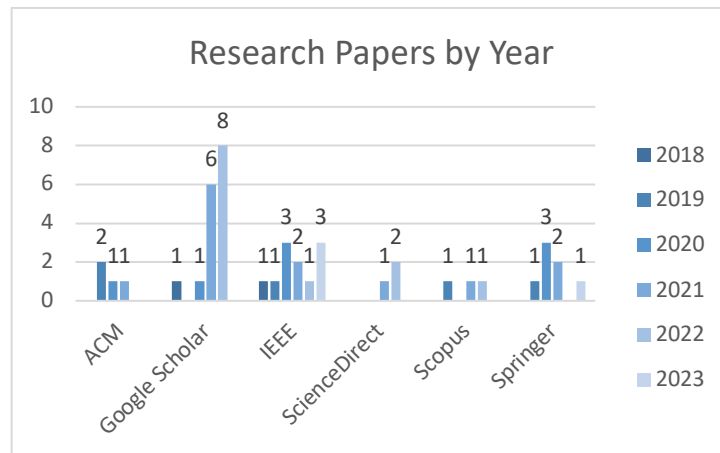


Fig. 5. Research papers by year

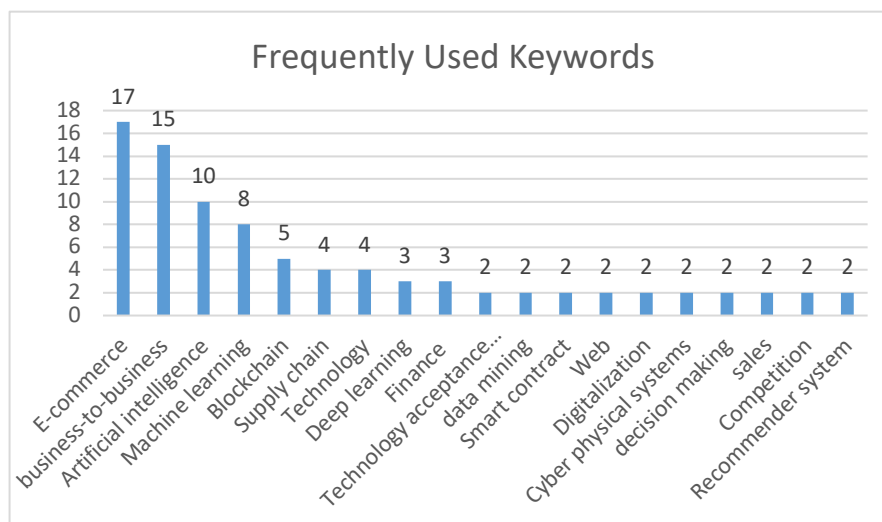


Fig. 6. Frequently used Keywords (n>1)

3. RESULTS

This section provides an analysis of the three research questions previously defined in section 2.2.1.

3.1. RQ1: What benefits can be achieved through the use of AI?

Delina et al., 2021 primarily focus on the application of AI techniques such as clustering and decision tree methods for solving supplier selection problems, developing strategies for the reduction of supplier risk, and analyzing supply disruption risk in supplier selection.

Devi, 2021 provides the next four benefits that can be achieved through the use of AI, particularly in the context of e-commerce. AI and machine learning technologies are capable of analyzing and predicting consumer shopping behaviors based on their browsing and purchasing history. This can lead to the development of more targeted and effective marketing and sales strategies. AI can be utilized to integrate chatbot tools into your customer service system. These chatbots are capable of handling a substantial

portion of customer inquiries, thereby improving the overall customer experience and simultaneously alleviating the workload of your customer service team.

In their research paper titled "Framework for Detection of Fraud at Point of Sale on Electronic Commerce sites using Logistic Regression," Alabi and David, 2023 introduced a novel application of artificial intelligence, specifically logistic regression and artificial immune systems, to tackle the issue of identifying fraudulent transactions in the domain of e-commerce.

Rosas, 2023 discusses how AI and machine learning can transform businesses' processes and analyze information, enabling organizations to derive deeper insights and make more informed decisions. They allow for "human-like" thinking, which makes it easier for professionals to do the business analytics part. These technologies can learn from business patterns and adapt their process specifically to business needs. AI combined with BI can revolutionize how businesses work.

Zong et al., 2021 discuss several benefits of using AI, particularly in the context of e-commerce and decision support systems. AI systems, such as Decision Support Systems (DSS), can gather and synthesize large amounts of data efficiently. This capability is particularly useful for managing operations and other planning divisions of an enterprise. In e-commerce, AI systems can gather and analyze data to create comprehensive information about customers. This goes beyond the capabilities of normal operations applications, which only collect data. The document highlights the existence of an operational research-based intelligent decision support system (OR-IDSS) designed for e-commerce decision-making.

Pan & Zhou, 2020 discusses the benefits of using AI, specifically Convolutional Neural Networks (CNNs), in the context of e-commerce and data mining. CNNs can automatically extract effective features from raw data, eliminating the dependence on manual feature engineering. This is particularly beneficial as manual feature extraction is often time-consuming, labor-intensive, and requires expertise in a specific field. The document discusses an algorithm for predicting sales volume based on CNNs. This algorithm can automatically extract effective features from the original structured data and use them to forecast commodity sales. Through verification experiments conducted on extensive data sets, it has been demonstrated that this algorithm effectively enhances the accuracy of sales forecasting.

Goyal et al., 2022 discuss the role of AI and e-commerce in B2B interactions and the benefits they bring. The document highlights how e-commerce, powered by AI, has facilitated global market access, improved economic positions, and promoted tourism. It also mentions the benefits of reduced information searching costs, improved efficiency, and productivity in many areas. AI plays a pivotal role in the B2B e-commerce context by significantly enhancing efficiency, automating processes, and fostering sales improvements. It supports up-selling, cross-selling, supply chain maintenance, production and procurement operations, and corporate procedures. The document discusses the utilization of real-time analytics and machine learning to enhance sales performance.

The document titled "RATAN: A Smart Business to Business (B2B) Communicator" (Das et al., 2018) discusses the use of AI in enhancing B2B communication. The AI system, RATAN, automates the process of searching, scheduling, and setting appointments, providing an edge over rivals by speeding up the process of making deals. It uses AI and web scraping to provide better results in the form of reviews, ratings, stats, and client history. The system also predicts which companies will grow faster in the coming years and recommends them to clients for profitable business deals.

The document titled "Analyzing sales proposal rejections via machine learning" (Nguyen, 2023) provides of using AI and machine learning (ML) that can be used to analyze unstructured, complex sales data. This approach can help uncover buyer- and transaction-level insights, which can be used to better understand the antecedents of customer dissatisfaction that lead to supplier rejections. The application of AI and ML can develop competitive advantages in the marketing discipline.

The article by Han et al., 2021 provides several benefits of using AI, particularly in the context of B2B marketing. Undoubtedly, the implementation of AI for innovation has the potential to significantly enhance customer satisfaction within B2B marketing. Notably, AI technologies often require less time to enhance customer satisfaction when compared with conventional management processes. For

example, AI can be used to develop models to classify customers into different groups based on various criteria. This allows B2B marketers to understand their customers and personalize the company's services to increase customer satisfaction. AI technologies offer a valuable and effective solution to address challenges in sales forecasting, which is influenced by a complex array of interrelated elements. These elements include conflicting interests among participants, the ever-changing business environment, and the involvement of multiple stages in the sales process. Leveraging AI can provide powerful insights and predictive capabilities to navigate these complexities and improve the accuracy of sales forecasts.

The document "Applications of artificial intelligence in B2B Marketing: Challenges and future directions" (Moradi & Dass, 2022) discuss AI can be used to analyze email communications, acting as an early-detection measure of crisis. AI also assists in making restocking easier and increases productivity in sales by supplying supplementary data and analysis in real-time throughout a sales call, or by training salespeople directly. Chatbots can be more effective than novice workers when using highly organized outbound sales conversations.

Pan & Nugent, 2018 discusses the implementation of artificial intelligence (AI) in electronic bartering platforms, which can be seen as a form of B2B collaboration. The AI system acts as a mediator, managing interactions between buyers and sellers. It stores purchase requests and sells requests and facilitates transactions when a purchaser's requested price is higher than a seller's offer. The AI collects the difference between the transaction's requested price and the seller's offer, thus earning from facilitating the trade.

Kong et al., 2021 explore the integration of Artificial Intelligence in the e-commerce trade of the healthcare industry in their research paper titled "The Adoption of Artificial Intelligence in the E-Commerce Trade of Healthcare Industry." The authors delve into the various benefits and practical applications of AI within the context of B2B collaborations, with a particular emphasis on the healthcare sector.

Buyanova et al., 2020 discuss the use of AI in the context of e-commerce and B2B collaboration. AI offers numerous advantages that positively impact various aspects of the digital landscape. Establishment of an E-commerce Ecosystem: AI contributes to the creation of a thriving online marketplace, enabling seamless interactions between businesses and consumers. Widespread Internet Access: With the aid of AI, there is a significant expansion in internet coverage, reaching more people worldwide and fostering connectivity. AI facilitates the seamless transition from traditional electronic trading to the mobile commerce realm, enhancing accessibility and convenience for customers. AI-powered advancements propel the progress and expansion of digital marketplaces, empowering businesses to access a broader clientele and elevate their product and service offerings. AI-powered logistics solutions receive substantial investments, leading to improved efficiency, timely deliveries, and cost-effectiveness in the supply chain.

The article titled "Managing B2B customer journeys in the digital era: Four management activities with Artificial intelligence-empowered tools" (Rustholkar et al., 2022) identifies four key management activities for managing B2B customer journeys: analyze, design, engage, and guide. AI-empowered tools can support companies in these B2B customer journey management activities. AI can interact with its surroundings and modify its behavior or surroundings in a goal-oriented way based on recognized patterns in data. This ability allows AI to demonstrate intelligence in a non-human context, such as learning, understanding, and dealing with new situations. AI can be used for automatic social media posts, determining the best timing for these posts, creating personalized ads and experiences for customers, and responsive testing of alternative ads. It can also personalize social media feeds and recognize prohibited posts on social media.

Damnjanovic, 2019 discusses the use of AI technologies, particularly chatbots, in enhancing business operations and B2B collaborations. The benefits of using AI include improved business results, effective communication, increased customer engagement, cost efficiency, and a personalized approach to customers. These benefits are particularly realized through the use of chatbots, which can automate and

enrich communication, support customer acquisition and sales, provide a personalized approach, overcome language barriers, and integrate with various departments.

Leung et al., 2019 discuss the application of AI in a B2B e-commerce environment, specifically in managing the Request For Quotation (RFQ) process. Using AI in this context offers several advantages, such as enhanced efficiency in decision-making, particularly when it comes to pricing decisions. It also leads to considerable time and manpower savings during the RFQ (Request for Quotation) process. Moreover, AI can boost the acceptance rate of quotations and uncover hidden relationships among various parameters, such as customer purchasing behaviors and product sales performance.

Wei & Pardo, 2022 emphasizes the importance of AI in optimizing business processes, improving customer interaction, and enhancing operational efficiency. It also highlights the role of AI in B2B collaboration, particularly in areas such as design, innovation, and cross-platform coordination.

The paper titled "Determinants of E-Commerce, Artificial Intelligence, and Agile Methods in Small- and Medium-Sized Enterprises" (Barata et al., 2023) delves into the significance of AI and agile methods within the realm of e-commerce, with a particular focus on their impact on small and medium-sized enterprises (SMEs). The document explores how these technological advancements can benefit SMEs operating in the e-commerce sector and highlights their potential contributions to improving business operations and competitiveness. AI is an innovative tool for customizing and optimizing e-commerce platforms and SME operations, which can be crucial in B2B collaborations. AI can help in the efficient acquisition and analysis of data, which can be beneficial in B2B collaborations where data sharing and analysis are often required.

In Jahangiri, 2020 AI enhance the internal integrity of B2B companies, particularly those in the e-commerce market. Companies that leverage AI can gain competitive advantages over those that do not. AI can help create demand for specific products, provide a better B2B market experience, and expand the customer base. As more customers mean more risks, including privacy and security, AI can help ensure confidentiality and cybersecurity.

Usluoğlu et al., 2021 discuss how AI can support B2B collaboration in the context of e-commerce based on a B2B platform such as data processing and predictions, product categorization, and big data analytics. AI can analyze immense volumes of electronically exchanged data among businesses and generate valuable insights for predicting future processes.

Rashed et al., 2020 titled "MultiRec: The paper "A Multi-Relational Approach for Unique Item Recommendation in Auction Systems" introduces an innovative model called MultiRec, specifically designed to address the challenges of recommending unique items in auction systems. This model utilizes user and item attributes in conjunction with auxiliary relational data commonly found in auction settings, such as user purchase and bidding histories, as well as final sale prices of items. To evaluate the effectiveness of MultiRec, the authors conducted several experiments using both a proprietary dataset from Volkswagen Financial Services' used cars center and a publicly available eBay auction dataset.

Rabieinejad et al., 2021 discuss a DeFi-based model for financial management in the supply chain, specifically in the context of e-commerce and B2B collaboration. This model uses blockchain to create a Peer to Peer (P2P) network between members of the supply chain, providing security, transparency, and proper distribution of information.

The study titled "The Impact of AI-Human Interaction on Value Generation in Multi-Actor Systems: The Role of AI in Shaping Digital B2B Sales" explores how AI plays a pivotal role in leveraging customer data analysis for predicting purchasing patterns. This empowers businesses to tailor their offerings and marketing tactics to individual customers. Additionally, AI is shown to enhance supply chain operations, leading to greater efficiency across inventory management, logistics, and delivery processes. AI can personalize product recommendations, improve customer service, and optimize various other aspects of the online shopping experience and AI and machine learning can shift the focus of sales to new inter-organizational functions, enhancing B2B collaboration and value creation (Rustholkarhu & Aarikka-Stenroos, 2019).

Nia et al., 2019 discuss the use of AI technologies in the context of a large-scale B2B recommender system, particularly for e-commerce applications. Essential AI techniques employed encompass Natural Language Processing (NLP), unsupervised learning, word representations, similarity computation, and short text categorization. These technologies support various aspects of B2B collaboration, such as item recognition, user modeling, item classification, and feature extraction. The integration of this system can result in reduced labor costs and enhanced efficiency in accurately identifying the appropriate items for customers.

Sancar & Uzun-Per, 2022 titled "Feature Selection in Customer Churn Analysis: Case Study in B2B Business" discusses the use of AI technologies in a B2B company called BiletBank, specifically for customer churn analysis. BiletBank collects periodic data sets from various business units and categorical characteristics of customers for churn analysis. This data is then preprocessed to make sense of it. The document discusses the use of statistical, wrapper, and embedded methods to examine the effects of different types of data sets on churn analysis. It also analyzes the importance of these features over time. The study examines the effect of customer interactions with the system over different periods on churn analysis.

Arora et al., 2020, explore the application of AI technologies, such as machine learning, deep learning, and blockchain, within the realms of e-commerce and B2B collaboration. These technologies are used to enhance customer experiences, anticipate customer behavior, and improve security. Specifically, AI and blockchain are applied in recommender systems, which generate meaningful recommendations for items of interest to users. The convergence of these technologies holds significant promise for the future, especially in bolstering security within collaborative recommender systems.

Azevedo, 2022 discusses how AI technologies, specifically the Analytic Hierarchy Process (AHP), the Technique for Order Preference by Similarity to an Ideal Solution (TOPSIS), and Big Data Analytics, are used in the context of e-commerce and B2B collaboration. These technologies help in making decisions about business supply chains and logistics operations, improving customer segmentation, personalizing marketing messages, and understanding customer needs and preferences. They also play a key role in the decision-making processes for logistics distribution and supply chain management.

3.1.1. Clustering

With the search results remaining at the end, seven topic clusters can be formed. The clusters correspond to the application fields of the AI methods.

AI-powered chatbots can enhance customer support and engagement in B2B e-commerce. These AI-powered systems can manage routine inquiries, furnish product information, aid in order tracking, and even handle intricate interactions using their natural language processing capabilities. By utilizing machine learning, chatbots can continuously improve their responses and become more effective in understanding and addressing customer needs.

In the cluster Customer Experience AI can enhance customer experience through personalized recommendations, targeted marketing, and more streamlined interactions. AI algorithms exhibit a remarkable ability to analyze customer data, encompassing historical purchases, preferences, and behavioral patterns. This prowess empowers them to provide personalized product suggestions and tailored offers, catering to individual customer needs and enhancing their shopping experience. Moreover, AI can be used to optimize website layouts and design, making the user experience smoother and more intuitive.

In Data Analysis and Data Mining AI can efficiently process and analyze vast amounts of data in real-time, helping businesses uncover valuable insights. By employing techniques like machine learning, AI can identify patterns, trends, and correlations within the data, leading to better-informed business decisions and improved strategies.

A very extensive subject area is the Decision Support. AI can act as a powerful decision support system by providing data-driven insights and recommendations. It can assist in pricing strategies, demand forecasting, and supply chain optimization. By presenting relevant data to decision-makers, AI enables faster and more accurate choices in B2B e-commerce operations.

AI-driven automation can streamline various processes in B2B e-commerce, reducing manual labor and minimizing errors. By automating tasks such as order processing, inventory management, and shipment tracking, businesses can achieve heightened efficiency, diminished operational costs, and accelerated order fulfillment processes.

In cluster fraud detection, AI can be utilized to identify and prevent fraudulent activities in B2B e-commerce transactions. By leveraging historical data and monitoring real-time transactions, AI algorithms can detect unusual patterns and raise red flags for potentially fraudulent activities, initiating additional scrutiny and enhancing safeguards against fraud risks.

A topic that is frequently mentioned is predictions and sales forecasting. AI can aid in predicting market trends and forecasting sales based on historical data, customer behavior, and market dynamics. Accurate sales forecasts enable businesses to optimize inventory levels, plan marketing campaigns, and make informed business decisions for future growth.

Cluster /Authors	Findings
Chatbots	
Barata et al., 2023; Wei & Pardo, 2022; Sivaram et al., 2022	AI automates working processes, reducing routine tasks' time and encouraging more efficient data acquisition and analysis. AI automation improves various processes and customer service experiences through chatbots.
Buyanova et al., 2020	The accelerated introduction of AI in e-commerce enables improved customer service, personalized advertising, and efficient operations.
Damnjanovic, 2019	AI-powered chatbots help with customer acquisition, qualifying leads, and raising awareness, improving sales proposals in enterprises.
Moradi & Dass, 2022	AI-powered chatbots improve outbound sales conversations.
Customer Experience	
Dwivedi et al., 2021	AI assists in understanding customer behavior and preferences, enabling better decision-making in marketing.
Mohdhar & Shaalan, 2021	AI and IoT enhance e-commerce systems, providing a better user experience and identifying and solving problems proactively.
Sancar & Uzun-Per, 2022	AI helps analyze customer churn patterns and develop strategies for customer retention in B2B businesses.
Treiblmaier & Sillaber, 2021	AI-driven online robots can improve customer service experience.
Wei & Pardo, 2022; Damnjanovic, 2019	AI enhances customer interaction, and engagement, and provides a personalized approach, improving customer satisfaction and loyalty.
Data Analysis & Data Mining	
Nia et al., 2019	AI facilitates data interpretation and feature selection, essential for churn analysis in B2B businesses.
Pan & Zhou, 2020	AI-driven sales forecasting, effective data utilization, and improved accuracy enhance optimization in e-commerce.
Sancar & Uzun-Per, 2022	AI predicts customer behavior, allowing businesses to target specific users and improve marketing ROI.
Usluoğlu et al., 2021	AI effectively categorizes products in e-commerce platforms, improving data organization.
Decision Support	
Arora et al., 2020	AI and deep learning enhance security in collaborative recommender systems through better decision-making.
Delina et al., 2021; Rashed et al., 2020	AI aids decision-making by predicting consumer behavior, analyzing market structure, and enhancing recommendation systems.

Han et al., 2021	AI increases efficiency and serves as a method of invention for R&D and marketing strategies.
Leung et al., 2019	AI techniques provide decision support in e-commerce, leading to efficient and effective pricing and production decisions.
Makinde et al., 2020	AI can help predict customer behavior for improved customer service and increased sales.
Nguyen, 2023	AI and ML can analyze unstructured sales data, providing decision support through topic modeling and insights from failed interview transcripts.
Nia et al., 2019	AI improves B2B recommender systems' anomaly detection, leading to better decision-making and user experiences.
Rabieinejad et al., 2021	Defi's characteristics include user data control, secure info sharing, and rapid capital transfer.
Rosas, 2023	AI in BI leads to deeper insights, informed decisions, and business automation, transforming how organizations process and analyze information.
Rustholkarhu & Aarikka-Stenroos, 2019	AI's learning capabilities set it apart, influencing value creation in multi-actor systems.
Saleem et al., 2019	AI, data science, and data mining support decision-making by extracting business patterns and providing market analysis in e-commerce.
Usluoğlu et al., 2021	AI's real-time analytics benefit various industries, analyzing current user behavior for predictions.
Wu et al., 2019	AI-based protection frameworks ensure system stability by handling service failures.
Zong et al., 2021	AI systems, such as Decision Support Systems (DSS), can gather and synthesize large amounts of data efficiently.
Efficiency & Automation	
Barata et al., 2023; Buyanova et al., 2020	AI reduces costs, and large-scale investments in logistics improve delivery efficiency, benefiting both businesses and consumers.
Devi, 2021; Jahangiri, 2020; Wei & Pardo, 2022	AI automates upselling, customer support, distribution planning, and online purchases, streamlining business processes.
Ehm et al., 2020	AI facilitates efficient data flow in B2B environments like semiconductor supply chains.
Goyal et al., 2022; Wei & Pardo, 2022	AI helps in cost reduction by optimizing information search and credit access costs for suppliers.
He et al., 2023	AI can increase transaction efficiencies by automating repetitive tasks and efficiently mining data.
Leung et al., 2019	AI supports efficient decision-making and improved pricing decisions in the RFQ process, resulting in time and manpower savings and an increased acceptance rate.
Maurya et al., 2023; Das et al., 2018; Delina et al., 2021; Wei & Pardo, 2022	AI enables efficient scheduling, decision-making, and supply chain optimization, leading to enhanced customer experience.
Miao et al., 2019	AI helps SMEs reduce costs, accelerate product development, and adapt to customer needs.
Mohdhar & Shaalan, 2021	AI-enabled e-commerce systems efficiently handle data, enable conversation commerce, and transform job roles, enhancing user experience and location-based services.
Moradi & Dass, 2022	AI enhances efficiency in B2B firms by analyzing emails, improving sales productivity, and providing real-time data and analysis during sales calls.
Nia et al., 2019	AI automates the recommendation process, saving labor costs and improving item classification.
Rabieinejad et al., 2021	Blockchain-based SCF allows faster capital transfer, increasing liquidity and system efficiency.
Rustholkarhu & Aarikka-Stenroos, 2019	AI's enhanced data processing capabilities enable broader task automation and behavior adaptation.

Usluoğlu et al., 2021	AI's Naive Bayes classifier excels in fast and effective text classification with minimal training data.
Fraud Detection & Intrusion Detection	
Alabi & David, 2023	AI can detect and prevent fraudulent activities, safeguarding businesses and customers.
Mehmood, 2021	AI can detect intrusions and potential security threats, improving overall cybersecurity measures.
Predictions & Sales Forecasting	
Agrawal et al., 2022	AI-driven MTA helps optimize business processes, leading to process optimization and better outcomes.
Das et al., 2018	AI aids in accurate sales forecasting, supporting strategic decision-making and inventory planning.
Dharshini & Vijila, 2021	Deep learning models like CNNs improve sales forecasting accuracy.
Maurya et al., 2023; Das et al., 2018	AI can predict product sales and company growth, supporting inventory planning and strategic decision-making.
Nia et al., 2019	AI helps interpret data and select relevant features for better sales forecasting in B2B businesses.
Sancar & Uzun-Per, 2022	AI assists in customer churn analysis, leading to better sales proposals and customer retention strategies.
Sivaram et al., 2022; Wei & Pardo, 2022	AI-based predictive analysis aids in customer recommendations, customized offers, and actions.

Table 1. Clustering Benefits

3.2. RQ2: Which AI technologies, techniques, and methods were used?

Presentation of the technologies, techniques, and methods in some exemplary analyzed papers:

The document by Han et al., 2021 mentions several AI technologies that are used, particularly in the context of B2B marketing. Decision support systems find common applications within companies to facilitate managerial decision-making at the commercial level. These systems often involve the use of analytical models and can be either automated, managed by human operators, or a combination of both. On the other hand, machine learning entails an analytical approach in which algorithms are designed to perform specific tasks autonomously, without direct human intervention. These algorithms learn from patterns present in historical data, enabling the establishment of analytical models capable of uncovering previously unknown patterns and making accurate forecasts.

Delina et al., 2021 mentions the use of the Clustering Approach: This is a technique used for solving supplier selection problems. The document specifically mentions the use of a two-step clustering method for market structure analysis. This approach is recommended for extensive datasets that include a combination of categorical and numerical information.

Decision Tree: This classification technique has been previously utilized to tackle supplier selection problems, encompassing tasks such as feature selection and multiclass classification. The document specifically mentions the use of the CHAID decision tree for analyzing relations between variables and price premiums considering also the number of new potential suppliers/competitors.

Treiblmaier & Sillaber, 2021 use Online robots that use an intention recognition model: These can be used to enhance e-commerce customer service.

Devi 2021 uses AI-assisted upselling and cross-selling, where machine learning is used to predict shopping habits based on browsing and shopping history. AI is used to add chatbot tools that can lighten the customer service workload and improve the customer experience.

Saleem et al., 2019 provide several insights into the benefits of using AI, particularly in the context of business and e-commerce. Machine learning and data mining tools are used to extract data. This includes

techniques such as text analytics, predictive analytics, descriptive statistics, and natural language processing. The ability to merge old (historical) data with new data has had a significant impact on results. This has helped data scientists uncover hidden business patterns, multiple correlations, unknown user preferences, and abstract market zones, thereby setting up new business opportunities.

In Alabi & David, 2023 Artificial Neural Networks (ANN) have been found to outperform Random Forest in electronic fraud detection. The paper presents a novel model specifically crafted for fraud detection in e-commerce platform transactions, employing logistic regression as the primary analytical technique. This method is known for its resilience and versatility in predicting dichotomous categorizations, making it suitable for anticipating binary outcomes or conditions. The document also discusses alternative machine learning approaches, such as Support Vector Machines (SVM), Decision Trees, and Random Forest algorithms, which have been employed in prior research for fraud detection, yielding varying levels of effectiveness.

Zong et al., 2021 explore various AI technologies employed in the realm of e-commerce and decision support systems, which are computerized systems designed to aid companies or organizations in making informed decisions and judgments. These systems utilize extensive data analysis to solve problems and make effective decisions. Fuzzy Logic, a form of AI, plays a significant role in this context by dealing with approximate reasoning instead of rigid and exact logic. Incorporating fuzzy logic as a management approach enhances the effectiveness of analysis and business regulation, particularly concerning ambiguous concepts, software techniques, and languages. The research introduces an innovative approach called Intelligent Fuzzy Agent (IFA), which works in tandem with a meeting scheduling agency (MNA), a fuzzy inferential agent (FIA), and a genetic learner agent (GLA). Together, these components synergize to enhance the meeting schedule selection process, leading to more efficient outcomes. Furthermore, the Fuzzy Association Rule Mining (FARM) approach proves to be invaluable in a pricing decision support system, particularly in the B2B e-commerce domain, where determining prices becomes challenging due to an increasing number of influencing factors.

Pan & Zhou, 2020 discusses the use of the following AI technologies. Convolutional Neural Networks (CNNs) are used for automated feature extraction from raw data, eliminating the need for manual feature engineering. They are also used for sales forecasting, data mining, and building models to predict customer behavior. CNNs are particularly effective for characteristic variables with complex non-linear relations. The stochastic Gradient Descent Algorithm is used to optimize the model, with parameters updated by backward conduction.

In Das et al., 2018 the AI technologies used include web scraping, Selenium, a Decision Support System, and a ViewBot Crawling Algorithm. These technologies help in data extraction, web crawling, converting social media data into business intelligence, and efficient data fetching and processing.

Nguyen, 2023 mentions the Part-of-Speech (POS) Tagging technology. This involves annotating words in a text with their respective part-of-speech based on their definition and context. It assumes a crucial role in numerous Natural Language Processing (NLP) tasks. On the other hand, Topic Modeling refers to a statistical modeling technique used to identify abstract "topics" present in a set of documents. It's used to analyze unstructured data in a relatively simple and comprehensive manner. ML is used to analyze postmortem interview transcripts from B2B sales proposal rejection cases.

Moradi & Dass, 2022 provide several insights into the AI technologies used in B2B marketing. AI can be used in predictive analytics for customer relationship management (CRM), helping B2B companies understand and anticipate their customers' needs better. AI is used for data processing, which is one of the most useful applications of AI as reported by B2B marketers. AI is used for identifying trends and B2B marketers can apply computer vision models for image/video analysis, providing them with additional tools for marketing and customer engagement.

Maurya et al. 2023, conducted a comprehensive study employing a diverse array of machine-learning techniques to effectively classify product categories. The algorithms utilized in this study included Naive Bayes, Logistic Regression, Support Vector Machines, K-Nearest Neighbors, Decision Trees, and Random Forests. The primary objective of these algorithms was to analyze customer behaviors and forecast purchase intentions.

He et al., 2023 mention the use of AI technologies in the context of Alibaba's Lingshoutong ("LST") platform, a B2B digital retail sourcing and distribution platform. AI plays a crucial role in data mining activities, empowering the exploration of vast datasets to reveal valuable patterns and trends. Additionally, AI can be leveraged to forecast customer preferences and facilitate the creation of more captivating products and services.

Buyanova et al., 2020 used AI Technologies including lead scoring, blacklist services, personalization of advertising content based on Big Data, voice search, Augmented Reality technology, total automation, chatbots, and omnichannel communication. These cutting-edge technologies are harnessed to elevate customer service, optimize operations, and boost the overall efficiency of e-commerce platforms.

The technologies in Rustholkar et al., 2022 are ML, NLP, and Image Recognition. ML allows the machine to learn to perform a task by examining previous examples. ML embodies the remarkable capacity to uncover patterns and insights from data automatically. Within the realm of ML, various methods come into play, such as artificial neural networks, decision trees, regression techniques, and random forests, among others.

In Leung et al., 2019 the key AI technologies used include fuzzy association rule mining, fuzzy logic, MATLAB Fuzzy Logic Toolbox, and data mining techniques, all integrated into a system called Smart-Quo.

Jahangiri, 2020 mentions the use of AI Algorithms. Alibaba, the Chinese e-commerce platform, uses specially created AI algorithms to fulfill certain needs. These algorithms likely help in enhancing the internal integrity of the company, creating demand for specific products, providing a better B2B market experience, and expanding the customer base. Ant Financial, a prominent subsidiary of Alibaba, has seamlessly integrated a cutting-edge blockchain solution into its platforms, specifically the Ant Blockchain Open Alliance and Double Chain Connection. The primary objective behind this integration is to extend a range of financial services specifically catering to SMEs.

Usluoğlu et al., 2021 mention several AI technologies that were used in the context of e-commerce. Apache Spark is a cutting-edge framework renowned for its ability to efficiently handle extensive data sets, enabling real-time processing of tasks. Within its architecture, it incorporates essential functionalities for data analysis, including data transformations and actions. Moreover, Spark excels in distributed data processing, effectively executing tasks across multiple computers and utilizing cluster computing to leverage its analytics prowess and storage capabilities.

Dharshini & Vijila, 2021 discusses the use of various AI technologies in sales forecasting, particularly in the context of e-commerce and B2B collaborations. Key technologies include Convolutional Neural Networks (CNN), Radial Basis Function Networks (RBFN), Multilayer Perceptron (MLP), Self Organizing Maps (SOM), Generative Adversarial Networks (GAN), and Long Short Term Memory Networks (LSTM). These technologies can improve the accuracy of sales forecasting, which is crucial for decision-making in B2B collaborations and can lead to increased profitability in e-commerce.

3.2.1. Result of the most used technologies, techniques, and methods

In the analyzed papers, 174 different technologies, techniques and methods could be proven. The following table lists the most frequently mentioned technologies, techniques, or methods:

frequently mentioned technologies, techniques, or methods
Augmented Reality (AR)
Automatic Reasoning
Big Data Analytics
Blockchain
Chatbots

Clustering
Computer Vision
Convolutional Neural Networks
Data Analysis
Data Mining
Decision Support System
Decision tree methods
Deep Learning
Fuzzy Logic
Image Recognition
Internet of Things (IoT)
Language Generation
Logistic Regression
Natural Language Processing
Neural Networks
Predictive Analytics
Predictive Modelling
Recommender Systems
Robotic Process Automation (RPA)
Smart contracts
Speech Recognition
Speech Recognition
Support Vector Machines
Text Analytics

Table 2. Frequently mentioned technologies, techniques, or methods

4. DISCUSSION

A thorough and systematic literature review was conducted to delve into the topic of B2B e-commerce and explore the diverse array of AI techniques along with their applications. This comprehensive analysis aimed to provide an understanding of how is the power of AI harnessed and applied in the B2B e-commerce landscape. The review examined how B2B companies are presently leveraging AI in their operations, encompassing an investigation into the diverse applications of AI technologies within this context. Furthermore, the study sought to capture the viewpoints and perspectives of B2B companies regarding the advantages and benefits that AI brings to their businesses in the e-commerce domain.

Different AI applications in B2B e-commerce are discussed in the literature (Nia et al., 2019; Leung et al., 2019; Makinde et al., 2020; Rashed et al., 2020; Jahangiri, 2020; Kassies, 2022; Li, 2022; Rustholkarhu et al., 2022). These techniques enable companies to assess current business conditions, observe trends and precedents, and make predictions. AI scoring helps B2B companies reach, acquire, convert, and retain customers. For example, AI-generated content and intelligent content delivery (Wei

& Pardo, 2022; Damjanovic, 2019) can transform the way content is created to reach and engage customers. Predictive analytics effectively encourage customers to buy products. Moreover, dynamic pricing, web and app personalization, and chatbots (Barata et al., 2023; Wei & Pardo, 2022; Sivaram et al., 2022) engage and convert customers. The potentials implemented so far are mainly the seven researched clusters.

B2B companies have the option to build the knowledge themselves or to outsource it. They need to consider the long-term benefits of AI. Although the initial costs are estimated to be high, after AI implementation, the benefits outweigh the costs. AI is not only used to analyze large amounts of data but also for automation. The resulting increase in efficiency is an important way to use AI. Finally, due to recent advances in the efficiency of ML algorithms, B2B companies are now able to integrate the technologies directly into the applications.

As the utilization of AI becomes more prevalent, the need to address its associated risks and ensure its sustainability becomes ever more crucial. The expanding adoption of AI underscores the importance of proactively managing potential challenges and ensuring a responsible and enduring integration of this transformative technology.

5. CONCLUSIONS

Leading global companies, such as Google and Microsoft, are increasingly expanding their products with AI, thereby enabling broad access to the technologies.

The paper discusses already implemented AI projects in the field of B2B e-commerce, whereby AI in B2B e-commerce still has a lot of potential for further applications. The role of AI in B2B e-commerce has been underrepresented in previous research, with limited exploration of potential benefits for companies. The literature review highlights a growing trend of AI methods in B2B e-commerce, yet widespread implementation remains relatively scarce.

Chatbots, Customer Experience, Data Analysis and Data Mining, Decision Support, Efficiency & Automation, Fraud Detection & Intrusion Detection, and Predictions & Sales Forecasting were the mainly described areas of AI applications. Many other AI methods are still relatively unknown.

The time is ripe for B2B companies to gain a competitive advancement through implementing AI technologies.

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