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Challenges and applications of Generative AI in Business

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Abstract

For the purpose of this current study a systematic literature review has been conducted, this method was chosen to ensure a comprehensive perspective of existing challenges and applications of generative AI in businesses. The research involved tapping into metadata and peer-reviewed publications from reputable and reliable academic databases such as WoS, IEEE Xplore and Scopus while referring to reputable websites such as Statistica and Deloitte for statistical data that is relevant to the research. The sources used throughout the research were specifically chosen for their credibility, reliability and relevance to the topic being researched. Additionally, to enhance the real-world application and relevance of the research the study incorporates three qualitative contemporary case studies from different sectors that were selected to showcase how generative AI is applied and used in various contexts with its specific challenges and applications.

Keywords: Generative AI, Business, Chatgpt, Customer Service

Introduction

Artificial Intelligence (AI) has sparked many conversations across numerous Industries and Sectors for driving innovation and efficiency. There is no commonly accepted definition of AI however it is commonly referred to as "a technology, or machine, that can perform a task which if conducted by a human would require intelligence to complete" (McCarthy, Minsky, et al, 1955). Generative AI refers to a set of artificial intelligence techniques and models designed to learn the underlying patterns and structure of a dataset and generate new data points that plausibly could be part of the original dataset (Pinaya, Graham, et al, 2023). In the competitive and changing world of business management, integrating and incorporating innovative and unique technologies are essential to ensure that businesses can be competitive and meet consumer ever changing demands. Generative AI and Large Language Models (LLMs) such as text based systems like ChatGPT and image generation softwares such as DALL-E have completely transformed how businesses engage and interact with their customers (Reimer & Peter, 2024).

Recently, generative AI has evolved rapidly with its market value skyrocketing above 8.65 billion dollars (Elad, 2024) , primarily due to advancements in deep learning mechanisms and Generative Adversarial Networks (GANs) . This has significantly improved the ability of Artificial Intelligence to be able to generate high quality content. Because of this businesses are able to provide more personalized and creative services to their customers. Consequently, reshaping how industries tackle problem solving, decision making, and consumer engagement in businesses (Perez-Vega, Kaartemo et al, 2021). Industries are now becoming extremely reliant on generative AI for completing tasks to enhance productivity and innovation in the workplace, according to a report published by Deloitte in 2024 almost all organizations report measurable ROI with GenAI in their most advanced initiatives, and 20% report ROI in excess of 30% (2024). Generative AI has been a disruptive force in numerous fields like banking, healthcare, education, and transportation (Akpabio, Narad & Ulhe et al, 2025) The new wave of AI systems has improved an organisation's ability to use data to make predictions and has substantially reduced the cost of making predictions (Agrawal, Gans, et al, 2018) according to data provided by Statistica between 2017 and 2021, AI adoption in customer management activities was projected to save approximately $265 billion globally. However, while AI can have many benefits to businesses and reshape how industries work there are also drawbacks. It calls attention to numerous concerns about the ethical use of AI, inaccuracy, misinformation and intellectual property rights. As the use of generative AI continues to rapidly grow within businesses and its various industries, understanding both its benefits and challenges is imperative for its responsible and sustainable use (McKinsey, 2023).

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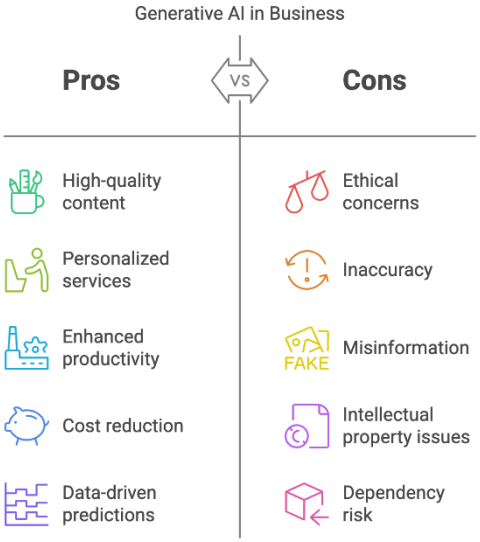

Figure 1 Pros and Cons of the use of generative AI in businesses

The evolution of AI can be traced in line with key technological advancements throughout history with the 5 distinct industrial revolutions in the world; each revolution had presented key findings and technologies that reshaped technology and brought rise to the concept of AI as we know it today (Zarif Bin Akhtar, 2024). Figure 1.1 displays the gradual development of innovations and technology and how these have significantly shaped industries.

Table 1. The evolution of Industrial Revolutions and the increasing role of AI in Businesses

Industrial Revolution	**Time period**	**Key Technologies**	**Impact on businesses**	**Involvement of AI**
1.0	Late 18th Century to early 19th century	Steam engines, mechanization	Revolutionized manufacturing, led to rise of mass production	AI not present, but automation concepts began to emerge
2.0	Late 19th to early 20th century	Electricity, assembly lines	Increased productive efficiency, allowed large scale factories	Early forms of automation and basic machine learning.
3.0	Late 20th Century	Computers, robotics, the internet	Involvement of automation and digital devices in manufacturing & production	Introduction of AI systems in business management, basic AI tasks like data analysis
4.0	Early 21st Century	IoT, Big Data, AI, cloud computing	Digital transformation of industries, digital dependence	Rapid growth of AI capabilities, machine learning, and predictive analytics
5.0	Present & Future	Advanced robotics, generative AI, autonomous systems	AI-powered decision-making and hyper-innovation, fostered	Generative AI revolutionizing business operations

			sustainable human AI collaboration	

Generative AI is a key tool marking Industrial Revolution 5.0, however this is only the beginning of the new era of AI in its theory, method, research, and application (Shao, Zhao & Yuan et al). Unlike the previous revolutions, industry 5.0 mainly focuses on the collaboration and co-integration of human intelligence with AI systems (Sun & Song, 2025). This has allowed businesses in particular to redefine many of its sectors such as marketing, finance and product development. As the revolution grows and as industries continue to adopt Generative AI in their models, the future of businesses are only seen to grow. With the ever-going evolution and updating of AI systems businesses would now be able to unlock new possibilities such as hyper personalization, risk assessment and real-time decision making, this signals the emergence of a new era where technology actively collaborates with humans in order to redefine the way in which industries operate (Rashid & Kausik, 2024). Generative AI is synonymous with models such as Chat GPT, Deepseek, DALL-E have significantly changed the interaction between humans and computers, these models have an extensive database and have a detailed algorithm to mimic human-like responses that are contextually coherent and relevant. Generative AI is completely changing the way we obtain information, streamlining operations and sparking a wave of innovative methodologies (Söllner, Arnold & Benlian et al, 2025). Numerous human-like generative AI tools are impacting various industries and providing unique capabilities that cater to the various business needs. The integration of such models in businesses ensures that businesses are able to continuously evolve as user demands rapidly change, its ability to transform business operations is becoming increasingly evident. By embracing this revolution organizations would be able to maximize their efficiency, innovation, and customer satisfaction consequently allowing them to competitively position themselves in the rapidly changing digital landscape (Ali, Khan, et al, 2024).

The objective of this paper is to explore the sector specific applications of Generative AI in businesses, to identify the key challenges associated with its implementation and to provide a comprehensive understanding of how businesses can leverage generative AI to their advantage considering its drawbacks and opportunities and also how frameworks can be designed to ensure the responsible, sustainable and ethical use of Generative AI technologies in commercial environments. The paper is organized into 5 key sections: Section 2 delves into a comprehensive review of existing literature on the adoption of generative AI in businesses highlighting current and previous research studies related to the use of Generative AI in businesses. Section 3 delves into the research methodology it explains the research design, data sources and the approach used to investigate the chosen research questions. Section 4 would present and discuss an analysis of the findings in relation to the research questions and finally section 5 addresses the unresolved research questions and provides insights into potential future research trajectories while summarizing the key insights and broader implications of the study.

2. Literature Review

Generative AI models have completely revolutionized business operations by being able to automate repetitive and time-consuming blue-collar worker tasks. By using Generative AI to produce new content, businesses are now able to enhance creativity, efficiency, and customer engagement. According to Prahl's study (2023), Generative AI tools are now very extensively applied in tasks such as resume screening, email generation, inventory, and basic IT support tasks. This has led to drastic cost savings on generic and menial costs, leading to productivity gains. McKinsey's analysis of the harnessing generative AI in manufacturing and supply chains stated that the use of Gen AI could lead to reducing expenses by half a trillion dollars in supply chain and manufacturing operations alone (McKinsey, 2023). Despite these advancements one major gap in the literature is the underrepresentation of SMEs in its research, most of the research focuses on big corporations with enough funding and sufficient digital infrastructure, leaving SMEs with lesser technological advancements in the new revolution of AI. In the future research should focus on how AI can be implemented into SMEs and how cost-effective and attainable the use of Generative AI is for smaller firms (McKinsey, 2023).

In product development generative AI has been of extreme use, it serves as a catalyst for faster prototyping, data gathering and brainstorming. Thoughtworks has recorded that product developing teams are now increasingly using generative AI to be able to enhance their product development process. The research suggests that almost one third of companies across various industries are actively exploring the use of AI in product design (Bi, 2023). Moreover, reports suggest that Generative AI is predicted to contribute to the development of 30% new drug discoveries by the year 2030 (Fu & Chen, 2025), further highlighting its use in the aspect of product development. Generative AI tools like Chat GPT help in ideation, creation ,and basic coding whereas tools such as Adobe firefly can help in the more creative processes of product creation. While Generative AI tools are extremely useful in businesses and innovation, one primary challenge in its lack of domain

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specific tuning and training, many tools are generic and not specific or custom to the operation of industry specific businesses, which in turn leads to limitations in generating feasible ideas and content (Holmström & Carroll, 2024).

Figure 2 Enhancing Customer Experiences with Generative AI

Moreover, one of the primary uses of Generative AI is in the field of Customer experience enhancement, more specifically in hyper-personalization of customer experiences and communications, according to research conducted by Salesforce (2023) 48% of service professionals said generative AI will improve customer self-service options and 47% said it will help automate customer service communications better. It is noticed that Generative AI tools are effectively able to analyse behavioral and linguistic cues, and interaction patterns in order to generate tailored responses that are specific to the customer and their needs (Davenport et al, 2023). Moreover voice assistance and human-like conversational experiences are all examples of how businesses are transforming their customer engagement experience. However, a few concerns such as the loss of human connection and empathy, especially during complex customer situations arise with the use of Generative AI in customer experiences, specifically in areas where generative AI is still underperformed compared to human knowledge. Future studies could focus on exploring the feasibility and effectiveness of the use of hybrid models with an integration of generative AI and human representation.

Generative AI has also been leveraged to strengthen decision making by being able to automate and synthesize large datasets and by being able to identify trends and patterns more accurately than human capability. AMCIS 2022 proceeds further emphasize how human-AI models are able to reduce decision latency by 60% in market analytics. Moreover, KMPGs predictive modelling reports highlight that Generative AI can also be used to visualize multi dimensional data using natural language and storytelling, this makes data analysis easier and more accessible in businesses (Harvard Business Review, 2023). However, research gaps still do exist in the transparency and explainability of Generative AI models, as many generative AI tools in the industry today function as black boxes where people do not know where data is gathered from and how the outputs are generated, this leads to there being lesser trust in the generative AI tools in high stake sectors such as healthcare and finance. In the future learning about tools that can explain the thinking of generative AI models will be crucial for reliable and accurate decision making. Ethical considerations are still one of the most pressing concerns about the use of generative AI in business, according to research conducted by KPMG 57% of organizations using GenAI have reported risks related to data privacy, copyright infringement, or algorithmic bias, these ethical concerns make it more difficult to seamlessly integrate generative AI into business.

Furthermore, it is imperative for corporations to balance technological integration and innovation with inclusion of the workforce, especially as generative AI begins replicating tasks typically performed by blue-collar employees, however AI is still challenged with the task of being able to replicate specific white collared employee roles that require skills like expert judgement and emotional intelligence. Future research should explore how generative AI can complement jobs done by all employees rather than replace them, and how education and awareness can prepare future employees to work alongside AI models and how there is a need for international governance to regulate the use of generative AI systems fairly and safely.

Table 2 : Summary of literature review

Study	AI tools mentioned	Key findings	Research Gap and Limitations
(1)	Not Specified	How AI has been revolutionizing creative processes in different fields such as marketing, designing, etc.	Does not explicitly mention the specific limitations
(2)	ChatGPT, DALL-E, Bard, Bing Chat	Generative AI has enhanced analysis in business through various methods and helped customize services while discussing improvements in processing data.	Does not address the challenges such as data accuracy and the complex nature of the generation process
(3)	Chatbots, ChatGPT	Generative AI has potential to completely replicate human creativity but addressing responsible development and addressing ethical concerns are critical.	Limited understanding of Generative AI's nuanced aspects and understanding its full potential.
(4)	ChatGPT, Bard, PaLM2 model	Generative AI models have the potential to transform the finance sector. Highlights the limitations of Generative AI use in the finance sector.	The specific challenges of implementing generative AI in business environments.
(5)	Large language models, Generative adversarial networks (GANs), IBM Watson Assistant	Generative AI has transformational potential for businesses but also faces significant challenges in implementation and integration.	Challenges like data protection, ethical and legal considerations, and specialized skills.
(6)	ChatGPT	States that GenAI tools are extremely easy to use and give solutions to problems for many different business sectors leading to better productivity.	Identifying a need for organizations to maximize AI productivity while minimizing the potential harms of its use in businesses.
(7)	Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), Diffusion models	Generative AI offers benefits like efficiency and innovation, but also risks like workforce displacement and ethical challenges,	Challenges such as job displacement, ethical issues, privacy concerns, algorithmic bias, and regulatory issues.

(8)	ChatGPT	AI models have experienced rapid growth and progress and have the potential to transform daily work, while there are concerns about their societal impacts.	The need for regulation to ensure fairness, competitive balance, and protection of intellectual property and privacy.

Based on the insights derived from the above literature review research questions and its following hypothesis have been derived to obtain a structured investigation that explores the applications of Generative AI in various businesses.

The research is structured around the following questions and hypotheses:

Research Questions (RQs):

1. **RQ1:** What are the primary organizational and technological challenges associated with adopting Generative AI across different industries?
2. **RQ2:** How do businesses perceive and implement ethical norms and regulatory frameworks, including privacy, bias, and transparency, when using Generative AI?
3. **RQ3:** How is human–AI collaboration evolving in Generative AI-enabled workflows, including job roles, decision-making, and skill requirements?

Hypotheses (H):

- **H1:** Perceived usefulness and performance expectancy of Generative AI significantly impact its acceptance in enterprise settings.
- **H2:** The existence of well-defined ethical guidelines and AI governance increases organizational trust in Generative AI systems.
- **H3:** Higher levels of digital skill development and employee training are associated with more effective human-AI collaboration.

Limited understanding of Generative AI's nuanced aspects and understanding its full potential, more research required for the aspects of human-AI collaboration and its ethical considerations. Moreover, the need for regulation to ensure fairness, competitive balance, and protection of intellectual property and privacy in the Generative AI market. Developing regulations for the ethical use of Generative AI and promoting technological improvements to harness the applications of Generative AI while enhancing the collaboration between humans and AI whale defining ethical norms for various situations and prioritizing research on the real world applications of Generative AI models.

Research Methodology:

This research utilizes a comprehensive and research methodology that involves gathering qualitative and quantitative data to critically examine the challenges and applications of generative AI in businesses. Real-world case studies are thoroughly and systematically analyzed while also using a structured SWOT framework to understand both the advantages and the limitations of AI integration in businesses. Specific attention is given to ethical considerations, ensuring that the analysis addresses the prevalent question for responsible AI deployment and utilization. The research recognizes the extremely complex and evolving impact of the use of AI in business environments. This research also explores policy implications, showcasing the urgent need for technological governance and stringent regulatory frameworks. These frameworks must be specifically designed to be capable of keeping up with the pace of the rapid growth and transformative impacts of the use of generative AI in businesses. By placing emphasis on practical application, the methodology elucidates current market impacts but also highlights sustainability issues while establishing a robust basis for further research. The aim is to be able to facilitate deeper investigation into alignment of generative AI with business value creation, its broader economic impact and its growing role in shaping organizational strategies and future market structures

Case Study 1: Coca Cola - Marketing personalization using Generative AI : In 2023 Coca Cola had launched its "Create real magic" campaign in collaboration with Open AI, the campaign used generative AI to let people create their own Coca Cola themed digital artworks and co-create advertisements by generating visual and text based content using DALL E and ChatGPT.This showcases how generative AI can be used to enhance consumer engagement and brand personalization while raising concerns about the implications of intellectual property rights and brand authenticity.

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Case Study 2: Pfizer - Drug discovery and clinical trial simulation : The reputable pharmaceutical brand Pfizer has been integrating generative AI in its framework in order to accelerate drug discovery by simulating clinical trial outcomes, by using tools such as AlphaFold and generative AI algorithms the pharmaceutical brand was able to reduce the time for a new molecule identification by almost 40%. However, along with its transformative implications the case highlights key challenges such as data privacy, accuracy and ethical challenges that businesses face while integrating AI frameworks

Case Study 3: JPMorgan Chase - AI powered fraud detection : JPMorgan Chase introduced a new generative AI model to create synthetic datasets that would be able to simulate and replicate real transaction patterns, this helped in improving fraud detection accuracy and was able to enable risk modelling without compromising confidential and private data.This highlights the importance of a balance between data utility and privacy and showcases the impact and importance of AI governance frameworks in the financial sector.

These case studies were qualitatively analyzed in order to identify potential patterns across implementation strategies. The methodology was strategically framed to answer the three research questions and test their respective hypothesis by combining empirical and theoretical insights and perspective. This integrated approach allows for research that would provide a grounded understanding of how generative AI is transforming businesses while acknowledging their respective challenges and applications.

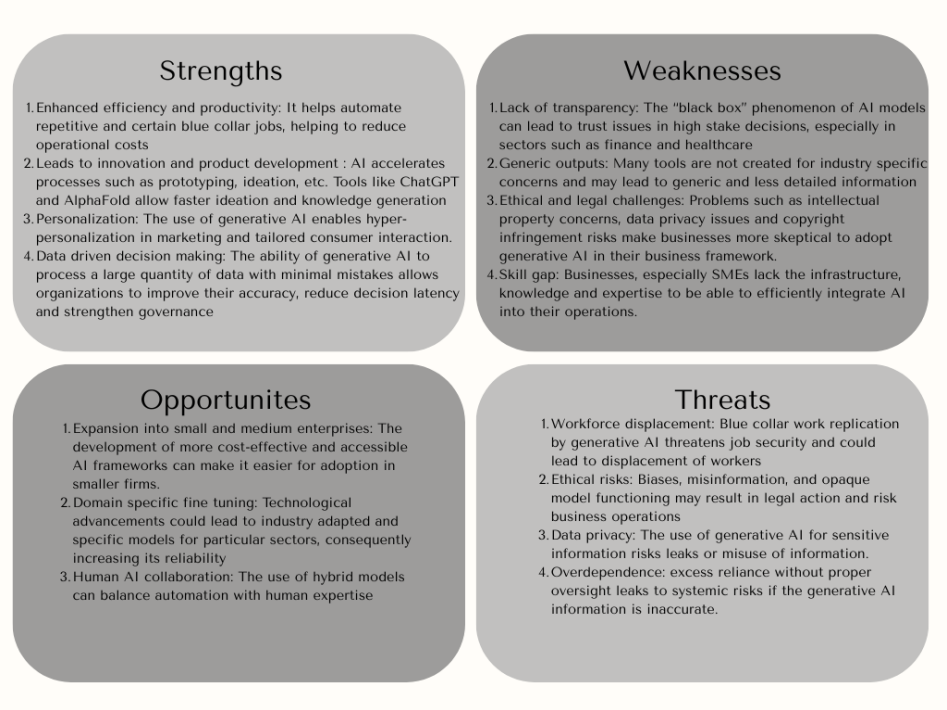

Figure 3 SWOT Framework

Discussion:

The research findings indicate that while generative AI provides transformative opportunities across various business sectors, its implementation is complemented by significant challenges. Recent literature showcases that the integration of generative AI in businesses has led to a significant increase in efficiency and opened new areas for personalization and risk management. For example authors such as (Gursoy, Cai, 2024) highlight how such models are able to drive marketing productivity, streamline clinical research and enhance fraud detection yet still highlight the issues regarding data quality, regulatory compliance and ethical issues. Innovation diffusion theory was an idea that was originally articulated by Evrett Rogers, it frames the adoption of new technologies, including generative AI, within a social system. According to this model, “diffusion”refers to the process by which innovation spreads through various communication channels over time in a social system (Kwon, Woo, et al 2021). Adoption within organizations follows an S shaped curve, with early adopters being followed by early majority, late majority and finally the laggards (Avilés, 2020). The findings are mapped through the lens of innovation diffusion theory and showcase how companies such as Coca-Cola , Pfizer and JPMorgan Chase serve as innovators and early adopters, showcasing both the business value of using Generative AI while also addressing the

various challenges that accompany its use. The observed applications in industries such as marketing and finance highlight how generative AI helps enhance efficiency and improve the decision making process. Marketing firms are able to leverage generative AI for hyper personalized customer engagement and content generation. Similarly, in pharmaceuticals generative AI accelerates the drug discovery process by analyzing a lot of biomedical data sets and shortening the development timeline. These examples demonstrate how the perceived relative advantage of generative AI, which is its ability to outperform traditional methods, is what drives its rapid adoption. However, the significant challenges that were identified emphasizes that the adoption of generative AI is not without its limitations. Concerns around data privacy, intellectual property rights, copyrights, bias and accuracy create barriers in companies ability to utilize generative AI ethically.

While current studies mostly focus on technological or operational outcomes, this framework recognizes the central role of AI governance and ethical design, suggesting that sustainable AI implementation requires effective policies to be implemented. By examining the case studies through a qualitative, theoretical lens, the research demonstrates that generative AI enables rapid business model adaptation, fosters research and development. Unlike most prior research available we provide a comprehensive approach that directly informs policy making by emphasizing the need for transparent governance. The key policy implications include:

- The necessity for adaptive and flexible legal frameworks that evolve with the changing complexity and scalability of generative AI
- Integration of explainable generative AI practices to be able to enhance stakeholder trust and accountability
- Mandating strict and robust data governance and privacy-preserving mechanisms especially in high stakes factors such as finance and healthcare

Lastly this investigation is limited by its emphasis on qualitative information and focus on flagship enterprises, which may not include small or less digitally inclined organizations. Future research should incorporate more quantitative analysis while broadening the industry scope.

Conclusion:

In conclusion, generative AI is reshaping the entire business landscape by contributing to improving efficiency, consumer engagement and accelerating innovation.Its perceived relative advantage lies in its ability to surpass traditional business operations in speed and accuracy, being of utmost importance for a rapidly changing digital world. However, the challenges surrounding data privacy, algorithmic biases, high costs and ethical concerns, underscore that the adoption of generative AI is not without its risks. As a result, firms must be able to balance innovation with responsible and ethical governance. Ultimately, the extent to how effectively businesses incorporate generative AI within their operations will depend on how businesses can harness their transformative impacts while simultaneously mitigating its limitations.

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