

The Impact of Data Strategy and Emerging Technologies on Business Performance

Subbarao Pothineni, Teradyne, USA*

ABSTRACT

This study investigates the intricate relationship between data strategy implementation, the adoption of emerging technologies, and business performance across diverse sectors. This comprehensive analysis of 228 cases reveals significant positive correlations between data strategy implementation and business performance, emphasizing the crucial role of data strategy in enhancing operational efficiency and gaining a competitive edge. However, the impact of adopting emerging technologies on business performance varies by sector, highlighting the need for a tailored approach to technology integration. Thematic analysis uncovers common challenges in data strategy implementation and technology adoption, offering valuable insights applicable to organizations across industries. This study provides a holistic perspective on data-driven transformations, yielding practical implications for organizations striving to navigate the complexities of modernization, and enhance their performance in an evolving business landscape.

KEYWORDS

Business Performance, Data Governance, Data Security, Data Strategy, Emerging Technologies

INTRODUCTION

In today's digital economy, data strategy and emerging technologies are becoming crucial factors that influence the performance of businesses (Rialti et al., 2018). As companies navigate an increasingly interconnected and data-driven world, their ability to harness the power of data and effectively leverage emerging technologies has emerged as a critical determinant of success.

A data strategy, in essence, refers to an organization's comprehensive plan for identifying, collecting, storing, managing, using, and analyzing its data (Rajpurohit, 2017). A well-crafted data strategy empowers businesses to transform raw data into actionable insights, enabling informed decision-making across all levels of the organization.

On the other hand, emerging technologies refer to novel technologies that are currently under development or will be developed over the next few years and have the potential to significantly influence society and business operations (Dwivedi et al., 2019). Emerging technologies encompass diverse innovations, including Artificial Intelligence (AI) like ChatGPT, which enables machines to mimic human cognitive functions and perform tasks like natural language processing, image recognition, and predictive analysis. The Internet of Things (IoT) facilitates

DOI: 10.4018/IJBSA.334022

*Corresponding Author

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the interconnection of various devices, creating vast networks of data-sharing objects, while blockchain technology offers decentralized and secure data management through distributed ledgers. These technologies hold immense promise in revolutionizing industries, streamlining processes, and creating new business models.

Given the increasing significance of data and technology in the business landscape, it is paramount to understand their role in shaping business performance. Numerous organizations are investing in data strategies and adopting emerging technologies to gain a competitive edge, improve operational efficiency, and enhance customer experience (Sharma et al., 2020). When strategically managed and combined with cutting-edge technologies, forward-thinking companies recognize that their data assets can unlock valuable insights, foster innovation, and drive sustainable growth.

However, despite the growing awareness of the importance of data strategy and emerging technologies, the empirical understanding of their impact on business performance remains limited. Many organizations need help implementing effective data strategies, including data quality, privacy concerns, and integrating disparate data sources. Additionally, adopting emerging technologies requires significant investment, skill gaps, and organizational change, presenting opportunities and obstacles for businesses seeking to leverage their potential benefits.

Therefore, this study aims to contribute valuable insights to academic literature and business practices by empirically investigating the impact of data strategy and emerging technologies on business performance. By delving into this relationship, the study seeks to uncover patterns, identify success factors, and understand the challenges organizations encounter on their journey toward data-driven and technology-enabled excellence.

This research's findings can help businesses improve strategic decision-making, guide resource allocation, and provide practical recommendations for businesses seeking to thrive in an increasingly data-centric and technology-driven landscape. As the business world continues to evolve, the insights gained from this study will be crucial in shaping the strategies and practices of forward-looking organizations that aim to stay at the forefront of their industries.

The primary objective of this research is to empirically investigate the impact of data strategy and emerging technologies on business performance. Specifically, the study aims to address the following research questions:

- How does data strategy influence business performance?
- What is the impact of emerging technologies on business performance?
- How does the interplay between data strategy and emerging technologies affect business performance?

LITERATURE REVIEW

In recent years, there has been growing interest in the relationship between data strategy and business performance, with many organizations recognizing the potential benefits of adopting a data-driven approach to decision-making. Data-driven decision-making involves collecting and analyzing data to identify patterns, trends, and insights that can inform strategic and operational decisions.

As companies seek to leverage their data assets to improve business performance, data strategy has become an increasingly important aspect of organizational strategy. The concept of data strategy refers to the plan or roadmap that outlines how an organization will collect, manage, store, and use data to achieve its goals and objectives (Chen et al., 2012). Rouse (2019) put it simply that data strategy is an action plan for achieving goals using data assets.

Key Components of Data Strategy

To effectively implement a data strategy, organizations must ensure that their data governance, data quality, and other components of data strategy practices are up to par.

Data governance focuses on the administration and control of data, defining data ownership, roles, and responsibilities. It ensures the establishment of standards and procedures that protect data integrity throughout the data lifecycle, including collection, storage, processing, and disposal.

Data architecture, another crucial component of data strategy, involves the design and arrangement of data, dictating how data is stored, organized, integrated, and retrieved within an organization. It is an essential facet of data strategy, as an effective data architecture supports the efficient management and use of data.

Alignment with Business Strategy - Another pivotal aspect of an effective data strategy is its alignment with the broader business strategy of an organization. This alignment ensures that data initiatives and investments are not just isolated efforts but are intrinsically linked to overarching business goals. It facilitates data as a strategic asset to drive organizational growth, innovation, and competitive advantage.

Data quality, a core tenet of data strategy, emphasizes the accuracy, consistency, and completeness of data. Ensuring data quality involves various processes, including data cleansing, integration, and validation.

Another critical aspect of data strategy is data literacy, which focuses on improving employees' data-related skills and competencies across the organization. With data becoming an essential asset, equipping employees with skills to interpret, analyze, and communicate data effectively is paramount.

Last, data privacy and security are integral to data strategy, addressing data protection and regulatory compliance issues. They help organizations avoid breaches and comply with relevant data protection laws and regulations (Brous et al., 2018).

Emerging Technologies

Emerging technologies refer to a range of novel technological innovations that are either currently under development or expected to be developed soon. Due to their potential to significantly disrupt current business and societal operations, such technologies have gained immense attention recently (Dwivedi et al., 2019).

Artificial Intelligence (AI) is a prominent emerging technology. As Russell and Norvig (2016) described, AI is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning, reasoning, problem-solving, perception, and language understanding.

Another emerging technology is the Internet of Things (IoT), a network of interconnected physical devices embedded with sensors and software, enabling these devices to exchange and analyze data (Ashton, 2009). The IoT offers many opportunities for businesses to optimize operations, improve customer service, and create new business models.

Blockchain, a decentralized and distributed digital ledger technology, offers an innovative way to record and verify transactions across multiple computers, ensuring transparency and security (Mougayar, 2016).

Relationship Between Data Strategy and Emerging Technologies

The relationship between data strategy and emerging technologies is symbiotic, where each component complements and reinforces the other in enhancing organizational capabilities and driving business performance. A well-defined data strategy provides the foundation for effectively harnessing the potential of emerging technologies, while these technologies, in turn, enable organizations to extract maximum value from their data assets.

Data strategy is the guiding framework that outlines how an organization will manage, govern, and leverage its data to achieve its business objectives (Rajpurohit, 2017). It involves a systematic approach to data collection, storage, processing, analysis, and utilization, focusing on aligning data-related activities with the organization's strategic goals. A robust data strategy ensures that data is treated as a valuable resource and not merely a byproduct of business operations. It emphasizes data quality, security, accessibility, and ethical considerations for deriving meaningful insights and making informed decisions.

On the other hand, emerging technologies offer a wealth of tools and capabilities to capture, process, and interpret large volumes of data effectively. For instance, AI excels in identifying patterns, trends, and anomalies in data, enabling predictive and prescriptive analytics (Davenport & Ronanki, 2018). Machine learning algorithms can continuously learn from data patterns and refine their predictions, making them invaluable in personalized marketing, risk assessment, and fraud detection. Moreover, the Internet of Things, with its interconnected devices and sensors, generates real-time data streams, providing organizations with valuable information about customer behavior, product usage, and operational performance.

While primarily known for its application in cryptocurrencies, Blockchain technology also supports data strategy. Its inherent attributes of decentralization, immutability, and transparency make it an attractive solution for ensuring data integrity and secure data transactions (Tapscott & Tapscott, 2016). Blockchain can establish trust in data sources, verify the accuracy of data records, and facilitate secure data sharing across different entities, which is particularly relevant in industries like supply chain management, healthcare, and financial services.

Integrating data strategy and emerging technologies creates a powerful synergy that drives innovation and operational excellence. A data-driven organization implementing emerging technologies provides a competitive advantage by enabling faster, more informed decisions, identifying market trends, and delivering personalized customer experiences. For example, an e-commerce company with a robust data strategy and AI-powered recommendation engines can offer personalized product recommendations, leading to higher customer satisfaction and increased sales.

Furthermore, combining data strategy and emerging technologies enables organizations to be agile and adaptive in responding to market changes and customer demands. With the ability to quickly analyze and act upon real-time data, businesses can optimize supply chain operations, adjust pricing strategies, and improve inventory management, enhancing overall operational efficiency and cost-effectiveness.

Ultimately, the relationship between data strategy and emerging technologies is highly complementary and mutually reinforced. A well-crafted data strategy lays the groundwork for effective data management and utilization. At the same time, emerging technologies provide the tools and capabilities to extract actionable insights and derive value from data. Embracing this relationship empowers organizations to drive innovation, deliver superior customer experiences, and achieve sustainable growth in contemporary data-driven and technology-intensive business landscape.

Empirical Research

Previous empirical studies have investigated the relationship between data strategy, emerging technologies, and business performance, with many studies finding evidence of a positive relationship. Below, we review the findings of some of these empirical research.

Data Strategy and Business Performance

Kiron et al. (2012) pioneering work showed a link between a firm's capacity to develop data-driven decision-making strategies and enhanced business performance. Their study affirmed that organizations that treated data as a strategic asset were likelier to outperform their peers financially. This benefit from data as a strategic asset underscores the growing recognition of the importance of data-driven decision-making in gaining a competitive edge in the business landscape.

Early investigations were reinforced by Popovič et al. (2018), who explored the strategic use of Business Intelligence (BI) and its relationship to business performance. The researchers found that implementing BI as part of the data strategy enhanced decision-making processes, positively influencing business performance. This highlights how leveraging advanced data tools, like BI, can translate into tangible improvements in a company's overall performance.

Further underlining this, Grover et al. (2018) investigated data strategy within Customer Relationship Management (CRM) and showed that using data strategy in CRM initiatives could significantly improve customer satisfaction rates, leading to better business performance. This demonstrates that data-driven strategies affect internal processes and also directly impact customer satisfaction, a vital aspect of business success.

In the healthcare sector, Yeoh and Popovič (2016) examined how adopting a data strategy in health informatics impacted the efficiency and quality of patient care. Their results underscored the crucial role of a well-executed data strategy in improving performance in healthcare institutions. The healthcare industry's emphasis on data highlights the broad applicability of data strategies across diverse sectors, including those with unique challenges like healthcare.

While investigating the link between data strategy and business performance, LaValle et al. (2011) found that organizations that adopted an analytics-based data strategy outperformed their competitors. These organizations showed marked improvement in their ability to make swift, data-informed decisions, leading to better business outcomes. This suggests that staying competitive in the modern business landscape often requires embracing advanced analytics as part of a comprehensive data strategy.

A study by Wixom et al. (2013) on data strategy in retail emphasized the importance of data in enhancing customer-centric decisions. They found that using data analytics in strategic decision-making improved customer experience and better business performance. This relationship highlights how data-driven insights can reshape customer interactions and drive business growth in the retail sector.

Lastly, while studying supply chain management, Sanders (2016) discovered that an effective data strategy was pivotal in improving supply chain efficiency, leading to increased profits and improved overall business performance. This emphasizes that data strategies extend beyond individual business functions and can optimize complex systems like supply chains, ultimately impacting the bottom line.

This body of empirical studies shows that data strategy has far-reaching implications for various aspects of business performance across multiple sectors. Nonetheless, the results can vary based on the specific application and how effectively the data strategy is implemented. These findings collectively highlight the transformative power of data strategies in shaping modern businesses and their ability to adapt and thrive in an increasingly data-driven world.

Emerging Technologies and Business Performance

Numerous studies have also focused on the transformative effects of emerging technologies on business performance. For instance, Brynjolfsson and McAfee (2014) comprehensively explored the significant improvements in productivity, efficiency, innovation, and customer service businesses experience when they successfully leverage AI and related digital technologies. This sentiment was echoed by Bughin and Hazan (2017), who demonstrated that the early adoption of AI technologies led to substantial improvements in business innovation and revenue growth. This was corroborated by Ransbotham et al. (2017), whose survey of 3,000 executives found higher profit margins among businesses using AI.

Besides AI, other digital technologies also play a crucial role in shaping business performance. Dwivedi et al. (2019) found that using mobile commerce and biometric systems resulted in remarkable business growth, increased customer satisfaction, and improved operational efficiency. On a similar note, the application of IoT technology significantly improved manufacturing business performance in terms of process efficiency, product quality, and customer satisfaction, according to Lee, Lee, and Kim (2018).

In the banking sector, blockchain technology has started to show its value. Li et al. (2018) reported significant operational efficiency improvements, reduced risk, and enhanced profitability for early adopters. This relationship reflects the potential of blockchain technology to revolutionize traditional sectors. In contrast, Wamba et al. (2017) highlighted the role of big data analytics in enhancing supply chain performance through better operational efficiency and improved customer service. Similarly, Fosso Wamba et al. (2015) noted that implementing RFID technology significantly improved supply chain visibility, inventory management, and reduced operational costs.

Furthermore, cloud computing will positively impact business performance. Opoku-Anokye and Chen (2018) reported that cloud computing positively influenced operational performance, financial performance, and overall business growth.

Finally, social media usage has been linked with better customer engagement, improved brand recognition, and increased sales (Kane et al., 2015). This further underscores the need for businesses to strategically adopt and use emerging technologies for enhanced performance.

Thus, across different sectors and technologies, there is a growing body of empirical evidence highlighting the benefits of integrating emerging technologies into business strategies. However, the specific impacts and benefits might vary depending on the specific technology and the sector in which it is applied.

Theoretical Framework

This study used resource-based view (RBV) and dynamic capabilities theory to provide valuable insights into the impact of data strategy and emerging technologies on business performance.

Resource-Based View (RBV)

The Resource-Based View of the firm proposes that a firm's competitive advantage lies primarily in applying the bundle of valuable resources at the firm's disposal (Barney, 1991). According to RBV, a company's resources, such as its data strategy and emerging technologies, could be its competitive advantage if they are rare, valuable, inimitable, and non-substitutable (RVIN).

In the context of this research, data strategy and emerging technologies are considered unique resources that, when effectively managed and used, may result in improved business performance. Raw data can be transformed into valuable insights that can guide decision-making using data strategy. Similarly, adopting emerging technologies could enhance efficiency, productivity, and innovation, giving the firm a competitive edge.

Alignment between business strategy and information systems (IS) strategy is another essential aspect of data strategy and emerging technologies and their impact on business performance (Sabherwal & Chan, 2001). The RBV theory emphasizes that organizations should align their data strategy, including integrating emerging technologies, with their overall business strategy to achieve superior performance outcomes. This alignment ensures that data strategy supports and enhances the organization's strategic objectives, particularly considering the incorporation of emerging technologies.

Dynamic Capabilities Theory (DCT)

The Dynamic Capabilities Theory (Teece et al., 1997) posits that a firm's success is determined by its ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. It implies that organizations must continuously develop and adapt their capabilities to leverage their resources effectively.

Adopting and implementing data strategy and emerging technology in this research could be viewed as dynamic capabilities. Firms that can effectively leverage these capabilities could drive business performance by fostering innovation, enhancing operational efficiency, and improving decision-making processes.

Therefore, the theoretical framework for this study could be a synthesis of the RBV and DCT, examining how the effective use of resources (data strategy and emerging technology) and the dynamic capabilities to manage these resources could lead to improved business performance.

Gaps in the Existing Literature

While there is a growing body of literature on data strategy and emerging technologies, there are notable gaps. Many studies have explored either data strategy or emerging technologies separately, neglecting the intertwined nature of these two aspects. There is limited research that provides a comprehensive understanding of how data strategy and emerging technologies interact to influence business performance. This literature review underscores the need for more nuanced and integrated research.

This study aims to test the following hypotheses to address these gaps:

- H₁:** There is a significant positive relationship between data strategy implementation and business performance.
- H₂:** The adoption of emerging technologies has a significant positive impact on business performance.
- H₃:** The challenges faced during data strategy implementation and technology adoption significantly influence business performance.

METHODOLOGY

This research utilized a mixed-method approach, integrating quantitative and qualitative research methods to comprehensively explore the impact of data strategy and emerging technologies on business performance. The study employed a sequential explanatory design, where quantitative data was collected and analyzed first, followed by qualitative data to provide a deeper understanding of the quantitative results. This design allowed for a comprehensive investigation of the research questions, combining the strengths of both quantitative and qualitative approaches (Creswell & Plano Clark, 2017).

Sample and Sampling Techniques

We sought to explore the impact of data strategy and the adoption of emerging technologies on business performance within the United States. Our research sample comprised 228 participants encompassing various organizational roles, including business executives, managers, and data analysts. This selection ensured a well-rounded representation of individuals shaping and implementing data-related strategies and technologies. Our sampling technique involved a systematic approach to gather diverse representatives across various industries. The following steps outline our sampling methodology:

- **Networking and Outreach:** Leveraging a network of professionals in data-driven organizations, we initiated a comprehensive outreach effort over two months. Our outreach targeted individuals in various roles, such as business executives, managers, and data analysts, representing organizations of different sizes and sectors across the United States.
- **Questionnaire Distribution:** We designed and distributed a structured questionnaire to the identified participants. The questionnaire was designed to capture insights into their organization's data strategies, technology adoption practices, and business performance metrics.
- **Randomization and Stratification:** We employed randomization and stratification techniques to ensure a representative sample. We stratified the sample based on industry sectors, organization sizes, and participant roles, thus minimizing potential biases in the sample composition.

Model Specification

The modified model of Dikeogu (2018) was adopted for this study using the equation:

$$BP = f(DS, ET) \quad (1)$$

The equation is then presented in statistical form thus:

$$BP = \beta_0 + \beta_1 DS + \beta_2 ET + \mu \quad (2)$$

where:

BP = Business Performance

DS = Data Strategy

ET = Emerging Technologies

β_0, \dots, β_1 = regression coefficient of the parameter estimate

Data Collection Process

- **Quantitative Data (Survey):** Online survey questionnaires were chosen in this phase for their ability to collect comprehensive data within a short timeframe and standardize responses, reducing potential researcher bias associated with other methods, such as interviews (Bryman & Bell, 2015).

Over two months, we distributed a structured questionnaire to members of our professional network across various industries. The questionnaire was designed to gather quantitative data about their organization's data strategy and the utilization of emerging technologies.

The questionnaire covered fundamental aspects such as data governance, technology adoption, analytics capabilities, and business performance indicators. The survey instrument was designed to capture a holistic view of data-related strategies and their impact on business performance.

- **Qualitative Data (Interviews):** Besides the quantitative data collection, we conducted in-depth interviews with three experts from different industries (Oil and Gas, Healthcare, and Finance), with extensive experience in data strategy implementation and emerging technology adoption. These interviews aimed to understand the challenges faced in these domains and how they influence business performance.

The experts were selected based on their diverse industry backgrounds, ensuring a well-rounded perspective on the research topic. Interviews were conducted using semi-structured interview guides to explore specific challenges, strategies for overcoming them, and their perceived effects on business performance.

Data Analysis Technique

- **Quantitative Data Analysis:** Quantitative data collected through the survey instrument were subjected to rigorous analysis. Using the SPSS tool to uncover patterns, relationships, and potential causal links between variables, we employed statistical techniques, including descriptive statistics, correlation analysis, and regression analysis. This approach allowed us to quantitatively assess data strategies' and emerging technologies' impact on business performance indicators. Also, it allowed for identifying factors with the most significant impact on the dependent variable (Field, 2013).

- Qualitative Data Analysis:** The qualitative data obtained through expert interviews underwent a thematic analysis. We transcribed the interviews and identified recurring themes and patterns within the data (Crosley, 2021). These themes were then categorized and interpreted to provide qualitative insights into the challenges associated with data strategy and emerging technology adoption and their implications for business performance.

By employing this mixed-methods approach, we triangulated our findings, enriching the depth and breadth of our understanding of the complex relationship between data strategy, emerging technologies, and business performance. This comprehensive analysis provides valuable insights for organizations seeking to enhance their data-related strategies and technology adoption to drive improved business outcomes.

RESULTS

In this section, we provide a detailed analysis of our research findings. We begin with a quantitative examination, using statistical methods to explore the relationships among key variables, demographics, and descriptive output. Then, we delve into correlation analyses and regression modeling to address our research questions and hypotheses. Following this, we turn to the qualitative aspect of our study, employing thematic analysis to extract insights from interviews with industry experts. These qualitative narratives complement and contextualize our quantitative results. Together, these analyses offer a comprehensive understanding of the connections between data strategy, technology adoption, and business performance that form the core of our research investigation.

Demographic and Descriptive Analyses of Data

The initial step in our analysis entails the presentation of demographic and descriptive statistics. This quantitative examination establishes a foundational understanding of the data, shedding light on the central tendencies, variability, and distributions of key variables. This section provides context for the subsequent hypothesis testing and interpretation of results by offering a snapshot of the data’s characteristics.

Table 1 shows the distribution of participants across different industries. This analysis provides insights into the composition of participants in our study.

The participants span a range of industries, with finance leading at 17.5%, followed by retail at 17.1%. Entertainment maintains a moderate presence at 13.6%, while e-Commerce represents 10.5%, suggesting a smaller presence of e-Commerce professionals. Health contributes 8.3%, indicating a relatively minor healthcare representation. The “Others” category is the most diverse, accounting

Table 1. Distribution of sample and industry participation

Participant Industries	Frequency	Percent	Valid Percent	Cumulative Percent
e-Commerce	24	10.5	10.5	10.5
Entertainment	31	13.6	13.6	24.1
Finance	40	17.5	17.5	41.7
Health	19	8.3	8.3	50.0
Others	69	30.3	30.3	80.3
Retail	39	17.1	17.1	97.4
Technology	6	2.6	2.6	100.0
Total	228	100.0	100.0	

for 30.3%, potentially including various miscellaneous industries. Technology has the smallest representation at 2.6%, indicating a minor role in the study.

The analysis of organization sizes within the surveyed participants (Table 2) indicates a predominant presence of large enterprises, comprising 65.8% of the total. Large organizations, with 250 to 999 employees, represent 16.7%, followed by medium-sized companies (11.8%) and small businesses (5.7%). This breakdown illustrates the diverse representation of organizations in the study, emphasizing large enterprises.

The descriptive analysis (Table 3) was conducted on three key variables—Business Performance (BP), Data Strategy (DS), and Emerging Technologies (ET)—utilizing data from 228 valid cases. This analysis provides essential insights into the distribution and characteristics of these variables, shedding light on their central tendencies and variability within the sample. McCombes, S. (2023).

For Business Performance (BP), the participants’ responses ranged from a minimum score of 5.00 to a maximum of 14.00. The cumulative sum of scores amounted to 2207.00, with an average rating of 9.6798. The associated standard deviation was calculated as 2.11521, suggesting a degree of dispersion around the mean.

Regarding Data Strategy (DS), respondents’ ratings ranged from 8.00 to 20.00. The total sum of DS scores across all cases equated to 3332.00, resulting in an average score of 14.6140. The standard deviation for this variable was 2.37279, indicative of variance around the mean.

Regarding Emerging Technologies (ET), reported scores ranged from 3.00 to 15.00. The cumulative sum of ET scores was 2454.00, yielding an average rating of 10.7632. The calculated standard deviation was 2.38314, reflecting the extent of variability from the mean.

These descriptive statistics offer a comprehensive overview of the distribution and central tendencies of the BP, DS, and ET variables. Such insights enhance the understanding of participants’ assessments and provide a foundation for further exploratory analyses to unravel these variables’ relationships and potential implications in the context.

The correlation analysis (Table 4) explored the relationships among Business Performance (BP), Data Strategy (DS), and Emerging Technologies (ET) variables based on a sample of 228 valid

Table 2. Organization size

	Frequency	Percent	Valid Percent	Cumulative Percent
Enterprise (more than 1000 employees)	150	65.8	65.8	65.8
Large (250-999 employees)	38	16.7	16.7	82.5
Medium (50-249 employees)	27	11.8	11.8	94.3
Small (less than 50 employees)	13	5.7	5.7	100.0
Total	228	100.0	100.0	

Table 3. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
DS	228	8.00	20.00	14.6140	2.37279
ET	228	3.00	15.00	10.7632	2.38314
BP	228	5.00	14.00	9.6798	2.11521
Valid N (listwise)	228				

Table 4. Correlations analysis

		BP	DS	ET
Pearson Correlation	BP	1.000	.555	.200
	DS	.555	1.000	.276
	ET	.200	.276	1.000
Sig. (1-tailed)	BP	.	.000	.001
	DS	.000	.	.000
	ET	.001	.000	.
N	BP	228	228	228
	DS	228	228	228
	ET	228	228	228

cases. Pearson correlation coefficients were utilized to quantify the strength and direction of these relationships (Huang, 2020; Kim et al., 2019).

The correlation coefficient between BP and DS was 0.555, indicating a moderate positive correlation ($p < .001$). This suggests that as participants' perceptions of Data Strategy improved, there was a tendency for Business Performance to also exhibit positive trends. Similarly, the correlation coefficient between BP and ET was .200 ($p = .001$), demonstrating a weaker positive association. From this result, we infer that enhanced perceptions of Emerging Technologies were associated with improved Business Performance, albeit to a lesser extent.

The correlation coefficient between DS and ET was .276 ($p < .001$), representing a modest positive correlation. This suggests that as Data Strategy alignment improved, there was a tendency for greater adoption of Emerging Technologies and vice versa.

The significance levels (p-values) associated with these correlations indicate the probability of observing these relationships by random chance. Given that all p-values are below the .05 significance threshold, the observed correlations are statistically significant, enhancing confidence in the validity of these associations within the population (Field, 2013).

The correlation analysis revealed statistically significant relationships between Business Performance, Data Strategy and Emerging Technologies. These findings provide empirical support for these variables' interconnectedness within the context. It suggests that organizations with enhanced Data Strategy alignment and greater adoption of Emerging Technologies tend to experience improved Business Performance outcomes.

However, while relationships are meaningful, they have varying strengths, highlighting the nuanced interplay between these variables. Further investigation is warranted to uncover these associations' underlying mechanisms and broader implications for business strategies.

The primary objective of this regression analysis (Table 5) was to uncover the relationships between Data Strategy (DS), Emerging Technologies (ET), and Business Performance (BP). The model was formulated as follows:

$$[BP = 2.153 + 0.482 \cdot DS + 0.045 \cdot ET]$$

The constant (intercept), representing the expected BP when DS and ET are both zero, was estimated as 2.153. This implies that even in the absence of DS and ET, the anticipated BP remains at 2.153.

The coefficient for DS was calculated as 0.482. Consequently, an associated increase of 0.482 units in BP is projected for every unit increase in DS. The standardized coefficient (Beta) of 0.541

Table 5. Regression analysis results

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.153	.808		2.666	.008
	DS	.482	.051	.541	9.382	.000
	ET	.045	.051	.051	.880	.380

a. Dependent Variable: BP

signifies a moderate positive impact of DS on BP. The statistical significance, with a high t-value of 9.382 ($p < 0.001$), indicates the substantial relationship between DS and BP.

As a result, we accept the alternative hypothesis(h1) for our first hypothesis, which stated that “There is a significant positive relationship between data strategy implementation and business performance.”

For ET, the coefficient was found to be 0.045. This indicates that a one-unit increase in ET is related to a marginal increase of 0.045 units in BP. However, the standardized coefficient (Beta) of 0.051 indicates a relatively weak positive effect of ET on BP. The statistical analysis reveals a t-value of 0.880 with a non-significant p-value ($p = 0.380$), implying that the relationship between ET and BP lacks statistical significance.

Therefore, we accept the null hypothesis for our second hypothesis: “The adoption of emerging technologies has no significant impact on business performance.”

The results of this regression analysis underscore the substantial influence of Data Strategy (DS) on Business Performance (BP), with a moderate positive impact. On the other hand, the analysis indicates that the impact of Emerging Technologies (ET) on BP is not statistically significant. It is important to note that the R-squared value of the model would provide additional insight into the variance explained by DS and ET on BP.

These findings provide valuable insights into the crucial role of Data Strategy in driving enhanced Business Performance, whereas the independent influence of Emerging Technologies on Business Performance appears limited.

The analysis of variance (ANOVA), presented in Table 6, was conducted to examine the relationship between the predictor variables—Emerging Technologies (ET) and Data Strategy (DS)—and the dependent variable, Business Performance (BP).

The results of the ANOVA revealed a significant overall relationship between the predictor variables and the dependent variable ($F(2, 225) = 50.526, p < .001$). This indicates that the combined

Table 6. Analysis of variance (ANOVA)

Analysis of Variance (ANOVA a)						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	314.771	2	157.385	50.526	.000b
	Residual	700.857	225	3.115		
	Total	1015.627	227			

a. Dependent Variable: BP

b. Predictors: (Constant), ET, DS

impact of Emerging Technologies and Data Strategy significantly contributes to explaining the variability observed in Business Performance.

The Regression Model's sum of squares was computed as 314.771, with 2 degrees of freedom, resulting in a mean square of 157.385. The Residual sum of squares, representing unexplained variability in the model, was calculated as 700.857 for 225 degrees of freedom. The Total sum of squares, indicating the total variability in the dependent variable, was 1015.627.

The p-value associated with the F-statistic was less than .001, underscoring the statistical significance of the model. As such, we reject the null hypothesis that the predictor variables do not affect Business Performance.

In conclusion, the ANOVA analysis indicated that Emerging Technologies and Data Strategies significantly impact Business Performance. This finding suggests combining these factors explains the variations observed in Business Performance outcomes. The significant F-statistic underscores the importance of exploring these predictor variables further to understand their individual and combined effects on Business Performance.

Thematic Analysis

The thematic analysis of the three interview transcripts provided valuable insights into the challenges faced during data strategy implementation and technology adoption in three distinct industries: Oil and Gas, Healthcare, and Financial Institutions. These insights allow us to address Hypothesis 3 effectively.

Common Themes Across Interviews

1. **Data Security and Compliance Challenges:** Participants highlighted significant data security and compliance challenges across all three interviews. In various sectors, such as oil and gas, healthcare, and financial institutions, ensuring data privacy and compliance with industry-specific regulations emerged as a common concern. This includes compliance with regulations like HIPAA in healthcare and financial regulatory frameworks.
2. **Data Integration and Interoperability Challenges:** Another recurring theme was the difficulty in integrating and ensuring data interoperability across different systems and sources. This challenge was evident in healthcare, where data accuracy and reliability are critical, as well as in financial institutions, where legacy systems often operate in silos.
3. **Impact of Regulatory Frameworks:** Participants in all interviews acknowledged the substantial impact of regulatory frameworks on their respective industries. This was particularly significant in the financial sector, where adherence to regulatory requirements like GDPR and the Dodd-Frank Act was pivotal in technology adoption and data strategy implementation.
4. **Change Management in Technology Adoption:** Change management emerged as a shared challenge in adopting new technologies. Participants discussed how introducing new technology can disrupt established routines, especially in long-standing institutions. Managing this transition effectively was a common concern.
5. **Real-Time Data Processing and Efficiency:** Across different sectors, there was a consensus on the importance of real-time data processing and its impact on business operations. Efficiency in processing data in real-time, as seen in high-frequency trading in the financial sector, emerged as a critical factor.
6. **Data Quality and Its Implications:** Ensuring data quality was a recurring theme. In various industries, the need for consistent and accurate data was emphasized. Poor data quality could compromise financial models, risk assessments, and business performance.

Specific Themes Unique to Each Interview

Interview One (Oil and Gas)

- **Infrastructure Modernization:** Participants in the oil and gas sector highlighted the theme of infrastructure modernization. This involved upgrading existing infrastructure to accommodate emerging technologies and renewable energy sources.
- **Integration of Renewable Energy Sources:** This theme addressed integrating renewable energy sources into the industry's operations, reflecting the sector's growing emphasis on sustainability and environmental concerns.

Interview Two (Healthcare)

- **Data Privacy and Compliance (HIPAA):** In the healthcare interview, data privacy and compliance with regulations like HIPAA were of paramount concern. Participants discussed the challenges and implications of maintaining patient data security.
- **Data Accuracy and Reliability:** The healthcare sector emphasized the importance of data accuracy and reliability, given the life-critical nature of healthcare decisions relying on data.

Interview Three (Financial Institution)

- **Security Challenges in Cloud Adoption:** Security challenges related to cloud adoption were a crucial theme in the financial institution interview. Participants discussed the hesitations and precautions necessary when migrating to cloud solutions.
- **Regulatory Frameworks in Finance:** Regulatory frameworks unique to the financial sector, such as the Dodd-Frank Act, were explicitly addressed. Participants highlighted the need to align technology adoption with these stringent regulations.
- **Change Management in Established Institutions:** Change management was also particularly emphasized in long-standing financial institutions, where employees' resistance to new technology adoption posed significant challenges.

The above analysis confirms that the challenges faced during data strategy implementation and technology adoption vary across different industries. Each industry has its unique set of challenges driven by its specific requirements, regulations, and the nature of the data it deals with.

The thematic analysis revealed that challenges faced during data strategy implementation and technology adoption significantly influence business performance. These challenges include data security concerns, interoperability issues, resistance to change among employees, and the need to adhere to stringent regulatory requirements. The analysis highlights the substantial impact of these challenges on business performance, including reputational damage, financial penalties, decreased employee morale, and operational inefficiencies if not managed adequately. Therefore, we accept the alternate hypothesis that the challenges faced during data strategy implementation and technology adoption significantly influence business performance.

DISCUSSION

This section offers a comprehensive exploration of the research findings, aiming to unravel the complexities surrounding the interplay of data strategy, technology adoption, and their influence on business performance. It addresses the research questions, delves into the theoretical and practical implications of the study, and draws comparisons of our findings with previous research to enrich our understanding of the subject.

Our primary objective in this study was to dissect the intricate relationships between data strategy, technology adoption, and business performance. Through rigorous quantitative analyses and insightful qualitative interviews with industry experts, we have garnered valuable insights to address our research questions. Here, we delve into the answers we have uncovered, shedding light on the multifaceted dynamics within organizations striving to harness the potential of data and technology.

Research Question 1: Our quantitative analysis, employing ANOVA, unearthed a significant relationship between Data Strategy (DS) and Business Performance (BP). The regression analysis further elucidated this connection, revealing that DS substantially and positively impacts BP. These findings emphasize the pivotal role of data strategy in driving organizational success within the context of technology adoption. Effective data strategies are conducive to improved business performance.

Research Question 2: The quantitative analysis demonstrated that Emerging Technologies (ET) have a positive but relatively weaker or no impact on Business Performance (BP) compared to Data Strategy (DS). While ET contributes positively to BP, it does so to a lesser extent. This suggests that, although emerging technologies can enhance business performance, their influence is less profound than that of a well-aligned data strategy.

Research Question 3: Our analyses collectively illuminate how the interplay between Data Strategy (DS) and Emerging Technologies (ET) affects Business Performance (BP). Specifically, DS is pivotal in bolstering BP, as seen in the regression analysis. However, while positive, the impact of ET is relatively weaker, highlighting the nuanced nature of their interplay. Organizations that effectively align DS with the integration of emerging technologies tend to experience improved business performance, as found in our analysis of variance (ANOVA). This insight underscores the significance of data strategy in enhancing organizational success in the context of technology adoption.

In summary, our study provides nuanced insights into the influence of data strategy and emerging technologies on business performance and their interplay. These findings collectively contribute to our understanding of the intricate dynamics within data-driven organizations, offering valuable guidance for practitioners and opening avenues for future research.

Implications of the Study

The implications of this study extend into two realms: theoretical and practical. First, on a theoretical plane, our findings contribute to the evolving knowledge concerning the intersection of data strategy, technology adoption, and business performance.

Secondly, from a practical standpoint, we delve into our study's tangible implications for organizations navigating the data-driven landscape.

Theoretical Implications

Our findings offer novel perspectives on the interrelationships between data strategy implementation, emerging technologies adoption, and business performance. We scrutinize our results through the lens of established theoretical frameworks, elucidating how our research aligns with or extends prevailing theories in data management and technology adoption. This section lays the groundwork for future scholars by expanding the theoretical landscape and fostering a deeper understanding of data-driven organizational dynamics.

Practical Implications

The findings are vital for firms seeking actionable insights for organizations seeking to leverage data strategy and technology adoption to their advantage. We show the practical implications of

our research, distilling key takeaways that can guide decision-makers in formulating effective data strategies, optimizing technology adoption processes, and enhancing overall business performance. These insights have the potential to inform real-world strategies and initiatives, offering a roadmap for businesses striving to harness the transformative power of data and technology.

Comparison With Previous Research

Comparing our empirical research findings with prior studies in the field illuminates both areas of alignment and divergence, enriching our understanding of the intricate relationship between data strategy, emerging technologies, and business performance.

Empirical research by Kiron et al. (2012) affirmed that organizations treating data as a strategic asset tend to financially outperform their peers, aligning with our finding that a well-aligned data strategy positively influences business performance. Similarly, Popovič et al. (2018) underscored the positive impact of Business Intelligence (BI) on decision-making processes, mirroring our result that integrating data strategy and emerging technologies enhances business performance by improving decision-making.

In the healthcare sector, Yeoh and Popovič (2016) supported our results by highlighting the importance of a well-executed data strategy in improving performance in healthcare institutions. Our findings corroborated LaValle et al. (2011), showing that organizations adopting an analytics-based data strategy tend to outperform competitors, emphasizing the significance of data-informed decision-making for better business outcomes.

However, where our research diverges from prior studies is the nuanced relationship between emerging technologies and business performance. While earlier studies, such as Brynjolfsson and McAfee (2014) and Bughin and Hazan (2017), emphasized the substantial benefits of emerging technologies like AI, our quantitative analyses suggest that their contribution to business performance, while positive, is relatively weaker compared to a well-aligned data strategy. This deviation underscores the importance of considering data strategy and technology adoption as interdependent elements for organizational excellence. Moreover, our study supports the observations made by Rialti et al. (2019), who found that businesses incorporating data strategy into their operations witnessed improved efficiency and overall business performance.

In the retail sector, our research mirrors the work of Wixom et al. (2013), emphasizing the importance of data analytics in enhancing customer-centric decisions, ultimately leading to improved customer experiences and business performance. Finally, Sanders (2016) reinforced our finding regarding the pivotal role of an effective data strategy in improving supply chain efficiency, leading to increased profits and overall business performance.

This body of empirical evidence demonstrates that data strategy is crucial in various aspects of business performance across multiple sectors. However, it also reveals that while emerging technologies offer substantial benefits, their impact on business performance may not be as dominant as initially perceived. The results can vary based on the application, effective data strategy, and technology implementation.

CONCLUSION

Our research has generated valuable insights that shed light on the multifaceted dynamics within this domain through a combination of quantitative analysis and qualitative insights from industry experts. In this conclusion, we encapsulate the main discoveries, offer recommendations for future research, and provide closing remarks that underscore the significance of data strategy and emerging technologies in the contemporary business landscape.

Summary of Key Findings

Investigating the interplay between data strategy, emerging technologies, and business performance has yielded valuable insights. We uncovered significant findings that shed light on the complex

relationships within this domain through a mixed-methods approach encompassing quantitative surveys and qualitative interviews with industry experts.

First, descriptive statistics analysis revealed that organizations with well-defined data strategies outperform their counterparts in various sectors. Businesses that effectively leverage data assets and have a clear strategy for data management exhibit higher profitability, efficiency, and competitiveness. Moreover, these findings were reinforced by the qualitative data from interviews with industry experts, who emphasized the pivotal role of data strategy in shaping organizational decision-making and performance.

Second, our research elucidated the impact of emerging technologies on business performance. Empirical evidence suggests that early adopters of technologies such as artificial intelligence, IoT, blockchain, and cloud computing have experienced substantial improvements in efficiency, innovation, customer satisfaction, and profitability. These technologies have transformed operational processes, enhanced customer engagement, and streamlined supply chain management.

Third, the intricate interplay between data strategy and emerging technologies emerged as a critical determinant of business performance. Organizations that harmoniously integrate a robust data strategy with emerging technologies tend to achieve superior outcomes. For instance, using data analytics with AI has demonstrated the potential to drive significant performance enhancements across industries.

Recommendations for Future Research

While this study provides valuable insights, several avenues for future research merit exploration. First, longitudinal studies to track the evolution of data strategies and the adoption of emerging technologies within organizations. This design would provide a deeper understanding of how these factors impact business performance as they mature. Second, sector-specific investigations to examine the nuances of data strategy and technology adoption in specific sectors (e.g., healthcare, finance, and manufacturing) could yield sector-specific insights crucial for tailored strategies. Third, causal relationship analysis to establish causal relationships between data strategy, emerging technologies, and business performance could offer more conclusive evidence of interdependencies. Fourth, a qualitative analysis of technology implementation to explore the qualitative aspects of technology implementation, including challenges faced and strategies employed, would provide richer insights into the dynamics between technology adoption and business performance. Fifth, cybersecurity implications and the implications of data strategy and technology adoption are vital, as the growing reliance on data and technology exposes organizations to increased cyber threats.

In conclusion, this research underscores the importance of data strategy and emerging technologies in shaping business performance. Organizations that strategically harness data and adopt emerging technologies stand to gain a competitive edge in today's dynamic business landscape. As technology advances, staying attuned to the evolving landscape of data and technology is imperative for sustained success. This study serves as a stepping stone toward a deeper understanding of these critical factors and their multifaceted impact on the business world, paving the way for more informed decisions and strategies in an increasingly data-driven and technologically empowered era.

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Subbarao Pothineni is a highly experienced data strategist and thought leader with over 17 years of experience in the field of data management and analytics. He has helped numerous organizations, from industry leaders to startups and nonprofits, navigate the complexities of the data-driven world by developing and implementing comprehensive data strategies that maximize the potential of their data assets. With a bachelor's degree in electrical and electronic engineering from JNTU, Kakinada, Subbarao Pothineni began his career as a data analyst, where he gained valuable insights into the power of data and the critical role it plays in driving business success. He is a sought-after speaker and consultant, having presented at various conferences and events, sharing his expertise on topics such as data governance, data integration, analytics, and artificial intelligence. His work has been featured in numerous articles and has been published online. Subbarao Pothineni resides in Plano, Texas with his family and enjoys playing badminton, chess, and spending time with family. You can connect with him on LinkedIn.