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AI chatbots: Fast tracking sustainability report analysis for enhanced decision making

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# AI CHATBOTS: FAST TRACKING SUSTAINABILITY REPORT ANALYSIS FOR ENHANCED DECISION MAKING

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#### Abstract

This paper explores the integration of artificial intelligence (AI) in businesses, focusing on the utility of chatbots for sustainability report analysis. Using ChatGPT technology via the Chat-based platform, we developed a personalised chatbot to extract data from sustainability reports, with the aim of facilitating decision-making processes. The study includes a literature review on AI's impact on the economy and labour markets, followed by a methodology base on technology ChatGPT detailing chatbot development and testing using a sustainability report of a company listed on the Romanian stock market. The results demonstrate the efficacy in providing accurate financial insights, offering potential benefits for analysts, investors, and business organisations managers. By harnessing AI-powered chatbots, organisations can streamline operations and gain a competitive edge in today's digital landscape.

**Keywords:** artificial intelligence; chatbot; finance; financial analysis; decision-making

**JEL Classification:** C69, C89, G19, G29, G39

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## Introduction

The development of advanced technologies in the operationalisation of business organisations' activities, with the help of artificial intelligence (AI), can lead to an increase in their performance by increasing employee productivity, optimising sales, saving energy use, etc. In a digitised era, it is imperative that all organisations employees have digital skills, so organisations, regardless of their size, should invest in the development and continuous training of their employees' skills as a prerequisite for ensuring future performance.

AI has a major influence on decision-making patterns in companies and on redefining the tasks of their employees, requiring continuous adaptation to the advancement of artificial intelligence techniques (Thomas et al., 2016). The same idea is also supported by Agrawal et al. (2019) who show in their research the usefulness of thinking in terms of prediction tasks and decision tasks, prediction having no value without decision, AI replacing employees in the workplace depending on the degree to which the basic skills involved in the intended job involve prediction.

We are seeing an increasing amount of Environmental, Social, and Governance factors (ESG) influence on investment decisions at the investor level. ESG-aware investing benefits investors both financially and non-financially and promotes social and environmental responsibility. et al. Sultana (2018). The study's findings encourage businesses to adopt environmentally friendly practices, sound social and governance policies in order to support a more sustainable economy, and authorities may utilise this data to create ESG-related legislation that preserves social and environmental equilibrium in the stock market.

Advanced artificial intelligence/machine learning tools that are increasingly applied in the financial sector are able to perform clear tasks that previously required human intelligence. For this reason, financial institutions rely more and more on artificial intelligence/machine learning tools for asset management, optimisation of customer experience, algorithmic trading, optimal risk management, optimisation of lending operations (Belhaj, & Hachaïchi, 2023).

In this regard, the International Monetary Fund (2021) in the study on the use of artificial intelligence in the financial sector points out that systems based on artificial intelligence/machine learning (AI/ML) have made significant progress in recent years, AI/ML systems are already able to perform tasks well-defined that usually require human intelligence. It is estimated that the accelerated development and propelled by the pandemic crisis of the digitisation of employee tasks through the application of artificial intelligence will generate massive transformations in the labour market, from job requirements to task design, as well as employee work evaluation (Cramarenco et al., 2023).

In the context of digital transformations, organisations have adopted technological innovations based on artificial intelligence and recent studies have shown the ability of artificial intelligence applied in organizations to improve their performance both at the organisational level (financial, marketing and administrative) and at the process level, as well as increasing the return on investment in AI-transformed projects (CIGREF, 2018; Crews, 2019; Wamba-Taguimdjeet al., 2020)



In this paper, we aimed to show the usefulness of chatbots in the current activity of organisations, by creating a chatbot based on the technology behind ChatGPT, using the Chatbase platform in order to obtain selective financial information for business analysis. The chatbot that we develop and propose in this paper can significantly reduce the time required to search for specific information and thus speed up the analysis of financial reports and improve the decision-making process.

This article is structured in three sections: the first section analyses the specialized literature regarding both chatbots and their utility in the economy and the transformations in the labour market through the integration of artificial intelligence in the activity of companies; the second section presents the methodology of building a chatbot based on ChatGPT technology, while the last section highlights the results obtained and the implications for investors, financial analysts, and company managers.

#### 1. Literature review

Cramarenco et al. (2024) systemic literature review encompassing 639 papers highlights the challenges posed by AI-driven disruption. The findings underscore the need for training, mainly to enhance and reskilling initiatives to address skill requirements in a world in which AI is used. The need for proper regulation and proactive ethical and responsible integration of AI is emphasised, as well as to ensure holistic employee well-being and sound professional development in an ever-changing world.

The research paper published by Ernst et al. (2018) examines the impact of AI on labour markets, comparing it with previous automation waves. It identifies opportunities for productivity gains, especially in developing countries, but also highlights the risks of exacerbating inequality. The conclusions emphasise the significant potential of AI technologies across sectors and skill levels, but highlight the need for encompassing policies to ensure equitable distribution of benefits. The collaboration between policy makers and stakeholder for addressing market concentration, protecting data rights, and fostering international cooperation, along with constant monitoring and regulations to address ethical issues and ensuring societal-centric AI are some of the recommendations offered by the authors. Similarly, Beljah et al. (2023) emphasises the necessity for policymakers to balance the risk and benefits of AI adoption using robust regulatory responses, calling for enhanced oversight to mitigate potential emerging risks and ensure ethical and responsible AI innovation, thus protecting financial stability and consumer welfare.

ESG reporting is an important consideration when making investment decisions. In their research, Sultana et al. (2018) investigate individual stock market investors' preferences for Environmental, Social, and Governance (ESG) issues and how these preferences, in addition to investing intent, influence decision-making. The study also examines the moderating role of the investment horizon, specifically how the long-term view affects the relationship between ESG issues and investment decisions. The study's key findings demonstrate that social, environmental, and governance concerns have a significant impact on investor decision-making processes. Long-term investors are more willing to examine ESG problems as a means of reducing risk and ensuring a sustainable return.



Furthermore, in their study, Park and Jan (2021) emphasise that ESG has a major impact on investor decisions, particularly on environmental and governance issues. The study looks at how institutional investors incorporate ESG factors into their own investing decisions, both globally and specifically in South Korea. They concluded in their analysis that institutional investors with forward-thinking investments, such as pension funds, place a higher weight on governance issues such as ownership rights and CEO reputation. On the contrary, short-term investors prioritise consumer happiness and environmentally friendly strategies. Companies that create a country-specific ESG framework can improve compliance, enhance market reputation, and attract more investment, indicating sustainability and long-term growth potential for both domestic and international investors. Furthermore, the study highlights that including country-specific criteria in a broader global ESG framework can lead to more accurate predictions of business performance.

These theories are reinforced and corroborated by Mehwish et al. (2022), who conducted a recent study on how ESG affects individual investment decisions at the Pakistan Stock Exchange. They applied a model based on the Theory of Planned Behaviour. This study discovered that PSX investors place a higher value on governance issues such as shareholder rights and corporate ethics than on social or environmental concerns. This preference highlights the role of excellent governance in recruiting and maintaining investors. The study also discovered that effective ESG integration can boost a company's reputation and financial performance, making it a more appealing investment. Aligning with ESG principles can help firms improve their market positioning, boost investor confidence, and ensure long-term success.

Kolbel et al. (2020) argue that investors who wish to have a genuine impact should collaborate with their portfolio firms and other investors to increase their influence. They feel that additional policies, such as pollution levies, stricter environmental rules, and financial incentives, are required to achieve meaningful progress. These regulations may improve the material financial benefits of ESG practices, making sustainable business strategies more economically viable and appealing to both investors and firms. Furthermore, Lingnau et al. (2022) show that business sustainability has an unequal impact on investor behaviour. Although good sustainability operations may not necessarily result in an increase in WTI, failure to achieve fundamental sustainability criteria severely reduces investor interest. This finding suggests that, for private investors, the question is not so much whether "it pays to be good", but whether "it hurts to be bad". Companies that violate sustainability standards face penalties, and negative reputational damage outweighs any potential for increased financial returns. The impact of these findings highlights the growing importance of ESG variables in influencing investor behaviour and equity investment decisions.

Bahoo et al. (2024) focus in their paper on AI's impact in various aspects of financial systems, such as market prediction, volatility reduction, risk mitigation, financial stability, performance evaluation, fraud detection, and early warning models for crisis prevention. The study highlights the widespread adoption of AI in finance, urging firms to embrace these technologies to remain competitive. Policymakers are encouraged to support AI adoption through funding and training initiatives. The authors also acknowledge the study's limitations, including the broad scope of topics covered and the evolving nature of

technological advancements while mentioning that further research directions should delve deeper into specific subjects and explore the implications of recent AI-related developments for various domains.

The work of Agarwal et al. (2022) focused on a bibliometric analysis of the most cited publications on chatbots and virtual assistants, in the context of the dynamics of technological progress. The authors highlight the fact that the USA has the largest scientific production on chatbots, the trend of publications being continuously increasing in recent years.

In the article by Pillai and Sivathanu (2020), the behavioural intention of Indian customers and the actual use of AI-powered chatbots in the tourism and hospitality sector is analysed. In the study, the interview technique was used and then the collected information was analysed with NVivo 8.0. The results of the study reflect the clear intention to use the chatbot, the usefulness, and the trust placed in it by the potential users.

The types of relationships that consumers of products and services have with chatbots created by artificial intelligence were researched by Youn and Jin (2021). The authors substantiated that, in the case of the competent personal brand, consumers perceive an assistant chatbot as more competent than a friendly chatbot.

The use of artificial intelligence for cost control in the conditions of the transition from a linear to a circular economy model is the subject of research by the authors Zota, Cîmpeanu and Dragomir (2023). The authors presented and analysed five proposed circular economy chatbots, also providing their development and testing procedures using natural language processing and deep processing techniques. It is concluded that the integration of artificial intelligence in the circular economy can ensure the reduction of waste and pollution, the saving of companies' resources, and the increase of their performance.

Abdulquadri et al. (2021) analysed through the Search-Access-Test model the role of chatbots used by banks in Nigeria in changing the business model and increasing customer engagement and their access to finance. The results of the authors' study show that chatbots on WhatsApp are used by most banks in Nigeria; the language used was only English and the chatbots presented themselves with a female gender identification.

Noy and Zhang's (2023) paper investigates how the ChatGPT AI chatbot affects the productivity of professional writers. The results reveal significant increases in productivity by reducing task completion time whilst improving output quality. The results also indicate a decrease in inequality between workers, as lower-skilled workers benefit the most from using the chatbot. The results indicate that the chatbot is more efficient substituting worker effort, rather than complementing their skills. Participants exposed to the chatbot also reported increased job satisfaction and self-efficacy, along with excitement and concerns about the technology. The authors propose future research targeted in understanding ChatGPT's broader impact and to address the concerns that people have regarding its potential to disrupt labour markets.

Odonkor et al.'s (2024) study, with a focus on financial reporting, auditing and decision making, it is exploring how AI is transofming accounting practices. The authors review different scientific literature and case studies from the past decade to understand AI's impact,



effectivenes and the challenges faced in accounting. Their findings indicate that AI significantly improves accuracy and efficiency in financial reporting by automating tasks and enabling predictive analytics. But these improvements do not come without a cost, as challenges such as the need for skilled employees and data privacy concerns exist. A balanced approach that emphasises continuous learning, and ethical considerations for AI integration in accounting is proposed by the authors.

# 2. Ways to build and test a chatbot to facilitate the analysis of financial documents

With the gain in popularity experienced by Large Language Models (LLMs) with the advent of the publicly available version of Open AI's ChatGPT, several start-ups and companies started tweaking the underlying models or building on top of them to create custom solutions that excel for specific tasks. As people are trying to increase their productivity or make their work easier, several third-parties are offering solutions that help users achieve just that. One such solution is presented in this paper – Chatbase.

Chatbase (https://www.chatbase.co/) is a web platform that leverages Open AI's Generative Pre-trained Transformer (GPT) LLM in order to build custom Artificial Intelligence (AI) chatbots in more than 80 languages.

The steps for building a custom GPT chatbot using the Chatbase platform are quite straightforward:

1. Importing the data.

If the AI chatbot is meant for only for personal use, or any other customisations are not needed, the process can be stopped here. Otherwise, the next steps serve to enhance the chatbot and user-experience.

- 2. Customising the behaviour and appearance of the chatbot.
- 3. Embedding the chatbot on a website.
- 4. Integrating the chatbot with several tools.

For the first step: importing the data, several data sources, such as .pdf, .doc, .docx, .txt files or webpages to be crawled, can be added in order for the model to be trained on it and provide the proper answers and sources of those answers. For the free versions of the platform, the data is limited to 400.000 characters per chatbot, or roughly a 5MB file, while the number of links is limited to 10.

In order to demonstrate the capabilities of the AI chatbot, in this paper, we have chosen Romgaz's sustainability report for the year 2023 (available here: https://www.romgaz.ro/en/2023-sustainability-report). With 131 pages and 289,103 characters, Romgaz's sustainability report can provide us with enough information needed to assess the solution.

A company's sustainability report gives a detailed analysis of how the company incorporates environmental, social, and governance (ESG) principles into its business strategy and operations, demonstrating how sustainability is linked to long-term value generation. It includes major risks and opportunities, such as how the company handles climate-related risks, regulatory changes, and emerging market trends, as well as identifying innovation opportunities and long-term sustainable growth. Environmental performance and impact are addressed using data on emissions, energy use, water management, and waste reduction, as well as initiatives aimed to reduce ecological footprints. Employee well-being, diversity, human rights, involvement in the community, ethical behaviour, and board diversity are all examples of social and governance concerns. The report also contains detailed performance metrics and data, such as important ESG indicators and targets, which are frequently verified by third parties, offering transparency and accountability for sustainable progress.

For the second step: customising the behaviour and appearance of the chatbot, several settings can be adjusted to customise the chatbot's output and appearance. The first and arguably most important setting to be customised is the "Instructions" field. The "Instructions" field contains the model's system prompt. The system prompt serves as guardrails that tell the underlying model how to behave. Every user's input will be amended to the system prompt before it is passed to the underlying GPT model.

For this paper, in order to ensure replicability and an evaluation of the most basic model, we have chosen to use the default system prompt that stated: "I want you to act as a support agent. Your name is "AI Assistant". You will provide me with answers from the given info. If the answer is not included, say exactly "Hmm, I am not sure." and stop after that. Refuse to answer any question not about the information. Never break character."

The aforementioned system prompt starts with describing the role that the underlying model should assume and hos it should behave – as a support agent. Then, it tells the model how it should respond – providing answers from the given info (i.e. the provided documents). Then, the limitations of the model are included – when the information is not present in the data provided, the chatbot should say "Hmm, I am not sure.". To further reinforce this behaviour, and avoid any hallucinations from the model, the system prompt tells the model to refuse to answer any question that is not in the information provided. Hallucinations refer to the tendency of Natural Language Processors to provide output that contains undesired content or non-sensical material that deviates from the source material (Ziwei et al., 2023). Finally, the model is reminded to never break character during the interaction. Of course, there are several ways in which this system prompt can be customised to better fit the needs of someone who needs to extract information from the financial documents provided, but prompt optimisation is not within the scope of this paper.

The next customisation step available is the model selection. Chatbase supports the following Open AI models: gpt-3.5-turbo, gpt-4-turbo, and gpt-4. For this paper, we have chosen the freely available gpt-3.5-turbo model in order to assess the chatbots' default capabilities. It is also important to note that the gpt-3.5-turbo model is both the most environmentally and cost-effective selection for this chatbot, offering 90% reduced costs when compared to its gpt-4-turbo counterpart and 95% reduced costs when compared to the gpt-4 model.



As per Open AI's description (https://platform.openai.com/docs/models/overview), the gpt-3.5-turbo model is a set of models that improve on te GPT-3.5 and can understand as well as generate natural language or code. Also, the gpt-3.5-turbo is mentioned by Open AI (https://openai.com/blog/gpt-3-5-turbo-fine-tuning-and-api-updates) to support various fine-tuning of parameters such as: improving steerability – which improves the model's capability to better follow given instructions; reliable output formatting – which improves the model's ability to format its responses in different formats, such as tables; and custom tone – which improves the model's ability to fine-tune the tone of the output to better fit the users' requests.

Finally, the temperature parameter is used to control the diversity and randomness of the generated responses. A lower temperature setting will offer a more conservative answer with a higher confidence, while a higher temperature setting will offer a more diverse and creative answer as the model explores a wider range of possibilities of answers. Temperature can be set between 0 or 1 for this paper, we have used the default setting of 0, which arguably is the best choice for a use-case that focuses on extracting precise data and numbers from the provided documents.

Other settings that help customise the visual appearance and user experience of the chatbot can also be customized at this step. Chat icons, profile picture, initial message or placeholders can be customised here in order to better fit the chatbot in different other platforms.

The third step: embedding the chatbot on a website helps with the integration of the chatbot on other websites to be available to a broader public. Although the chatbot can be used privately by its creator, it can also be shared via a link or embedded on a website. This step is useful when sharing the chatbot with a specific audience. Some use-cases could include a company or a stock exchange adding a chatbot to its website so that investors interested in one or more companies' financial standing and information could ask the chatbot and get a quick answer instead of endlessly browsing through different websites, web pages, and lengthy documents to find the much-needed information. For this paper, the chatbot was not embedded on any website.

The fourth step: integrating the chatbot with several tools offers the option to integrate the chatbot with other external tools such as Whatsapp, Messenger, Slack workspace, or Wordpress in order to make it even more available and easy to use to larger audiences. For this paper, the chatbot has not been integrated with any other tools.

After uploading the Romgaz 2023 sustainability report, and proceeding with the default settings, the chatbot was tested with different questions that fall within the scope of the document. The image below simplifies the whole interaction between the user and the chatbot.

- 1. The user asks a question (a prompt).
- 2. The question is amended to the system prompt.
- 3. The user's question, along with the system prompt are passed to the back end.
- 4. The back-end looks through the provided documents and, using the GPT technology formulates an answer.

1. The formulated answer is given back to the user.

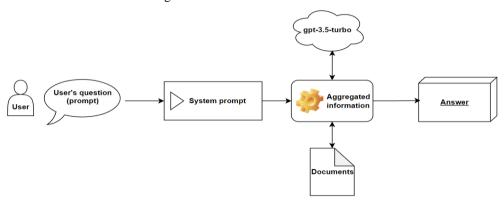


Figure no. 1. Diagram of a user asking a question to the chatbot

Source: authors' own creation

In order to gauge how and if it will be able to respond to the user's queries, the chatbot was asked 20 standalone questions, four for each of the five distinct categories of information present in the sustainability report. The categories were: business strategy and operations, risks and opportunities, environmental performance and impact, social and governance aspects, performance metrics and data. Table no. 1 shows the questions asked to the chatbot. They were asked in English, and the table below shows the versions translated into Romanian.

Table no. 1. List of questions asked to the chatbot

Table no. 1. List of questions asked to the chatbot					
Question asked	Was the information present in the document?	Did the chatbot provide an answer?	Was the answer correct?		
Category: Business strategy and operations					
Can you provide an overview of the company's key sustainability initiatives and their respective contributions to overall business strategy?	Yes	Yes	Yes		
What are the key sustainability-related markets or sectors the company serves, and how does it address the needs and preferences of environmentally or socially conscious customers?	Yes	Yes	Yes		
How does the company discuss its sustainability- focused research and development efforts, and how are they aligned with its broader business and environmental objectives?	Yes	Yes	Yes		
What information does the company provide about its sustainability partnerships or collaborations with key stakeholders?	Yes	Yes	Yes		



Question asked	Was the information present in the document?	Did the chatbot provide an answer?	Was the answer correct?
Category: Risks and opportunities			
What are the main sustainability-related risks identified by the company in its sustainability report?	Yes	Yes	Yes
Can you provide examples of environmental, social, or governance (ESG) risks that the company may face in its operations?	Yes	Yes	Yes
How does the company assess and mitigate risks associated with supply chain sustainability or regulatory compliance in environmental standards?	Yes	Yes	Yes
How does the company discuss risks related to climate change, such as extreme weather events or carbon emissions regulations, in its sustainability risk disclosure?	Yes	Yes	Yes
Category: Environmental performance and in	ıpact		
How does the company's year-over-year greenhouse gas (GHG) emissions reduction compare for the last three years?	Yes	Yes	Partial
What was the company's total carbon footprint in the most recent reporting year?	Yes	Yes	Yes
Can you summarize the trend in the company's energy usage and carbon intensity over the last five years?	Yes	Yes	Yes
Can you identify any significant sustainability initiatives or extraordinary efforts that have affected the company's environmental performance?	Yes	Yes	Yes
Category: Social and governance aspects	Ī	1	1
What are the primary social and governance factors discussed by the company's management that influenced its sustainability performance during the reporting period?	Yes	Yes	Yes
Can you summarize the company's management outlook on future sustainability opportunities and potential challenges?	Yes	Yes	Yes
Can you provide insights into any significant changes in the company's governance or ethical practices as discussed in the sustainability report?	Yes	Yes	Yes

Question asked	Was the information present in the document?	Did the chatbot provide an answer?	Was the answer correct?
What strategic initiatives or corporate social responsibility (CSR) objectives are highlighted by the company's management in the sustainability report?	Yes	Yes	Yes
Category: Performance metrics and data			
What is the company's waste recycling rate based on the data presented in its sustainability report?	Partial	Yes	Yes
How does the company's environmental performance vary across different geographic regions or operations?	No	No	Yes
Can you summarize any significant changes in the company's sustainability metrics or performance compared to the previous year's report?	Yes	Yes	Yes
Can you identify any key performance indicators (KPIs) or supplementary disclosures in the sustainability report that investors should be aware of?	Yes	Yes	Yes

Source: authors' own creation

To test if the chatbot was able to discern cases in which the content was not present in the document and to test if it would hallucinate, some questions asking information that was not present in the document were asked.

We define as a correct answer either of the following two options:

- 1. The chatbot was able to correctly answer a question in which the information was present in the document.
- 2. The chatbot mentioned that it cannot answer a question in which the information was not present in the document.

Of the 20 questions asked, 18 questions (90%) had the information available in the document and could be answered. In this case, the chatbot was able to answer correctly in 100% of the cases. And the remaining 2 questions (10%), for one the chatbot did not have the information present in the document and was able to correctly mention that it does not possess the information, while for the other question the information could be obtained by calculating together other indicators in the document, and the chatbot did just that to obtain the relevant information needed. Overall, in all 20 of the 20 questions (100% of cases), the chatbot was able to give the correct answer to the user. The only case in which the chatbot was not able to offer the information it was the case in which that information was not present to the document.



Thus, with access to Romgaz's sustainability report and with the current gpt-3.5-turbo iteration, the chatbot was able to identify the needed information and offer pertinent answers in the majority of cases.

Another feature of the chatbot is that it can also offer the source of the answers, a feature that is becoming increasingly important in a world in which AI traceability is important. Instead of dealing with a black-box and blindly trusting the output of the model, the user has the option to check the sources and double-check the accuracy of the information if needed.

#### 1. Discussions of results and implications

It can be seen from the examples above that the chatbot, after having been trained on Romgaz's sustainability report, can offer answers to relevant questions about the information presented in the document. This solution can greatly reduce the time needed to search for specific information and thus fast-track sustainability report analysis and enhance decisionmaking. This value proposition can be useful for several types of entities such as financial analysts or investors that need specific information to make recommendations or decide if they should or should not invest in a specific company. Publicly listed companies could use this kind of solution in order to help their public navigate more easily through their complex reports and receive their answers faster. Stock market research firms could use this kind of solution to provide their customers with a quick and easy way to compare different publicly traded companies with regard to their sustainability measures. Management of companies could also use this solution to quickly find information needed to take business decisions or to be informed and up to date with the latest figures. Employees from different departments within the same company could use this tool to quickly obtain the information needed to do their job better. In fact, the information can also be obtained by looking through the document, but the added value is the time saved while using such a solution. Depending on the information sought, several steps and delay points could greatly slow down the process, and besides the regular time (and implicitly money) spent looking for the required information, some time-sensitive situations could cause even more harm. Some of the steps slowing the process down could be having to identify the type of document needed, looking through several other documents, waiting to receive an answer from a colleague regarding the document, waiting for an answer from a colleague that is on leave, ensuring that the document received has the latest updated information, etc. All these situations can be mitigated by having a person (or a team) responsible for keeping the chatbot's documents up to date and the chatbot ready for everyone to use whenever needed.

# **Conclusions**

This study underscores the significant role of AI, particularly chatbots, in improving efficiency and decision-making processes within businesses. By leveraging ChatGPT technology, we demonstrated the effectiveness of AI-powered chatbots in extracting insights from specialty documents like Romgaz's sustainability report. The findings highlight the potential of such tools to improve various aspects of business operations, including financial analysis, investor relations, and managerial decision-making. As organisations navigate the digital transformation landscape, investing in AI-driven solutions can yield substantial benefits, enabling them to stay competitive and agile in an ever-evolving market.

Furthermore, the widespread adoption of AI chatbots offers promising prospects for improving productivity, reducing operational costs, and fostering innovation in all industries. Embracing AI technologies represents a strategic imperative for businesses seeking to thrive in the digital age, driving sustainable growth and value creation in the process.

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