

Approaches for Adopting AI-Powered Business Intelligence in the Organization to Ensure Consistent Decision-Making

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ABSTRACT

Integrating Artificial Intelligence (AI) into Business Intelligence (BI) is fundamentally transforming how organizations process data and make decisions. This article analyzes current trends in AI applications within BI, focusing on key innovations such as augmented analytics, generative AI assistants, automated machine learning models, and neural networks. These advancements enable non-technical users to extract insights independently, enhance data preparation, and facilitate informed decision-making, thereby democratizing access to data analytics.

Despite these benefits, the adoption of AI-driven BI introduces significant challenges. These include accountability for AI-assisted decisions, ethical governance to prevent biases in AI models, cost implications associated with implementing large language models, and data security and privacy concerns. The article discusses the crucial role of Explainable AI (XAI) in providing transparency and building user trust. It also outlines strategies for mitigating biases, conducting cost-benefit analyses, and establishing robust data governance policies.

By addressing both the opportunities and the challenges, the article proposes comprehensive approaches for integrating AI-oriented solutions into organizational processes. This ensures consistent, ethical, and effective decision-making, aligning technological advancements with business objectives.

KEYWORDS: Artificial Intelligence, Business Intelligence, Augmented Analytics, Explainable AI, Hybrid Decision-Making, Machine Learning.

INTRODUCTION

In today's business environment, there is a rapid increase in the implementation of artificial intelligence (AI) across various platforms and applications, as companies strive to enhance their capabilities and maintain competitiveness in a dynamically changing landscape¹. According to a Forbes report, the most popular areas for AI applications among business owners include customer service, fraud management, and personal assistants². Many enterprises, instead of developing their solutions, rely on offerings from vendors, leading to an increased dependence on AI models for client interactions, content creation, and forecasting. This trend directly impacts business decision-making processes

1 Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data—evolution, challenges and research agenda. *International journal of information management*, 48, 63-71.

2 Haan K. (2023). How Businesses Are Using Artificial Intelligence In 2024. Forbes. URL: <https://www.forbes.com/advisor/business/software/ai-in-business/>

and underscores the significance of integrating AI into corporate strategies.

Business Intelligence (BI) is also transforming the influence of AI and Machine Learning (ML) methods. Traditionally, BI focused on analyzing historical data, requiring specialists to have deep analytical skills and an understanding of data processing nuances. However, with the development of AI and ML, there is a shift towards providing real-time analytics and generating recommendations, opening opportunities for a broader range of users to effectively utilize data and enhance the accuracy of business decisions.

The integration of AI into BI leads to several innovations:

- Enhanced Data Processing: AI increases the accuracy of identifying inconsistencies and anomalies in data³.

- Augmented Analytics: Automated tools detect and explain

3 Raisch, S., & Krakowski, S. (2021). Artificial intelligence and management: The automation–augmentation paradox. *Academy of management review*, 46(1), 192-210.

complex patterns, making insights more accessible to non-technical users.

- Neural Networks: Provide decision-making recommendations based on analyzing large volumes of data and identifying hidden relationships.

Despite the evident advantages, the implementation of AI in BI is accompanied by several challenges. Organizations must adapt to new technologies, rethink their approaches to decision-making, and ensure that their policies and guidelines align with current business objectives⁴. Additionally, there is a need to ensure transparency of AI models and manage risks associated with data security and the ethical aspects of using AI⁵.

The relevance of this research is driven by organizations' need for effective approaches to implementing AI-oriented business analytics that ensure consistent and justified decision-making. Existing studies in this field often focus either on the technical aspects of AI or on individual business cases, creating a gap in understanding the comprehensive impact of AI on BI processes and decision-making.

This article aims to analyze current trends in the application of AI in business analytics and to develop approaches for integrating AI-oriented solutions into organizational processes to ensure consistent decision-making.

MATERIALS AND METHODS

In this study of contemporary trends in the field of BI, we conducted a detailed analysis of new features and applications offered by both emerging startups and leading BI tool providers and technology giants⁶. The research aimed to identify how the integration of AI complements traditional BI tools by supporting data processing, insight extraction, and decision-making. Such integration promotes the centralization of BI processes, providing a full spectrum of services from data cleansing to report generation and business solution development.

One of the key trends is the development of augmented analytics, which is becoming an integral part of BI. Augmented analytics assists in data preparation, insight generation, and interpretation, acting as a facilitator in data exploration

4 Jöhnk, J., Weißert, M., & Wyrski, K. (2021). Ready or not, AI comes—an interview study of organizational AI readiness factors. *Business & Information Systems Engineering*, 63(1), 5-20.

5 Stahl, B. C., Timmermans, J., & Flick, C. (2017). Ethics of emerging information and communication technologies: On the implementation of responsible research and innovation. *Science and Public Policy*, 44(3), 369-381.

6 Provost, F., & Fawcett, T. (2013). *Data science for business: What you need to know about data mining and data-analytic thinking*. O'Reilly Media.

within BI tools and other analytics platforms⁷. One of the main advantages of augmented analytics is its ability to enable non-technical users, often referred to as “citizen data scientists,” to independently obtain insights, thereby democratizing access to data⁸.

Traditional data preparation requires significant manual effort from analysts, who need to eliminate missing values, incorrect entries, and inconsistencies before using the data in BI tools. With the advent of AI solutions, users can describe the necessary actions, and an AI assistant will suggest steps to achieve the desired results⁹. For example, previously, it was necessary to create formulas to standardize phone numbers entered in various formats; now, AI can automatically identify all input variations and generate the appropriate solution.

Generative AI assistants, built on models like ChatGPT¹⁰, contribute to developing efficient data flows and guide users in metric calculations. By using dataset documentation to train such an assistant, an AI agent can explain how to join datasets, which columns to use for calculating metrics, and answer many other questions. This allows users to familiarize themselves with the data more quickly and increases their autonomy.

Generative AI assistance can be used not only for data preparation but also for simplifying access to insights and generating reports from BI tools. For example, integrating Azure OpenAI—a large language model (LLM) developed by Microsoft—into the Power BI tool allows for providing summaries derived from dashboard tables and charts, explaining specific spikes and drops in metrics. AI is capable of identifying patterns not noticeable to the human eye, detecting outliers, analyzing trends across all provided information, and connecting data faster than the human brain¹¹.

7 Gartner (2022). *Augmented analytics: The future of data and analytics*. Gartner Research. URL: <https://www.gartner.com/en/information-technology/glossary/augmented-analytics>

8 Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. *MIS quarterly*, 1165-1188.

9 Dataiku (2024). *Concept | AI Prepare*. URL: <https://knowledge.dataiku.com/latest/data-preparation/prepare-recipe/concept-ai-prepare.html>

10 OpenAI (2023). *GPT-4*. URL: <https://openai.com/index/gpt-4-research/>

11 Learn Microsoft (2021). *Support for new AI Insights including Cognitive Services and custom Azure Machine Learning models*. URL: <https://learn.microsoft.com/en-us/power-platform-release-plan/2019wave2/cdm-data-integration/support-new-ai-insights-including-cognitive-services-custom-azure-machine-learning-models>

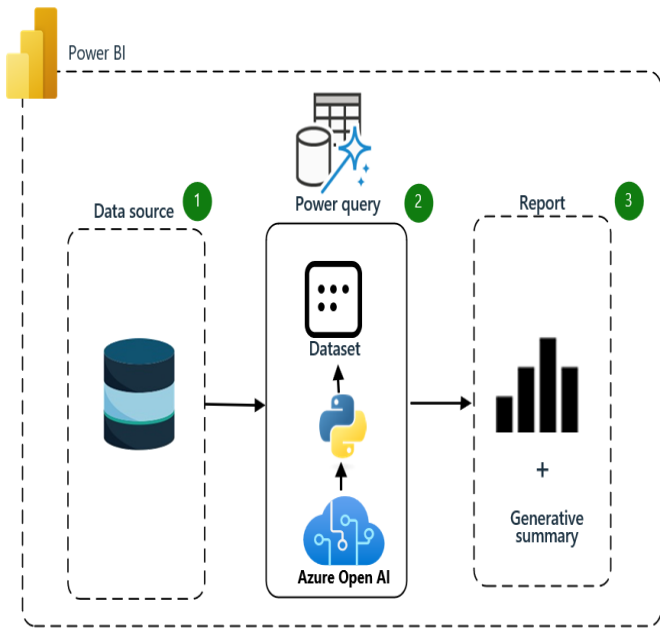


Figure 1. Power BI and Azure Open AI integration

A practical application of this approach can be seen in a scenario where a revenue manager logs into a BI tool to check the sales dashboard and prepare quarterly review results. The integration between Azure OpenAI and Power BI allows for the automatic summarization of regional performance indicators, highlighting trends, and explaining the reasons behind certain data points, and possible deviations¹².

Another way to enhance business analytics is by providing access to automated custom ML models. These models offer a streamlined pipeline that can be applied to various ML tasks. Users select the source of labeled training data, configure parameters, and go through iterations to choose models that best fit the data based on training metrics and performance.

Technology leaders such as Amazon offer platforms like Amazon SageMaker, which provide access to automated ML models designed to meet specific business needs and industry requirements¹³. These customized models enable domain experts to manage them without a deep technical understanding of feature selection, hyperparameter optimization, and model evaluation. For instance, many companies aim to detect early signals indicating the likelihood of customer churn; using such custom models makes this possible.

12 Burume P. (2024). How to use Azure Open AI to Enhance Your Data Analysis in Power BI. Techcommunity Microsoft. URL: <https://techcommunity.microsoft.com/t5/educator-developer-blog/how-to-use-azure-open-ai-to-enhance-your-data-analysis-in-power/ba-p/4041036>

13 Gangasani V., Gallitelli D., and Sureka R. (2023). Implementing MLOps practices with Amazon SageMaker JumpStart pre-trained models. URL: <https://aws.amazon.com/ru/blogs/machine-learning/implementing-mlops-practices-with-amazon-sagemaker-jumpstart-pre-trained-models/>

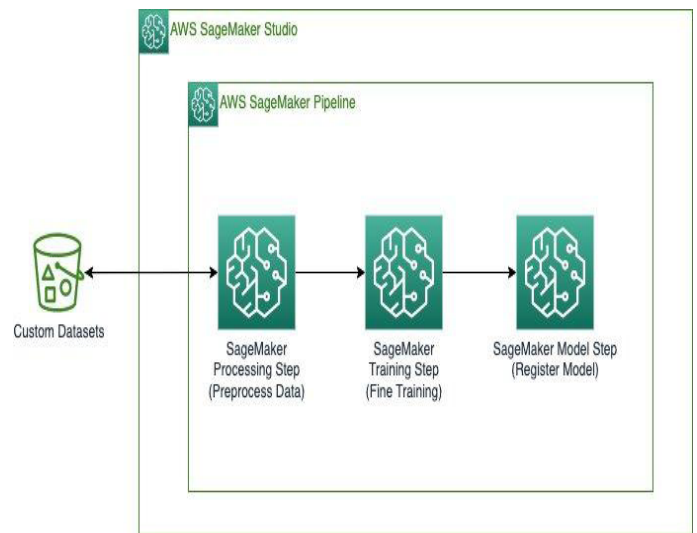


Figure 2. AWS SageMaker Studio

Furthermore, the integration of AI and neural networks into BI tools contributes to the development of neural decision-making. Neural networks are an AI method capable of handling very complex tasks with nonlinear dependencies, aiming to emulate the functioning of the human brain. These networks are trained on large volumes of unstructured data through nodes to understand relationships and make decisions. Due to this capability, they expand the analyzed data to include images, texts, and videos. A distinctive feature of neural networks is their ability to adapt and learn from their mistakes; for example, they can retrain on new trends such as changing customer behavior, process historical data considering complex relationships, and make predictions.

A practical example of using neural networks can be seen in the activities of Siemens, a global leader in industrial automation and software innovation. Siemens utilizes AI to predict equipment failures and implement preventive measures. This approach goes beyond traditional BI metrics, requiring advanced methods to ensure accurate predictions. To achieve this goal, Siemens relies on data collected from sensors, emphasizing the importance of combining human expertise with AI to complement and refine forecasts¹⁴.

Overall, the conducted analysis shows that integrating AI into BI technologies transforms data processing and decision-making processes, making them more efficient and accessible to a wide range of users¹⁵. The application of augmented analytics, generative AI assistants, automated ML models, and neural networks opens new horizons for

14 Siemens (2024). Leveraging AI for Predictive Maintenance: The Future of Industrial Efficiency. URL: <https://blog.siemens.com/2024/08/leveraging-ai-for-predictive-maintenance-the-future-of-industrial-efficiency/>

15 Chatterjee, S., Ghosh, S. K., Chaudhuri, R., & Seetharaman, P. (2021). "AI-enabled business intelligence for sustainable manufacturing ecosystems: Opportunities and challenges." *International Journal of Production Research*, 59(14), 4260-4276.

businesses, allowing them to gain deeper insights and make informed data-driven decisions.

RESULTS AND DISCUSSION

The integration of AI into BI provides substantial support in decision-making and optimization of business processes. However, this integration brings significant challenges related to responsibility for AI-assisted decisions, the cost of generative AI assistants, and issues of data security and management.

One of the most important aspects is the responsibility for decisions made by AI systems. If the data used is inaccurate or neural networks are trained on data with erroneous decisions, the question arises: who is responsible for the consequences of such decisions? Ultimately, business stakeholders must take responsibility for all business decisions. However, this can lead to two opposing user behaviors: over-reliance or complete resistance. Some users may fully trust AI solutions, accepting them without critical analysis, while others may avoid using AI tools to prevent possible errors.

In this regard, Explainable AI (XAI) plays a key role in achieving balance and perceiving AI as a tool for achieving business goals¹⁶. XAI tools provide transparency by explaining the logic underlying AI predictions and recommendations, including the factors that influenced these decisions. This helps bridge the gap between users without deep technical knowledge and complex AI models, which is an important step in implementing and democratizing AI-oriented BI.

As shown in Table 1, the principles of implementing Explainable AI in BI systems help enhance user trust and improve decision-making effectiveness.

Table 1. Principles of Implementing Explainable AI in BI

Principle	Description
Model Transparency	Ensuring the availability of information about how the model works
Informative Explanations	Providing clear and detailed explanations of the model's outputs
User Adaptation	Adjusting the level of explanation detail for different types of users
Feedback Integration	Enabling users to provide corrections and comments
Ethical Compliance	Adherence to ethical norms and standards in algorithms and outputs

Implementing these principles allows users to critically assess AI recommendations and make more informed decisions by combining automated insights with their own experience and knowledge.

To fully utilize AI's potential, enterprises need to develop

16 Sokol, K., & Flach, P. (2020, January). Explainability fact sheets: a framework for systematic assessment of explainable approaches. In Proceedings of the 2020 conference on fairness, accountability, and transparency (pp. 56-67).

new skills among employees. Critical thinking becomes mandatory for the effective use of automated solutions. Organizations implementing AI-based BI should provide training on possible AI shortcomings, including bias and accuracy issues. Proper training combined with detailed methodologies will lead to hybrid decision-making, capable of delivering positive results.

Ethical AI governance is another significant challenge. Companies must ensure that AI models do not perpetuate biases or historical prejudices embedded in training data¹⁷. Technical limitations of automated ML models must also be considered. Whether organizations develop their models or adapt existing ones, they must account for nuances and potential oversights to effectively mitigate these limitations.

Various methods for reducing bias in AI models are outlined in Table 2.

Table 2. Methods for Reducing Bias in AI Models¹⁸

Method	Application
Data Preprocessing	Removing or correcting biased data before training
Algorithmic Corrections	Using algorithms that consider fairness and equality
Post-processing Results	Adjusting model outputs to eliminate identified biases
Training on Expanded Datasets	Including diverse and representative data
Multi-objective Optimization	Balancing accuracy and fairness during model training

These methods help create fairer and more objective AI systems, which is especially important in the context of business decision-making.

Another aspect is the cost of implementing BI and AI-based solutions, which includes not only initial implementation and subscription expenses but also the costs of using Large Language Models (LLMs) if they are integrated into BI tools. The cost of using LLMs depends on the number of tokens, that is, the number of words in queries and responses. It is important to understand that commercial models can be associated with substantial costs, especially when used frequently.

Despite the anticipated increase in operational efficiency, productivity, and quality of decision-making when using advanced AI-based BI solutions, a thorough cost-benefit analysis is necessary. This includes pilot projects to verify

17 Arrieta, A. B., Díaz-Rodríguez, N., Del Ser, J., Bennetot, A., Tabik, S., Barbado, A., ... & Herrera, F. (2020). Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI. Information fusion, 58, 82-115.

18 Verma, S., & Rubin, J. (2018, May). Fairness definitions explained. In Proceedings of the international workshop on software fairness (pp. 1-7).



the expected effect and ensure that investments align with organizational goals. Thus, enterprises can strategically use AI tools while maintaining control over their budgets¹⁹.

Data security and management become critically important with the increasing volume of data used for training models and applications in generative AI applications. Companies are obliged to review and establish extensive policies that ensure data security and management. Organizations must comply with the General Data Protection Regulation (GDPR) and other regional laws.

One of the key concerns when using generative AI assistants on external platforms, such as OpenAI, is data confidentiality. If employees are encouraged to ask questions about company metrics, client information, and other confidential data, strict security protocols are necessary. In addition to data encryption and permission policies, organizations should establish clear guidelines on how employees can interact with these models.

Setting up internal restrictions to ensure that AI models and users can only access approved data is one of the solutions to reduce risk and ensure data confidentiality. Companies should implement regular audits and monitoring systems to detect any misuse or potential breaches.

CONCLUSION

The integration of Artificial Intelligence into Business Intelligence is fundamentally transforming how organizations process data and make decisions. Through the incorporation of augmented analytics, neural networks, and automated machine learning models, AI is optimizing the entire data workflow—from AI-powered data preparation to the generation of insightful reports and actionable recommendations. These advancements empower businesses to derive deeper insights, respond more rapidly to market changes, and maintain a competitive edge in an increasingly data-driven world.

However, these technological strides inevitably introduce new challenges. As companies adopt these advanced tools and extend their use to a broader range of users, there is a pressing need to address issues related to user competency, data security, and ethical considerations. The democratization of sophisticated data instruments requires users to develop new skills, particularly in critical thinking and AI literacy. Organizations must invest in training programs to ensure that employees can effectively interact with AI-enhanced tools and interpret their outputs accurately.

Robust data security and governance policies become paramount in safeguarding sensitive information and maintaining compliance with regulations such as GDPR.

19 Mikalef, P., Boura, M., Lekakos, G., & Krogstie, J. (2019). Big data analytics capabilities and innovation: the mediating role of dynamic capabilities and moderating effect of the environment. *British journal of management*, 30(2), 272-298.

Establishing clear internal guidelines on how to utilize AI technologies responsibly is essential to prevent misuse and build trust among stakeholders. Ethical AI practices, including transparency and accountability, should be integral to the organization's strategy to mitigate risks associated with bias and erroneous decision-making.

By embracing AI-driven intelligence with these considerations in mind, organizations can position themselves to harness the transformative potential of AI fully²⁰. This strategic adoption not only drives innovation and operational efficiency but also aligns technological advancements with long-term business goals. Ultimately, a thoughtful and comprehensive approach to integrating AI into BI will enable companies to navigate the complexities of the modern business landscape successfully, fostering sustainable growth and a resilient competitive advantage.

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