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How OpenAI can disrupt the creative industries

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Abstract

ChatGPT is a powerful new language model developed by OpenAI. The aim of this study is to examine how the evolution of AI-driven autonomous systems has transformed traditional and new industries such as advertising/marketing, publishing, IT (software and computer services), and design (products and graphics). The research observed a number of changes in these industries, including faster and more accurate mobilization and dissemination of information, enhanced productivity, job displacement, automation of routine tasks, the creation of new job opportunities, greater collaboration with teams, and improved speed and accuracy of creative processes. The study provides a conceptual framework that explains the impact of industry drivers and external factors on the industries' environment. The findings offer valuable insights and suggest future research directions to further understand the impact of AI technology on industry evolution.

Keywords: OpenAI; new technology; ChatGPT; technology.

1 Introduction

In today's fast-paced global business environment, no company or industry is immune to the effects of technological breakthroughs, industry reforms, and government actions (Doganis, 2005; D'aveni, 2010). As industries continue to evolve, firms must initiate changes to respond to the constantly evolving competitive landscape (Burnes, 2004). Organizations that can embrace and capitalize on new technologies such as artificial intelligence, robotics, and the internet of things are better positioned to renew their business models and revitalize their sources of market competitiveness (Sheng et al., 2019). The effects of these change forces have impacted every functional activity within organizations across an array of industries in both advanced and emerging economies. Furthermore, ample opportunities for business growth and expansion into new markets exist alongside these emerging forces. Despite the growing interest in new technology and the evolution of industries (Malerba, 2007; Malerba & Orsenigo, 1997; Ozalp, Eggers & Malerba, 2023), much remains to be learned about how industrial structures can be disrupted by the introduction of new

technology. Specifically, studies on industry disruption and evolution have largely failed to account for the impact of contemporary technologies such as OpenAI.

OpenAI has enabled advances in machine learning, natural language processing, computer vision, and robotics, creating powerful tools that are being used to revolutionize everything from healthcare and automotive manufacturing to retail and banking sectors (Finley-Moise, 2020). However, there is a lack of research on how industrial structures can be disrupted by the introduction of OpenAI. Therefore, the primary purpose of this study is to examine how the evolution of AI-driven autonomous systems has altered traditional and new industries. This article aims to contribute to this body of knowledge by examining how OpenAI has transformed and can transform different industries.

OpenAI has demonstrated the potential of using AI-driven autonomous systems in various fields, including autonomous vehicles and military robotics (Darrell et al., 2023). Additionally, OpenAI has had a significant impact on the creative industries, from content creation to video games. OpenAI's tools, such as GPT-3 for music creation and StyleGAN for photorealistic images, have enabled creatives to develop new methods of creating content (Larsen and Narayan, 2023). Moreover, OpenAI's research in reinforcement learning has advanced AI-powered video games and automated content curation (OpenAI.com, 2023). The company's work in natural language processing has also revolutionized content creation and automated marketing campaigns.

This research contributes to the literature on industry and technology evolution by examining the impact of OpenAI on various industries, including the regulatory environment, employability, and future potential for investments (Chuma et al., 2023). Building on prior research, this paper identifies key trends and opportunities that can be leveraged to improve

the effectiveness of operations within several industries. Furthermore, this study examines how the evolution of industries has made the creative industry more competitive and diverse, with smaller businesses able to access larger customer bases and new markets with less cost than ever before. The paper also explores the process adopted by OpenAI, which has fostered an increase in collaboration between companies in the industries, leading to more innovative and creative outcomes, as well as the associated risks of adopting such technology with limited access to human interference.

The paper begins by providing a brief overview of the literature on industry and technology evolution, followed by an examination of the development of OpenAI, its symptoms, and industry evolution as the context. The effects of OpenAI on four traditional and new industries - advertising/marketing, publishing, IT (software and computer services), and design (products and graphics) - are then examined. Finally, the paper outlines the lessons and insights from the evolution of OpenAI for future research and practice.

2 Theoretical underpinnings: industry and technology evolution

Industry evolution refers to the process of change and development within industries and organizations over time, which can be in response to technological advancements, economic shifts, and other market changes (Audretsch, 1995). It can also encompass the transformation of individual companies and their products or services to remain competitive and successful (Cusumano et al., 2015). According to Verhoef and colleagues, industry evolution is driven by increasing competition, changing consumer demands, and global markets (Verhoef et al., 2021). Industries that have evolved over time tend to be more successful than those that have not. For instance, digital technologies have revolutionized the media, retail, and automotive industries, while automation, robotics, and 3D printing have

challenged traditional manufacturing. However, industry evolution can also involve the development of standards and regulations to ensure compliance, sustainability, and safety (Latapí Agudelo et al., 2019). Compliance with specific regulatory and safety standards is a necessity for all industries to remain competitive, such as minimum wage requirements, environmental regulations, and product safety standards. Industry evolution creates new opportunities for collaboration between companies, organizations, and governments of all sizes to create new products and services that benefit customers and society (Santos et al., 2018). Nevertheless, many industries must develop strategies for managing costs, responding to new technologies, and staying competitive in a changing market. Research suggests that innovation is a driver of industry evolution (Malerba & Orsenigo, 1997; Ozalp, Eggers, & Malerba, 2023). Coupled with liberalization and deregulation, it creates a conducive environment that facilitates entrants (Doganis, 2005). In many sectors, new entrants have been a source of new technologies, innovation, and new business models (Agarwal, Sarkar & Echambadi, 2002).

Over the past century, technology has evolved rapidly since the invention of the telephone and the introduction of computers, becoming increasingly complex and sophisticated, and continuously improving communication, entertainment, and productivity (Shan et al., 2023). Modern advancements such as artificial intelligence, virtual reality, and 3D printing have revolutionized how we live and work in the 21st century (Xuhui et al., 2023). As technology continues to evolve, it paves the way for countless opportunities and applications. For example, robotics, automation, and the Internet of Things are transforming manufacturing, while big data analytics and machine learning are revolutionizing data science (He et al., 2023; Xuhui et al., 2023).

The advancement in biotechnology, nanotechnology, and quantum computing is ushering in a new era of possibilities (Eller, 2023). Technology is not just about inventions; it's about the use of technology. New technologies can create sustainable solutions, improve healthcare, and enhance education (Caviggioli et al., 2023). Technology is helping to bridge the digital divide through initiatives such as low-cost computers, open educational resources, and mobile phone applications for education (Ghildiyal et al., 2023). Furthermore, technology is making a massive impact on human lives and the world around us, playing an increasingly important role in the workplace. Businesses are using robotics, automation, and big data to automate processes and enhance productivity (Tu et al., 2023). Virtual reality is being used to improve training and experience virtual environments, and advances in communication technology are making it easier than ever to stay connected with colleagues and customers. Overall, technology is transforming the way we live and work (Hunter and Orr, 2023). Figure 1 illustrates a number of organizational and external drivers of industry and technology evolution.

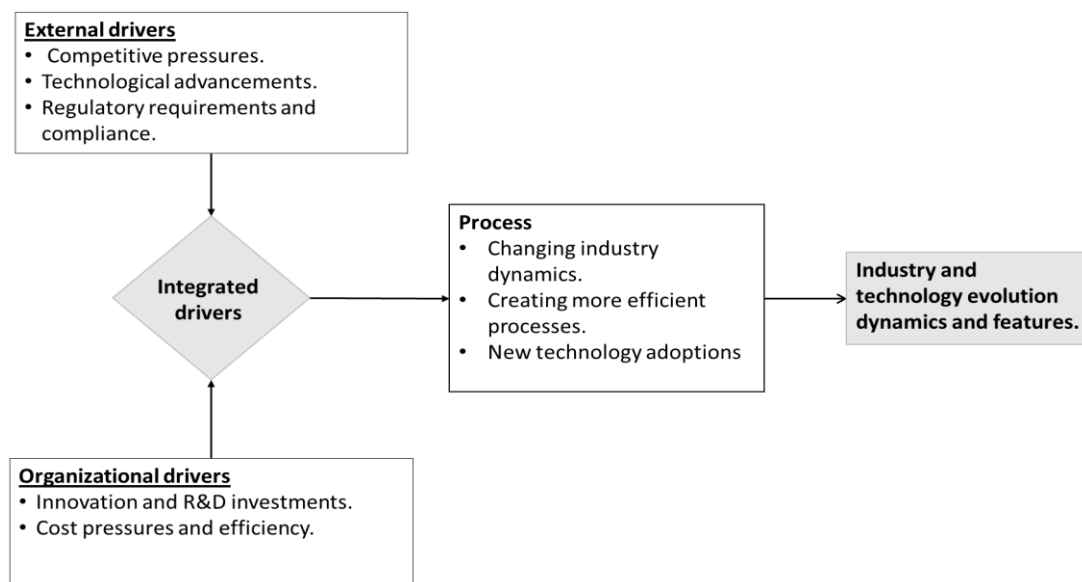


Figure 1: An integrated drivers of industry and technology evolution.

3 Research context: OpenAI, Symptoms and industry evolution.

To investigate the impact of OpenAI, it is essential to explore the evolution of technology and industries and understand how they change over time. This research aims to bridge the gap between theory and practice by examining how industry evolution affects critical transformations in business processes. Specifically, we focus on how OpenAI and evolution impact job creation, cost reduction, scalability of existing businesses, customer feedback, and other industries. This is a long-term cycle of adaptation and transformation driven by advances in technology, customer needs, and competition.

Changes resulting from technology and industry evolution are reflected in products, services, processes, and structures, providing opportunities to increase efficiency, reduce costs, and improve customer experience. However, it is necessary to further investigate the industry revolution and technology evolution to explain how OpenAI disrupts industry processes and how it impacts various industrial processes. This includes automating mundane tasks, replacing human labor, and introducing new ways to streamline and improve existing processes. OpenAI enables more efficient data analysis, providing deeper insights into processes and helping to detect problems before they arise. It also helps companies make smarter decisions and improve customer experiences by recognizing patterns, predicting outcomes, and utilizing natural language processing.

OpenAI has the potential to disrupt industrial processes through machine learning. By analyzing massive amounts of data, machine learning algorithms can recognize patterns and detect anomalies that may not be visible to the human eye (Gil et al., 2020). This enables

companies to make more informed decisions, streamline operations, and increase efficiency in their processes. In other words, OpenAI can help simplify and automate many manual tasks, allowing companies to focus on more important and complex problems. Additionally, OpenAI can provide greater insights into processes, helping to identify areas for improvement and allowing companies to take proactive measures to improve performance (George and George, 2023).

Ultimately, OpenAI has the potential to revolutionize the way businesses operate by creating more efficient processes, developing new products or services, and allowing for faster decision-making. It could also enable businesses to make better use of customer data and gain more insight into consumer behavior, increase the speed with which businesses can adopt new technologies, and stay ahead of their competition (Landrigan, 2017). The drivers of OpenAI include advancements in artificial intelligence technology and computational power, as well as the increasing availability of training datasets (Gil et al., 2020). Moreover, the increase in collaboration between tech companies and industry players, more investments being made in AI research, and the growing need for organizations to develop and implement AI solutions for their own business also contribute to OpenAI's potential impact. However, the vast amounts of data available today have made it easier to train AI models, leading to improved accuracy and reliability of AI-powered services. All of these factors will help businesses harness the power of AI (Chuma et al., 2023).

Although AI is being used to improve safety and security, many organizations use AI-enabled tools to identify threats and protect valuable data. AI is also being used to develop reliable facial recognition systems and detect suspicious activity in public areas. As AI technology continues to evolve, it will become increasingly important for governments,

businesses, and individuals to utilize these AI-powered tools to ensure their safety and security (Chuma et al., 2023).

The Creative Industries Task Force of the Department for Culture, Media, and Sport (DCMS 1998) established the first definition of creative industries in the UK. These industries can create wealth and jobs by exploiting intellectual property and utilizing individual creativity, skill, and talent. However, the definition is vague and does not provide a clear demarcation. According to Caves (2000, p.1), creative industries are those that provide goods and services that are broadly associated with cultural, artistic, or entertainment value, such as book and magazine publishing, visual arts, performing arts, sound recordings, cinema and TV films, fashion, toys, and games. In contrast, Rutten et al. (2004) define creative industries as those that produce goods and services using creative labor. This definition emphasizes content and symbolic value, highlighting the essential role creative industries play in developing and maintaining lifestyles and cultural identities in society.

ChatGPT is a powerful new language model developed by OpenAI that excels at natural language processing tasks (OpenAI, 2023). Its value includes its ability to generate coherent and honest conversations with limited input, quickly process large amounts of data, scale for complex, multi-turn conversations, and use multiple languages in a single conversation (Pavlik, 2023). Unlike Google, which is an online service that allows users to search for information on the web using keywords and returns results in web pages, images, videos, and other media (Hu, 2023; Kleinman, 2023), ChatGPT creates human-like conversations. Table 1 presents a comparison of the impact of OpenAI on four industries within the creative industries: advertising/marketing, publishing, IT services, and designing.

Table 2 highlights all key events that have influenced OpenAI's business strategies from its inception in 2015 to 2023.

Table 1: The impact of OpenAI on the Creative Industries

Type of industry → Aspect of comparison	Advertising/ Marketing	Publishing	IT (Software & Computer Services)	Design (Products & Graphics)
The scope of activities in the industry	Marketing involves activities that could be online and offline, such as advertising, direct email campaigns, public relations, market research, display advertising and promotion. It may include print and radio advertisements, trade show events, billboards, door-to-door sales, coupons, and other traditional marketing tactics. (Dibb et al., 2014)	Publishing covers activities such as book and magazine production, distribution, and promotion. This includes acquiring content from authors, editing, printing, and distributing books. In addition, creating online articles, blogs, videos, websites and apps, as well as promoting them through social media, email marketing and SEO (search engine optimisation). (Henitiuk and O'Sullivan, 2015)	IT services include installing, upkeep, and maintaining computer hardware and software. They involve a range of services, from troubleshooting hardware and software issues to network management, website design and development, coding and system security. (Karjala, 2016)	Design services cover a wide range of products and services related to product design, graphic design and branding. This includes designing logos, packaging, brochures, websites and other digital materials, banners and signs, as well as developing marketing campaigns. (Hubka and Eder, 2012)
Current use of the technology application in the industry	Digital marketing is a form of marketing that uses digital channels to promote products or services. Currently, digital marketing is an integral part of the marketing strategy for most businesses. (Chaffey and Ellis-Chadwick, 2019; Morris, 2009)	Many publishers are now taking advantage of technology to help with tasks such as content curation and text exploration. In addition, it can help automate tasks like image editing and plagiarism detection, and It is being used to personalise content to make it more engaging and attractive to readers. The technology is helping publishers to better understand their target audience. (Pavlik, 2023)	The technology part from the manufacturing and industrial sectors increases efficiency and productivity. Furthermore, coding and programming create software in many sectors, such as healthcare, finance, transportation, e-commerce, retail, gaming, and more. However, it can provide customers with personalised experiences and improved customer services. (Jeyaraj, et al., 2006)	Computer-aided design (CAD) software tools to create and edit 3D models. The 3D printing technologies to create physical prototypes. In addition, Image editing tools enhance graphics and photographs. Also, the Video production tools to capture visuals. Nevertheless, Web application tools create interactive websites and apps. (Kocielnik, 2019)
OpenAI Potential application	- OpenAI is more compelling content by automatically generating suggestions based on user input. - Reduces the need for manual research and editing and results in higher-quality text. - It provides insights into what type of content users	- It helps publishers improve content curation, sentiment analysis, and customer service. - It can automatically generate relevant answers to user queries, helping publishers save time and money.	- It enables machines to understand and respond to human messages using AI techniques. - It can be used to automate customer service, provide intelligent feedback to users. - It develops more	- It helps to create 3D simulations and generate automated design recommendations. - It optimises product manufacturing processes. - It could add interactive capabilities to customer experiences.

	engage with and potentially provides demographic information. It can be used to automate tasks such as ad copy creation and video production, and it allows marketers to spend less time and focus more on creative tasks. (Aljanabi et al., 2023)	It creates personalised experiences for readers by leveraging natural language processing and machine learning algorithms. (Pavlik, 2023)	advanced virtual assistants and chatbots. It improves the accuracy of natural language processing (NLP) algorithms, providing more realistic and accurate responses to user queries. (Avila-Chauvet, et al., 2023)	It automates customer service tasks, predicts customer preferences and trends, and can create virtual avatars. (Ventayen, 2023)
Risk of using OpenAI	- Still a nascent technology, so there may be some issues with it. - This can lead to a decrease in quality control as its outputs may not always be accurate. - OpenAI may produce illogical and nonsensical content for the target audience, which could negatively impact the marketing campaign. - There is a potential for bias to creep into automated processes powered by OpenAI, so marketers must ensure that the inputs used to generate content are unbiased. (Aydın and Karaarslan, 2022)	- It could generate content that is inaccurate or of low quality, and It could have a negative impact on reader trust and loyalty - Security risks could be associated with exposing sensitive customer information to ChatGPT-generated content, - The technology is still relatively new and untested, - There is always a risk of unexpected errors or interruptions in service. (Shen, 2023)	- OpenAI could Bias algorithms and data security. - It could provide incorrect or incomplete information by the system, leading to incorrect decisions or behaviours. - Companies must ensure they use it safely and ethically and follow the laws. - Companies should test and check it often to ensure it works the way it should. (Sobania, et al., 2023)	- The potential for errors due to miscommunication between humans and OpenAI. - The lack of human oversight in decisions made by the OpenAI. - Privacy and security issues are due to the processing of sensitive data, - There is a risk of creating faulty or low-quality designs. (Aydın and Karaarslan, 2022)
Risk on the industry from a technological prospect	By providing natural language processing and predictive analytics capabilities. This technology applies a different use of an algorithm different from the current use of digital marketers, the way to optimise online ad campaigns, personalise emails, predict customer behaviour, and more. Finally, OpenAI kills the competition among marketers.	It could disrupt traditional publishing models by creating and distributing content easier, and that leads to reducing the cost compared to the traditional publishing model by automating specific tasks such as editing and data analysis. It could make customer service faster and more customised than the traditional	By providing a natural and personalised customer experience. OpenAI can help automate customer interactions instead of the current way, in addition, by reducing manual processes and operational costs compared to the current model. Overall, OpenAI kills the competition with the current services provided to the customers, as	It automates many manual processes currently used in product design, such as CAD design, prototyping, and customer service, and Kills the competition as it reduces the time it takes to create high-quality designs and enables quicker customer service responses. (Pavlik, 2023)

	(Haque et al., 2022)	publishing model to respond quickly to reader queries. (Thorp, 2023)	OpenAI uses more natural conversations with customers, which is more convenient for them. (Castelvecchi, 2022; Zhuo, et al., 2023)	
Impact on the industry from a business prospect	- OpenAI can be used to create more accurate predictive models for business decisions. This could allow businesses to identify new market opportunities and tailor their products to customers' specific needs. (Kim, 2023). - Traditional marketing techniques are slowly becoming less effective due to the popularity of more technologically advanced tactics such as social media, search marketing, and mobile apps—for example, from the industry like WPP plc. - The technologies have made it easier for businesses to implement their own online marketing campaigns, which can make the competition for market share even tougher—for example from the industry like Havas. - Consumers become more knowledgeable about the data-driven marketing practices of companies and less trusting of traditional marketing techniques, so it may be difficult for companies to maintain customer trust—for example, from an industry like PwC Digital Services.	- OpenAI could be used to detect fraud or suspicious activity faster than traditional methods, allowing businesses to take preventative action before significant losses occur (Almansour, 2023) - Potential legal and regulatory implications associated with OpenAI in businesses include privacy and data security questions, ethical considerations related to algorithmic bias and transparency, and legal questions related to intellectual property rights in trained models. —for example, from the industry like Macmillan - Risks associated with the technologies used in the publishing industry include data security breaches, cyber-attacks, the introduction of malicious software, and potential copyright infringements. - The rapid pace of technological advancements can quickly introduce outdated technologies, making it more difficult to keep up with the latest trends —for example,	- OpenAI can be used to automate the development of software and applications. By using AI-generated code, businesses can significantly reduce the amount of time required for development and the cost of deploying updates. —for example, from the industry like IBM (Babich, 2023) - The risks associated with IT technologies for businesses include data breaches and cyberattacks, system downtime, lack of security protocols, and personnel turnover. Businesses must be aware of the potential for unauthorised access to sensitive information and legal and regulatory compliance issues. - Other potential risks include inadequate infrastructure, reliance on third-party solutions with inadequate security, and failure to update systems to keep up with the latest threats. - Businesses need to be aware of any potential new laws or policies related to IT	- OpenAI could be used to develop virtual assistants that help customers navigate websites or mobile apps more easily. (Parliament.uk, 2023). - The risks associated with the technologies used in the design industry vary depending on the particular technology and the business context in which it is being used, and they include financial losses due to unanticipated costs or delays, —for example from the industry like Milton Glaser. - Legal or regulatory risks related to data privacy or safety, reputational risks due to public perception, and operational risks related to the technical complexities of the technology itself. Businesses need to weigh these risks carefully before making any decisions about their use of design technologies —for example, from the industry like Pentagram - Businesses must consider the potential for disruption to their business models caused by new technologies and the

	It can be difficult for businesses to determine if their traditional marketing activities are generating a good return on investment. As a result, companies may decrease their ROI due to the new technologies. (Chuma et al.,2023)	from an industry like Simon and Schuster. Other risks may include the potential for data manipulation, increased costs associated with technological infrastructure, and the difficulty of adapting the technology to the specific needs of individual publishing houses. —for example, from the industry like Hachette Book Group. (Economist.com, 2023)	management that could have an impact on the use of their technology. —for example, from the industry like Oracle Companies may face liability risks if they fail to ensure their AI systems are used responsibly and have appropriate safeguards in place —for example, from the industry like Microsoft (Oxford Analytica, 2023)	potential for competition from other companies who may develop similar technologies. Manage it —for example, from the industry like Tolleson (Mijwil and Aljanabi, 2023.)
Impact on the industry from Employment prospect	- Reduce customer service costs by providing automated answers to customer inquiries and streamlining customer support processes, which leads to stopping hiring on these jobs. — for example, from the industry like Alphabet (Google search engine, Google analytics, and Google ad.) (Frederick, 2022..) - Technologies like artificial intelligence and machine learning have given the marketing industry access to more advanced tools, enabling them to process large amounts of data more effectively to create more specific and effective strategies. For example, social media platforms have allowed for better communication with stakeholders — for example, from the industry	- It automates tasks that would typically reduce manual labour. This could lead to cost savings for businesses by reducing the need for permanent staff and temporary labour, as there is a risk of reduced customer service due to automated customer service systems, as well as a potential for disruption in the supply chain —for example from the industry like Callisto Media. (Beeck, 2022) - New technologies have allowed for more interactive and engaging experiences, such as e-books, which can be accessed and manipulated quickly and easily. —for example, from the industry like Financial Times (Wigglesworth, 2022)	- OpenAI could be used to automate tedious tasks like paperwork and data entry, further streamlining operations. Which impact negatively the human influence on such jobs. —for example, from the industry like Ninja-one - The employees impact mental stress due to the threat of that new technology, and that may lead to reduced service quality or generally reduced the provided services to their customers —for example, from the industry like HP (van Dis et al., 2023) (O'Reilly et al., 2023)	- Businesses can use OpenAI to streamline their internal operations by leveraging AI-powered automation, eliminating redundant tasks and freeing up valuable resources, and for sure, this will undoubtedly affect human resources needs. —for example, from the industry like Visual Studio - AI technology could impact the selection process that assesses the employees based on the AI standards and ignore the human aspect in the first phase of the selection process. —for example, from the industry like Vox Media and Eclipse (Ludy, 2023) (cnn.com, 2023)

	like Amazon AWS. (Kim, 2023) - Improved access to analytics for better decision-making. - Optimised targeting for campaigns.	It provides an advantage to employees through increased productivity and efficiency. — for example, from an industry like Forbes. (Fowler, 2023).		
Impact on Industry from Customer Prospect	- Customers' Advertising/Marketing may become frustrated if the technology does not function as expected. This could include issues with accuracy, responsiveness, or reliability. - Customers may become frustrated if ChatGPT cannot answer their questions or provide accurate answers. - Many customers have found ChatGPT to be an effective way to generate customer insights and gather customer feedback. - By leveraging ChatGPT, customers of the traditional advertising industry can better optimise their ad campaigns and ensure that their messages reach the right audience. (Oxford Analytica, 2023)	- Customers of the publishing industry are embracing ChatGPT to automate customer service and enable customers to self-serve. - Customers are utilising chatbots to enable customers to quickly and easily find what they are looking for, answer simple questions, and provide helpful information. - Many customers use ChatGPT to help with data entry tasks, such as order fulfilment and customer data management. (Jenneboer et al.,2022)	- Customers of the traditional IT industry have leveraged ChatGPT to automate customer support tasks. - Customers have encountered certain challenges while using ChatGPT. For example, they have noted that the technology may not be able to answer complex technical inquiries or accurately interpret customer feedback. - Customers may experience difficulty integrating ChatGPT with their existing systems and databases. (Cheng and Jiang, 2020)	- Many customers use ChatGPT to help with data entry tasks, such as manipulating images and creating new designs. - Customers of the design industry have reported that using ChatGPT has improved the quality of their customer service responses and enabled them to provide faster, more accurate information. However, customers may experience difficulty integrating ChatGPT with their existing systems and software, and they have noted that the technology may not accurately interpret customer feedback or handle complex design tasks. (Rossmann et al.,2020)
Impact on the industry from the investment prospect	- Investment in traditional advertising will likely remain steady as companies continue to invest in traditional media such as television, radio, and print advertising. - Brands are increasingly turning to digital media in order to reach their customers, leading	- Traditional publishing investment will likely continue in the coming years, even at a slightly slower rate than digital publishing investments. - Traditional publishers are looking at new business models to remain competitive and increase revenues, such as	Investments in the traditional IT services industry, such as coding and manufacturing hardware, are expected to grow in the coming years. In addition, companies are increasingly relying on sophisticated IT services to support their	Investments in traditional design services, such as product and graphic design, are expected to grow in the coming years. Companies are increasingly turning to design services to develop innovative products and experiences that can differentiate them from the

	to opportunities for more targeted, effective campaigns. • Companies are investing more in influencer marketing and leveraging the power of social media to maximise their reach and engagement. (Clayton, 2023)	subscription services, partnerships with other media outlets, and offering more value-added services such as author tours and exclusive content. • Exploring new distribution channels and engaging in innovative marketing campaigns. (Westfall, 2023)	operations, investing in developing sophisticated systems that can automate tasks and manage large amounts of data. • Companies are turning to cloud-based infrastructure and services to reduce operational costs and stay competitive. • Rising demand for cybersecurity solutions will drive investment in IT services. (Weforum.org, 2023)	competition. • Companies are investing in user experience research and design to create engaging experiences that can boost customer satisfaction and loyalty. • The emergence of AI-driven design tools enables companies to create highly customised visual elements that can elevate their brand. (Channelcapital.io, 2023)
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Table 2. Key events in OpenAI

Year	Key events	Type of Event
2015 December 2015	OpenAI Beginning Introducing OpenAI as a non-profit artificial intelligence research company.	Business
2016 April 2016 December 2016	Work on Research - OpenAI released the public beta of Gym. It is a system for building and comparing reinforcement learning algorithms. - OpenAI has released a program that provides an opportunity to evaluate and enhance an AI's general intelligence through games, websites and other applications available globally.	Technology Technology
2017 July 2017 August 2017	Research and Developments that focused on gaming. - OpenAI released a reinforcement learning algorithm named: Proximal Policy Optimization (PPO). It is comparable to the state of art approach but better as it uses deep neural networks for control, from video games to 3D locomotion. - OpenAI developed Dot 2 - an AI bot that learned the game completely from its play.	Technology Technology
2018 February 2018 April 2018 July 2018	Mission Announcement - Released paper that investigates the potential for malicious actors to exploit AI technology and describes preventive and mitigation measures to address these risks. - OpenAI announced its mission to ensure that Artificial General Intelligence benefits all of humanity. - OpenAI announced that they had trained a human-like robot hand to manipulate physical objects more precisely than ever before.	Business Business/Technology Business/ Technology Technology
2019 February 2019 March 2019 April 2019 July 2019 August 2019 September 2019 October 2019 November 2019	The announcement of OpenAI LP and its partnership with Microsoft - Researchers have reported that they have developed superior Language Models with their implications, which can generate meaningful and structured text passages. These models have achieved leading-edge outcomes on many language modelling evaluations and have been able to execute basic reading understanding, machine translation, answering questions and summarisation - all without special training for those individual tasks. - Launched OpenAI LP, a special company with a limited profit-making capability that allows OpenAI to expand its investments in computing. - Berkeley AI Research Open World Cup - Created MuseNet, a deep neural network capable of generating 4-minute musical compositions utilising ten different instruments. - OpenAI announced its strategic partnership with Microsoft to accelerate the development and adoption of AI technologies worldwide. - Research on GPT-2 - Emerging tools to increase interactions in the new AI model. - Open AI solved the Rubik's Cube with a human-like robot hand. Using the neural networks. - Released GPT-2.5B	Business/ Technology Business Business Technology Business Technology Technology Technology Technology
2020 April 2020	Gaining results from the neural net OpenAI introduced Jukebox, a neural net that generates music.	Technology

June 2020	- OpenAI has launched an API that provides users access to new AI models. This interface differs from other AI systems, as it is designed to provide a general-purpose "text in, text out" function, enabling anyone to apply it to virtually any English language task. - OpenAI launched the Scholars Program - OpenAI Lab is a research and development lab dedicated to exploring the potential of AI technologies.	Technology Technology Technology/Business
2021 January 2021 March 2021 August 2021	OpenAI introduced GPT3 and signed a partnership with IBM to leverage the power of IBM's hybrid cloud platform and develop AI solutions that are accessible to the global developer community. - OpenAI introduced a new model; CLIP is a neural network created by researchers for learning visual concepts using natural language guidance. CLIP can be used for any visual classifying project by supplying the names of the visual categories desired to be recognised, similar to the "zero-shot" possibilities offered by GPT-2 and GPT-3. - OpenAI announced on DALL·E that it creates images from text captions for various concepts expressible in natural language. - OpenAI discovered that CLIP responds to the same concept, whether presented symbolically or conceptually. - OpenAI announced OpenAI Codex, an AI system that translates natural language to code.	Technology Technology Technology / Business Technology / Business
2022 April 2022 November 2022	OpenAI was launching a free preview of ChatGPT, its new AI chatbot based on GPT-3. - OpenAI introduced DALL·E 2, which can create realistic images and art from natural language descriptions. - OpenAI released ChatGPT as a related AI model to one that can interact naturally in a conversation. It answers subsequent queries, recognises its errors, contradicts incorrect beliefs and declines unreasonable requests.	Technology / Business Technology / Business
2023	Microsoft offers to buy 49% of OpenAI shares. (Clayton, 2023)	Business

Source: synthesised by authors

4 Key Findings

The AI industry has undergone significant evolution in the last two decades. In the early 2000s, AI emerged as a research field, which led to the development of techniques such as machine learning and deep learning (Shan et al., 2023). In the past decade, AI has grown exponentially due to increased investment and advancements in computing power, leading to large-scale AI applications across industries. These developments have led to breakthroughs in computer vision, natural language processing, and robotics, significantly impacting industry and society at large (Madhusudan et al., 2020). As AI technology continues to evolve, it will continue to shape the future of industry and global economies (Pavlik, 2023). AI is becoming increasingly important to various industries, such as healthcare, finance, and transportation. AI enables automation, better decision-making, and predictive analytics (Chuma et al., 2023), thereby improving customer experiences through personalized services and automated support (Aydın and Karaarslan, 2022).

AI is also helping businesses to develop better products and services, improve efficiency, and reduce costs (Hwang, 2023). AI plays a significant role in creating more efficient and personalized products by analyzing customer behavior and preferences (Anthony et al., 2023). AI is being used to optimize processes and identify areas of improvement while making it easier to detect and prevent fraud (Almansour, 2023). AI is also being used to develop personalized marketing strategies and assist with personalization and recommendation services.

As AI becomes increasingly integrated into businesses and everyday life, it's clear that its potential for innovation will continue to grow (Pavlik, 2023). The industry's evolution shows that

AI will become an integral part of many different industries, making it essential to keep up with the latest AI trends and developments.

AI is transforming the way people interact with technology by enabling computers to understand and respond to human speech through natural language processing (NLP) technology. This technology has led to the development of virtual assistants and chatbots that can provide quick and accurate customer support. AI-powered tools are also being used for automation purposes such as customer service and data analysis, making daily tasks more efficient. As AI evolves, it will continue to improve the customer experience in various ways. However, organizations must pay attention to the impact of this evolution on both the technology and the industry, including regulations and laws related to technology and industry evolution. Compliance with applicable laws and regulations can help organizations remain competitive and mitigate potential risks.

Technology and industry evolution typically goes through four stages: emergence, disruption, maturity, and transformation. During the emergence stage, a new technology or industry is introduced and explored. In the disruption stage, organizations either adopt the new technology or industry or are pushed out of the market by competitors who have adopted it. After the disruption stage, the technology or industry matures, and organizations become more efficient in applying it. In the transformation stage, technological or industry changes allow for innovation and continual improvement. While technology and industry evolution can create opportunities for businesses to improve operations, increase their customer base, and stay ahead of the competition, it can also present significant risks. Organizations that successfully navigate

this cycle must be able to identify potential new technologies and industries, assess market dynamics, and create an appropriate strategy for adoption and implementation.

However, organizations must also consider the impact that technology and industry evolution can have on their workforce. As technology and industries evolve, it can require changes in skillsets and job roles, making training and upskilling essential for companies that want to remain competitive. Furthermore, organizations must be proactive and strategic in order to avoid being left behind by their competitors. Recently, the application of technology has been used in various industries, including healthcare, finance, retail, manufacturing, transportation, and creative industries. This research will focus on the impact of OpenAI on the creative industries. To explain the disruption that OpenAI can cause, the research will examine the impact across four industries within the creative industries, including advertising/marketing, publishing, IT (software and computer services), and design (products and graphics). Based on key findings, it is essential to understand how to revitalize the creative industries. Accordingly, the authors will examine each industry within and across the industry to shed light on how to revitalize them, considering industry and external drivers to understand their potential effects.

4.1 Adverting / Marketing

OpenAI can be a valuable tool for advertising and marketing purposes, but it is crucial for marketers to use it correctly. To ensure effectiveness, marketers must guarantee that the data used to generate content is not biased and is representative of their target audience. Furthermore, before sharing the outputs with their audience, marketers should review the results manually and consider using machine learning and natural language processing technologies to detect and address any potential issues. In addition, to guarantee that the OpenAI output has the desired

impact on their campaigns, marketers should track performance metrics. The surge in investment in digital advertising technology, including demand-side platforms and ad exchanges, as well as data management solutions, is attributed to the rise of programmatic advertising. Brands are increasingly leveraging the power of big data and analytics to understand their customers better and improve their targeting abilities. Nevertheless, companies will continue to invest in social media marketing solutions to maximize their visibility and engagement on these popular platforms.

4.2 Publishing

Traditional publishing remains a profitable market for many publishers. With advancements like print-on-demand services, traditional print publishing has become more cost-effective and efficient. While print books continue to be popular in some industries, bookstores can still be a vital source of revenue. Additionally, the emergence of audiobooks and other delivery methods has created new untapped markets during a time of shrinking newsroom budgets and media austerity measures aimed at promoting economic efficiency. However, OpenAI platforms present a potential threat to human journalists and professional publishers. Although OpenAI lacks sentience and self-awareness, it excels at processing and presenting information in a manner that may resemble human communication, currently in written form and soon possibly in audio or video formats. Collaborating with OpenAI tools can serve as an asset to assist human journalists, and professional publishers could greatly benefit from improved quality and efficiency of publishing work, especially as time constraints and resource limitations continue to increase significantly.

4.3 IT (software and computer services)

Ensuring the security of any data utilized by OpenAI technology and implementing measures to detect and respond to malicious activities is crucial. Additionally, companies must consider how to integrate their AI systems into existing infrastructure and protocols to minimize unintended consequences. It is essential to guarantee transparency, comprehensibility, and accountability in any decisions made by AI. Despite these requirements, there is a significant anticipated growth in investments in artificial intelligence, machine learning, and natural language processing as these technologies advance and become more proficient at tackling complex tasks. Furthermore, investments in blockchain and other distributed ledger technologies can help organizations enhance efficiency and security. The Internet of Things (IoT) will continue to experience a surge in investments as companies seek to leverage the data generated by connected devices for various applications.

4.4 Design (product and graphics)

In this industry, it is crucial to engage with new talent, generate innovative and fresh ideas, incorporate technology into the design process, and establish trends within the community. Additionally, networking with other professionals, staying current on industry trends, and investing in education can help support the industry's vitality. It is important to integrate innovative technologies and develop strategies to adopt the innovation model. Investments in interactive design services, such as virtual and augmented reality, are expected to grow in the coming years. These technologies can provide an immersive experience that helps companies engage and retain customers more effectively. Furthermore, investments in 3D printing technology can assist companies in bringing new products to the market more quickly and easily.

Lastly, the investment in data visualization tools is also increasing as companies strive to maximize the value of their data.

4.5 Across the industries

OpenAI has the potential to transform the creative industries by offering tools and resources that can accelerate production and simplify the creative process. One example of this is OpenAI's GPT-3 language algorithm, which can generate sentences, stories, and articles with just a few prompts. This can help streamline content production for both small and large companies, saving time for artists and creators who want to produce high-quality work efficiently. OpenAI's algorithms can also generate personalized content and optimize campaigns for maximum reach. OpenAI's reinforcement learning agents can be used for automated music and video editing assistance, freeing up editors to focus on the creative aspects of their work while taking advantage of AI capabilities. Additionally, OpenAI's AI agents can provide virtual assistants to help artists and creators manage their time, allowing them to focus on their creative work. These tools could revolutionize how creative industries produce, distribute, and monetize content.

OpenAI can help the creative industries develop new ideas, which can be used as the basis for further creative exploration. These models can also create synthetic training data, which can be used to train other AI models to identify patterns or find new solutions to problems. This could aid in developing digital products or experiences with a high degree of fidelity and creativity.

While OpenAI offers significant benefits to creative professionals, it also introduces a level of automation into creative processes that may potentially reduce their creative output.

Additionally, OpenAI-generated content may not adhere to copyright laws, leading to potential legal disputes. To minimize these risks, it is important to protect intellectual property rights, ensure content is appropriate and fit for purpose, create a fair and competitive platform for all professionals, and employ rigorous security measures to ensure data safety and privacy. Finally, it is crucial to educate creative professionals about the technology so they can make informed decisions about its use.

5 Discussion and Conclusion

The aim of this study is to examine how the evolution of AI-driven autonomous systems has transformed traditional and new industries such as advertising/marketing, publishing, IT (software and computer services), and design (products and graphics). The research observed a number of changes in these industries, including faster and more accurate mobilization and dissemination of information, enhanced productivity, job displacement, automation of routine tasks, the creation of new job opportunities, greater collaboration with teams, and improved speed and accuracy of creative processes. OpenAI has had a significant impact on creative industries by automating complex tasks and developing new tools and technologies. Its various services and tools have also increased creativity and productivity. However, concerns remain that OpenAI could automate creative jobs, thereby stifling creativity. Moreover, there are concerns about potential risks to data privacy and security. OpenAI could also be used to manipulate public opinion and influence elections. The possibility of an AI arms race is another concern, as more powerful AI could lead to increased competition among companies. Therefore, while OpenAI has enabled major advances in creative industries, it is important to consider the potential risks.

5.1 Theoretical and Practical Implications

The study provides a valuable analysis of the impact of OpenAI on industry evolution both within and across four different industries. The research contributes to the current literature by bridging the gap between theory and practice regarding the implications of technology and industry evolution. The study highlights that OpenAI is a new technology that can assist industries in using technology in various ways. While it can make processes faster and easier, there are risks involved. The research investigated how OpenAI affects four different industries, examining both the benefits and risks associated with its use, and its impact on technology and industry evolution.

The research findings demonstrate that OpenAI has the potential to benefit various industries and provide valuable insights. These insights highlight the need for important measures, such as the government's role in developing investment opportunities that encourage individuals and businesses to participate in creative industries. Public-private partnerships can also be established to promote the sharing of expertise and resources across different sectors. Additionally, creative and innovative thinking can be encouraged by setting up incubator programs or hackathons that provide individuals with the support and resources they need to develop their ideas. Creating new platforms for sharing content and collaborating on projects can also help raise the profile of the creative industries, attract new talent and audiences, and provide opportunities for growth.

However, the impact of technology and industry evolution on employability can have a double-edged sword effect. While it increases employees' knowledge and facilitates automated services for them, it also places additional stress on their need to develop their skills to compete

in the job market, potentially causing mental stress and fears of job loss. To gain a deeper understanding of the impact of AI on industry evolution, research in a wide range of areas is necessary. This includes exploring changes in job roles, potential new job opportunities enabled by AI, increased use of data and automation, and implications for customer service. Research is also needed to understand the impact on intellectual property, liability issues associated with AI, and the security and privacy impacts of AI. Finally, further research into ethical considerations is essential to ensure that AI solutions are fair and equitable.

References

- Agarwal, R. and Braguinsky, S., 2015. Industry Evolution and Entrepreneurship: Steven K lepper's Contributions to Industrial Organization, Strategy, Technological Change, and Entrepreneurship. *Strategic Entrepreneurship Journal*, 9(4), pp.380-397.
- Agarwal, R. and Tripsas, M., 2008. Technology and industry evolution. *The handbook of technology and innovation management*, 1, pp.1-55.
- Agarwal, R., Sarkar, M. B., & Echambadi, R. (2002). The conditioning effect of time on firm survival: An industry life cycle approach. *Academy of Management Journal*, 45(5), 971–994.
- Aljanabi, M., Ghazi, M., Ali, A.H. and Abed, S.A., 2023. ChatGpt: Open Possibilities. *Iraqi Journal For Computer Science and Mathematics*, 4(1), pp.62-64.
- Almansour, M., 2023. Artificial intelligence and resource optimisation: A study of Fintech start-ups. *Resources Policy*, 80, p.103250.
- Anthony, C., Bechky, B.A. and Fayard, A.L., 2023. "Collaborating" with AI: Taking a System View to Explore the Future of Work. *Organization Science*.
- Audretsch, D.B., 1995. *Innovation and industry evolution*. MIT press.
- Auster, E.R., 1992. The relationship of industry evolution to patterns of technological linkages, joint ventures, and direct investment between US and Japan. *Management Science*, 38(6), pp.778-792.
- Avila-Chauvet, L., Mejía, D. and Acosta Quiroz, C.O., 2023. Chatgpt as a Support Tool for Online Behavioral Task Programming. Available at SSRN 4329020.

- Aydın, Ö. and Karaarslan, E., 2022. OpenAI ChatGPT generated literature review: Digital twin in healthcare. Available at SSRN 4308687.
- Babich N., 2023. « How to use ChatGPT in Product design: 8 practical examples » [Online] available at: <https://uxplanet.org/how-to-use-chatgpt-in-product-design-8-practical-examples-a6135308b9b2> accessed on 10/02/2023.
- Beeck N., 2022. "Callisto Media, Promising to 'Act Swiftly and Decisively,' Lays Off 35% of Workforce" [Online] available at: <https://www.publishersweekly.com/pw/by-topic/industry-news/publisher-news/article/89897-callisto-media-promising-to-act-swiftly-and-decisively-lays-off-35-of-workforce.html> accessed on 14/02/2023
- Burnes, B. (2004). *Managing change: A strategic approach to organisational dynamics*. Pearson Education.
- Castelvecchi, D., 2022. Are ChatGPT and AlphaCode going to replace programmers?. *Nature*.
- Caves, RE, 2000. *Creative industries: Contracts between art and commerce* (No. 20). Harvard University Press.
- Caviggioli, F., Colombelli, A., De Marco, A., Scellato, G. and Ughetto, E., 2023. Co-evolution patterns of university patenting and technological specialisation in European regions. *The Journal of Technology Transfer*, 48(1), pp.216-239.
- Chaffey, D. and Ellis-Chadwick, F., 2019. *Digital marketing*. Pearson UK.
- Channelcapital.io, 2023. "What is Chat GPT? What will be its impact on finance?" [Online] available at: <https://channelcapital.io/what-is-chat-gpt-what-will-be-it-impact-on-finance/> accessed on 11/02/2023
- Cheng, Y. and Jiang, H., 2020. How do AI-driven chatbots impact user experience? Examining gratifications, perceived privacy risk, satisfaction, loyalty, and continued use. *Journal of Broadcasting & Electronic Media*, 64(4), pp.592-614.
- Chuma, E., Bang, M. and Alfredson, J., 2023. *Business AI Decision-Making Tools: Case ChatGPT Evaluation*.
- Clayton J., 2023. "Microsoft unveils new Bing with ChatGPT powers" [Online] available at: <https://www.bbc.co.uk/news/business-64562672> accesses on 08/02/2023.
- Cnn.com, 2023. "Here are some of the companies that have laid off employees this year – so far" [Online] available at <https://edition.cnn.com/2023/01/21/business/layoffs-google-vox-microsoft/index.html#:~:text=check%20back%20later,-,Here%20are%20some%20of%20the%20companies%20that%20have,employees%20this%20year%20%E2%80%93%20so%20far&text=Just%20this%20week%2C%20Alphabet>

%2C%20Google's,Amazon%2C%20Goldman%20Sachs%20and%20Salesforce.
accessed on 14/02/2023

Cusumano, Michael A., Steven J. Kahl, and Fernando F. Suarez. "Services, industry evolution, and the competitive strategies of product firms." *Strategic management journal* 36, no. 4 (2015): 559-575.

Darrell M. West and John R. Allen, 2023. "How artificial intelligence is transforming the world" [Online] available at: <https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world/> accessed on 21/02/2023.

Dastin J., Hu K. and Dave P., 2022. "Exclusive: ChatGPT owner OpenAI projects \$1 billion in revenue by 2024" [Online] available at: <https://www.reuters.com/business/chatgpt-owner-openai-projects-1-billion-revenue-by-2024-sources-2022-12-15/> accessed on 21/02/2023

D'aveni, R. A. (2010). *Hypercompetition*. Simon and Schuster.

DCMS, U., 1998. *Creative industries mapping document*: DCMS London.

De Simone, V., Di Pasquale, V. and Miranda, S., 2023. An overview on the use of AI/ML in Manufacturing MSMEs: solved issues, limits, and challenges. *Procedia Computer Science*, 217, pp.1820-1829

Dibb, S., Simões, C. and Wensley, R., 2014. Establishing the scope of marketing practice: insights from practitioners. *European Journal of Marketing*, 48(1/2), pp.380-404.

Doganis, R. (2005). *The airline business*. Routledge.

Economist.com, 2023. "Artificial intelligence is permeating business at last" [Online] available at: <https://www.economist.com/business/2022/12/06/artificial-intelligence-is-permeating-business-at-last> accessed on 10/02/2023

Economist.com, 2023. "How good is ChatGPT?" [Online] available at: <https://www.economist.com/business/2022/12/08/how-good-is-chatgpt> accessed on 10/02/2023

Eller, M., 2023. Technology as a New Evolution in Fighting Disease. In the Lab eNewsletter, 18(1).

Finley-Moise T., 2020. "The Many Ways OpenAI is Changing the World" [Online] available at: <https://www.hp.com/us-en/shop/tech-takes/ways-openai-is-changing-the-world> accessed on 22/02/2023.

Fowler G., 2023. "ChatGPT's Impact On Business: 4 Applications For Generative AI" available at:

- <https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2023/02/08/chatgpts-impact-on-business-4-applications-for-generative-ai/?sh=252e095917bf> accessed on 06/02/2023.
- Frederick B., 2022. "Will ChatGPT Take Your Job?" [Online] available at: <https://www.searchenginejournal.com/will-chatgpt-take-your-job/476189/>. Accessed on 06/02/2023.
- George, A.S. and George, A.H., 2023. A Review of ChatGPT AI's Impact on Several Business Sectors. *Partners Universal International Innovation Journal*, 1(1), pp.9-23.
- Gil, D., Hobson, S., Mojsilović, A., Puri, R. and Smith, J.R., 2020. AI for management: An overview. *The future of management in an AI world: Redefining purpose and strategy in the fourth industrial revolution*, pp.3-19.
- Haque, M.U., Dharmadasa, I., Sworna, Z.T., Rajapakse, R.N. and Ahmad, H., 2022. " I think this is the most disruptive technology": Exploring Sentiments of ChatGPT Early Adopters using Twitter Data. *arXiv preprint arXiv:2212.05856*.
- He, Z., Kuai, L. and Wang, J., 2023. Driving mechanism model of enterprise green strategy evolution under digital technology empowerment: A case study based on Zhejiang Enterprises. *Business Strategy and the Environment*, 32(1), pp.408-429.
- Henitiuk, V. and O'Sullivan, C., 2015. *Aims and Scope: Journal Identity and Twenty-First-Century Scholarly Publishing. Translation and Academic Journals: The Evolving Landscape of Scholarly Publishing*, pp.15-35.
- Hu L., 2023. "is-chatgpt-the-new-google" [online] available on: <https://www.aiacceleratorinstitute.com/is-chatgpt-the-new-google/> accessed on 03/02/2023.
- Hubka, V. and Eder, W.E., 2012. *Design science: introduction to the needs, scope and organisation of engineering design knowledge*. Springer Science & Business Media.
- Hunter, P. and Orr, S., 2023. Technology evolution in the Future Corporation. In *The Corporation of the Future* (pp. 51-83). Routledge.
- Hwang, I., 2023. Evolution of the collaborative innovation network in the Korean ICT industry: a patent-based analysis. *Technology Analysis & Strategic Management*, 35(2), pp.221-236.
- Jei, W. and Bhaumik, A., 2023. The Power of Destructive Innovation Generation and Evolution: Changes in Customer Value System. *Asia-Pacific Journal of Management and Technology (AJMT)*, 3(3), pp.1-8.

- Jenneboer, L., Herrando, C. and Constantinides, E., 2022. The impact of chatbots on customer loyalty: A systematic literature review. *Journal of theoretical and applied electronic commerce research*, 17(1), pp.212-229.
- Jeyaraj, A., Rottman, J.W. and Lacity, M.C., 2006. A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of information technology*, 21(1), pp.1-23.
- Karjala, D.S., 2016. *Oracles v. Google and the Scope of a Computer Program Copyright*. J. Intell. Prop. L., 24, p.1.
- Kim E., 2023. "Amazon employees are already using ChatGPT for software coding. They also found the AI chatbot can answer tricky AWS customer questions and write cloud training materials." [Online] available at: <https://www.businessinsider.com/chatgpt-amazon-employees-use-ai-chatbot-software-coding-customer-questions-2023-1?r=US&IR=T> accesses on 08/02/2023.
- Kleinman Z., 2023. "Google killer' ChatGPT sparks AI chatbot race" [Online] available at: <https://www.bbc.co.uk/news/technology-64538604> accesses on 08/02/2023.
- Kocielnik, R., Amershi, S. and Bennett, P.N., 2019, May. Will you accept an imperfect ai? exploring designs for adjusting end-user expectations of ai systems. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (pp. 1-14).
- Landrigan, K., 2017. *Integrating Artificial Intelligence into the Corporate Workplace*.
- Larsen B. and Narayan J., 2023. "Generative AI: a game-changer that society and industry need to be ready for" [Online] available at: <https://www.weforum.org/agenda/2023/01/davos23-generative-ai-a-game-changer-industries-and-society-code-developers/> accessed on 11/02/2023
- Latapí Agudelo, M.A., Jóhannsdóttir, L. and Davídsdóttir, B., 2019. A literature review of the history and evolution of corporate social responsibility. *International Journal of Corporate Social Responsibility*, 4(1), pp.1-23.
- Ludy T., 2023. "Will ChatGPT Replace Software Developers?" [Online] available at: <https://www.ninethree.co/blog/will-chatgpt-replace-software-developers#:~:text=A%20chatbot%20might%20make%20that,to%20replace%20the%20human%20programmer.> Accessed on 06/02/2023.
- Madhusudan, C. and Panneerselvam, R., 2020. A four-stage framework for disruptive innovation. *International Journal of Business Excellence*, 22(4), pp.474-491.
- Malerba, F. (2007). *Innovation and the evolution of industries* (pp. 7-27). Springer Berlin Heidelberg.

- Malerba, F., & Orsenigo, L. (1997). Technological regimes and sectoral patterns of innovative activities. *Industrial and Corporate Change*, 6(1), 83–118.
- Malerba, F., & Orsenigo, L. (1999). Technological entry, exit and survival: An empirical analysis of patent data. *Research Policy*, 28(6), 643–660.
- Malerba, F., Nelson, R., Orsenigo, L. and Winter, S., 1999. 'History-friendly' models of industry evolution: the computer industry. *Industrial and corporate change*, 8(1), pp.3-40.
- Mijwil, M. and Aljanabi, M., 2023. Towards Artificial Intelligence-Based Cybersecurity: The Practices and ChatGPT Generated Ways to Combat Cybercrime. *Iraqi Journal For Computer Science and Mathematics*, 4(1), pp.65-70.
- Morris, N., 2009. Understanding digital marketing: marketing strategies for engaging the digital generation. *Journal of Direct, Data and Digital Marketing Practice*, 10(4), pp.384-387.
- O'Reilly L., Johnson L., Joe R. and Moses L., 2023. "Advertising Companies That Had Layoffs in 2022 and 2023." [Online] available at: <https://www.businessinsider.com/advertising-companies-that-had-layoffs-in-2022-2022-7?r=US&IR=T> accesses on 08/02/2023.
- Oberoi, P., 2023. How Artificial Intelligence Is Impacting Marketing?. In *Encyclopedia of Data Science and Machine Learning* (pp. 606-618). IGI Global.
- Openai.com, 2023. "Chatgpt: Optimising language models for dialogue." [Online] available at: <https://openai.com/blog/chatgpt/> accessed on 10/02/2023.
- Openai.com, 2023. "OpenAI is an AI research and deployment company" [online] available on: <https://openai.com/about/>, accessed on 03/02/2023.
- Oxford Analytica, 2023. Commercial use of ChatGPT requires caution. *Emerald Expert Briefings (oxan-es)*.
- Ozalp, H., Eggers, J. P., & Malerba, F. (2023). Hitting reset: Industry evolution, generational technology cycles, and the dynamic value of firm experience. *Strategic Management Journal*, 1– 36.
- Parliament.uk, 2023. "Chapter 2: A digital future" [Online] available at: <https://publications.parliament.uk/pa/ld5803/ldselect/ldcomm/125/12505.htm> accessed on 10/02/2023
- Pavlik, J.V., 2023. Collaborating With ChatGPT: Considering the Implications of Generative Artificial Intelligence for Journalism and Media Education. *Journalism & Mass Communication Educator*, p.10776958221149577.

- Pec.ac.uk, 2023. "National Statistics on the Creative Industries" [Online] available at: <https://pec.ac.uk/news/national-statistics-on-the-creative-industries> accessed on 11/02/2023.
- Reinganum, J.F., 1985. Innovation and industry evolution. *The Quarterly Journal of Economics*, 100(1), pp.81-99.
- Rossmann, A., Zimmermann, A. and Hertweck, D., 2020. The impact of chatbots on customer service performance. In *Advances in the human side of service engineering: Proceedings of the AHFE 2020 Virtual Conference on The Human Side of Service Engineering*, July 16-20, 2020, USA (pp. 237-243). Springer International Publishing.
- Rutten, P., Manshanden, W.J.J., Muskens, J. and Koops, O., 2004. *De creatieve industrie in Amsterdam en de regio*.
- Santos, B.P., Charrua-Santos, F. and Lima, T.M., 2018, July. Industry 4.0: an overview. In *Proceedings of the World Congress on engineering* (Vol. 2, pp. 4-6). London, UK: IAEN.
- Shan, C., Wang, J. and Zhu, Y., 2023. The Evolution of Artificial Intelligence in the Digital Economy: An Application of the Potential Dirichlet Allocation Model. *Sustainability*, 15(2), p.1360.
- Shen, Y., Heacock, L., Elias, J., Hentel, K.D., Reig, B., Shih, G. and Moy, L., 2023. ChatGPT and Other Large Language Models Are Double-edged Swords. *Radiology*, p.230163.
- Sheng, J., Amankwah-Amoah, J., & Wang, X. (2019). Technology in the 21st century: New challenges and opportunities. *Technological Forecasting and Social Change*, 143, 321-335.
- Sirimanne N.S., 2023. « How artificial intelligence chatbots could affect jobs » [Online] available at: <https://unctad.org/news/blog-how-artificial-intelligence-chatbots-could-affect-jobs> accessed on 06/02/2023
- Sobania, D., Briesch, M., Hanna, C. and Petke, J., 2023. An Analysis of the Automatic Bug Fixing Performance of ChatGPT. *arXiv preprint arXiv:2301.08653*.
- Stam, E., De Jong, J.P. and Marlet, G., 2008. Creative industries in the Netherlands: Structure, development, innovativeness and effects on urban growth. *Geografiska Annaler: series B, human geography*, 90(2), pp.119-132.
- Susnjak, T., 2022. ChatGPT: The End of Online Exam Integrity? *arXiv preprint arXiv:2212.0*
- Thorp, H.H., 2023. ChatGPT is fun, but not an author. *Science*, 379(6630), pp.313-313.

- Tu, W., Zhang, L., Sun, D. and Mao, W., 2023. Evaluating high-tech industries' technological innovation capability and spatial pattern evolution characteristics: Evidence from China. *Journal of Innovation & Knowledge*, 8(1), p.100287.
- van Dis, E.A., Bollen, J., Zuidema, W., van Rooij, R. and Bockting, C.L., 2023. ChatGPT: five priorities for research. *Nature*, 614(7947), pp.224-226.
- Ventayen, R.J.M., 2023. OpenAI ChatGPT Generated Results: Similarity Index of Artificial Intelligence-Based Contents. Available at SSRN 4332664.
- Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N. and Haenlein, M., 2021. Digital transformation: A multidisciplinary reflection and research agenda. *Journal of business research*, 122, pp.889-901.
- Weber, M., Beutter, M., Weking, J., Böhm, M. and Krcmar, H., 2022. AI Startup Business Models: Key Characteristics and Directions for Entrepreneurship Research. *Business & Information Systems Engineering*, 64(1), pp.91-109.
- Weforum.org, 2023. "Creative Disruption: The impact of emerging technologies on the creative economy" [Online] available at: https://www3.weforum.org/docs/39655_CREATIVE-DISRUPTION.pdf accessed on 11/02/2023.
- Westfall C., 2023. "Educators Battle Plagiarism As 89% Of Students Admit To Using OpenAI's ChatGPT For Homework," available at: <https://www.forbes.com/sites/chriswestfall/2023/01/28/educators-battle-plagiarism-as-89-of-students-admit-to-using-open-ais-chatgpt-for-homework/?sh=4379a208750d> accessed on 06/02/2023.
- Wigglesworth R., 2022. "ChatGPT vs The Sellside" [Online] available at: <https://www.ft.com/content/968ae6cd-2485-4ab0-b0d1-eb206f59884a> accessed on 06/02/2023.
- Xuhui, L., Mengcheng, Y., Han, Y. and Shuzhou, G., 2023. Measurement and trend evolution of the S&T innovation ability of the AI industry in China. *Science Research Management*, 44(1), p.1.
- Zhuo, T.Y., Huang, Y., Chen, C. and Xing, Z., 2023. Exploring AI Ethics of ChatGPT: A Diagnostic Analysis. *arXiv preprint arXiv:2301.12867*

