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Optimizing Business Intelligence Solutions: A TOPSIS-based Assessment of Micro Strategy Implementation Alternatives

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ABSTRACT

MicroStrategy stands at the forefront of business intelligence and analytics, offering cutting-edge solutions in reporting, data visualization, and mobile analytics. With options for both cloud-based and on-premises setups, it enables organizations to accelerate decision-making, boost user satisfaction, and maximize cost-effectiveness. Meanwhile, it ensures robust security and supports scalable growth with innovative, comprehensive solutions available globally. This study explores the best strategies for implementing Micro Strategy's business intelligence tools by critically assessing five distinct

Alternatives: Cloud Implementation, On-Premises Deployment, AI/ML Integration, Block chain Security, and Bit coin Expansion. As businesses increasingly rely on data-driven insights, choosing the most effective implementation strategy has become essential for sustaining competitive edge and operational efficiency. The research is pivotal in tackling the intricate decision-making challenges organizations encounter when adopting business intelligence solutions. By assessing several factors, such as Decision Processing Speed (DPS), User Satisfaction (US), Return on Growth (RG), Implementation Cost (IC), System Downtime (SD), and Learning Curve (LC), this study establishes a clear framework for making informed technology adoption choices within enterprise settings. Utilizing the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method, the study evaluates and ranks the various alternatives.

This approach to multi-criteria decision-making allows for a fair and objective comparison by determining how closely each option aligns with the ideal solution. The research employs normalized matrices and weighted criteria to guarantee a thorough evaluation of each potential implementation. The results indicate that Block chain-Based Data Security stands out as the top performer, boasting a closeness coefficient of 0.999941. This is followed by On-Premises Deployment (0.764172) and Bit coin Expansion (0.690708). Cloud Implementation secures the fourth spot with a coefficient of 0.529751, while AI/ML Integration ranks lowest with a coefficient of 0.Key observations suggest that block chain-based solutions excel in both security and reliability, presenting themselves as the superior choice. In contrast, traditional on-premises deployments continue to be highly relevant for organizations with specific infrastructure needs. The performance of AI/ML integration, however, falls short of expectations, pointing to potential hurdles in its implementation that organizations must carefully evaluate. Interestingly, Bit coin expansion presents a well-rounded profile across the various evaluation criteria, positioning it as a viable strategic investment while maintaining operational efficiency. These insights offer significant direction for organizations looking to fine-tune their business intelligence strategies, weighing the balance between performance, cost, and security concerns.

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Introduction

MicroStrategy Incorporated, a prominent player in the analytics and business intelligence (BI) software industry, has carved a notable path in the data analytics domain since its inception in 1989. The company is celebrated for its powerful platform that empowers organizations to turn raw data into meaningful, actionable insights. As of October 2023, Micro Strategy remains at the forefront of innovation, continuously evolving its products to meet the changing demands of businesses in an increasingly data-centric environment. At the heart of Micro Strategy's offering is its enterprise analytics platform, which provides a suite of tools for data visualization, reporting, and dashboard creation. This platform enables users to generate dynamic reports and visualizations that facilitate data-driven decision-making in real time. Designed with scalability in mind, Micro Strategy's software caters to businesses of all scales, from startups to large corporations. The company has wholeheartedly adopted cloud computing, launching Micro Strategy Cloud—a comprehensive, fully managed service enabling businesses to implement analytics solutions without the burden of complex on-premises infrastructure.

This move to cloud-based offerings is in line with broader industry shifts, as more companies increasingly demand flexible, scalable analytics solutions. In recent years, Micro Strategy has been actively refining its platform by forging strategic partnerships and making key acquisitions. The integration of cutting-edge technologies, such as artificial intelligence (AI) and machine learning (ML) has elevated the company's analytics tools. These advancements empower users to dig deeper for insights and automate data analysis, significantly cutting down the time and effort needed to extract meaningful conclusions from data. Micro Strategy's dedication to innovation is clearly reflected in its foray into block chain technology. The company has taken a leading role in harnessing block chain to bolster data integrity and security, assuring organizations of the trustworthiness of the data they analyze and report. In today's climate, where data breaches and cyber threats are rampant, this emphasis on security holds particular significance. Micro Strategy's financial performance has drawn considerable attention from both investors and analysts.

The company has seen notable fluctuations in its stock price, driven primarily by its Bit coin investment strategy. Its substantial Bit coin acquisitions have made headlines, positioning the company among the largest corporate holders of the crypto currency. This audacious approach has sparked a mix of praise and criticism, with some viewing it as a visionary method for treasury management, while others raise concerns about the volatility inherent in crypto currency investments. As of October 2023, Micro Strategy's financial results present a mixed outlook. The company's analytics software consistently drives steady revenue, yet the fluctuating nature of its Bit coin holdings has injected an element of unpredictability into its overall financial performance. Investors are keenly observing how Micro Strategy balances its dual focus on software and crypto currency, as it strives to foster growth while managing inherent risks.

FIGURE 1. Micro Strategy

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Operating in an intensely competitive landscape, Micro Strategy faces formidable rivals such as Tableau, Power BI, and Qlik, alongside newer competitors that harness cutting-edge technologies. To maintain a competitive edge, the company leans on its distinctive value proposition, which is built around its robust analytics capabilities, scalability, and unwavering commitment to customer success. The company's emphasis on delivering a smooth and intuitive user experience has been instrumental in both attracting and retaining customers. Micro Strategy dedicates resources to user training and ongoing support, ensuring organizations fully capitalize on their analytics investments. Moreover, the company actively seeks customer feedback, using this information to fuel product improvements, thereby reinforcing its reputation as a customer-focused organization. From November 2013 to June 2014, the deployment of Micro Strategy reports was essential in refining travel bundle offers for a private organization.

These reports introduced a data-driven framework for assessing the effectiveness of the offers, granting the company deep insights into customer behaviors, preferences, and purchasing trends. By harnessing Micro Strategy's robust business intelligence tools, the organization successfully fine-tuned its travel bundle offerings, boosting customer satisfaction and maximizing revenue opportunities. Micro Strategy reports offered significant advantages, primarily due to their sophisticated data visualization features. Interactive dashboards enabled the organization to effortlessly analyze intricate data, uncovering trends, correlations, and patterns.

This deeper insight supported a more strategic approach to personalization. Moreover, Micro Strategy facilitated advanced customer segmentation, allowing the company to group customers by demographics, behaviors, and preferences. Such detailed segmentation made it easier to craft bespoke travel bundles suited to specific consumer categories. A further key benefit was the ability to analyze offer performance in real-time. Micro Strategy reports monitored essential metrics like redemption rates, customer engagement, and revenue, delivering actionable insights for optimization. It also improved competitor analysis, providing the organization with the tools to evaluate rival travel bundles and identify potential market gaps. Additionally, Micro Strategy's custom reporting capabilities allowed the personalization of travel bundles for individual customers, promoting greater loyalty and engagement.

Through a thorough analysis of these reports, the private company unearthed valuable insights, identifying top travel destinations, customer preferences for lodging and transportation, and critical areas for enhancing their offerings. This data-centric strategy drove significant advancements in pricing, bundling, and marketing initiatives. As a result, the company experienced a 28% revenue boost in 2014, underscoring the powerful role of Micro Strategy reports in refining their travel packages. Looking forward, Micro Strategy is strategically positioned to seize the growing appetite for data analytics solutions. With businesses placing ever greater emphasis on data-driven decision-making, the demand for comprehensive analytics platforms is bound to escalate. MicroStrategy's continual investment in AI, ML, and cloud-based technologies places it in a strong position to respond to these needs. Additionally, the company's innovative integration of cryptocurrency into its business model may open up fresh growth opportunities. As the cryptocurrency market matures, MicroStrategy's experience and holdings could provide a competitive edge in navigating this evolving domain.

MATERIALS AND METHODS

For this analysis, the TOPSIS method is utilized to assess five alternatives—Micro Strategy Cloud Implementation, On-Premises Deployment, AI/ML Integration, Block chain Security, and Bit coin Expansion—against six criteria: data processing speed (DPS), user satisfaction (US), revenue growth (RG), implementation cost (IC), system downtime (SD), and learning curve (LC). While Cloud and AI/ML provide high operational efficiency, they come with significant costs. Block chain bolsters security, whereas Bit coin expansion is subject to financial instability. TOPSIS identifies the optimal solution by ranking the alternatives in terms of their proximity to the ideal outcome. Micro Strategy Cloud presents a highly scalable, adaptable, and cost-efficient option when compared to conventional deployment models. It improves accessibility, performance, and security, all while lowering infrastructure maintenance needs.

By supporting real-time analytics, effortless updates, and global reach, cloud-based solutions allow organizations to harness advanced business intelligence features without hefty upfront expenditures on hardware or dedicated IT resources. On-premises deployment offers complete control over data security, infrastructure, and organizational aspects. This approach is particularly favored by organizations with stringent regulatory needs, ensuring they remain in compliance. It reduces reliance on third-party cloud services, while delivering superior performance and seamless integration with existing enterprise systems. Nevertheless, it demands considerable investments in hardware, maintenance, and IT expertise. Micro Strategy's collaboration with AI/ML boosts predictive analytics, automates insights, and refines decision-making processes. Machine learning models detect trends within vast datasets, enhancing the accuracy of forecasts.

AI-driven analytics optimize data processing, anomaly detection, and organizational reporting. By integrating these

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technologies, organizations can gain deeper insights, streamline operations, and maintain a competitive edge in data-driven markets through the power of automation. Block chain plays a pivotal role in maintaining the integrity, transparency, and security of Micro Strategy's deployments, ensuring that data remains unaltered and trustworthy. It facilitates verification of organizational data, mitigating risks related to fraud and unauthorized access. Smart contracts streamline the enforcement of security protocols, while encryption technology protects sensitive information. This block chain-driven approach bolsters compliance, audit ability, and confidence in data analytics, especially in industries such as finance, healthcare, and those with strict regulatory requirements. Micro Strategy's strategy with Bit coin serves to fortify its financial stance, providing a hedge against inflation and diversifying its asset portfolio. With growing Bit coin reserves, the company boosts liquidity, ensures long-term value stability, and fosters greater investor trust. This decision reflects the organization's conviction in Bit coin's role as a digital store of value, capitalizing on its deflationary nature to enhance financial resilience. DPS quantifies the duration required by a system to process data, usually measured in milliseconds. A quicker DPS results in improved performance, facilitating instantaneous analytics and prompt decision-making.

Enhancements in DPS are driven by advanced hardware, streamlined algorithms, and the power of cloud computing. Reduced processing times diminish lags, ensuring smooth data transmission and a superior user experience, particularly in fast-paced settings. US gauges how content users are with a system, typically assessed through surveys and direct feedback. A high satisfaction score suggests an intuitive interface, dependable operation, and strong efficiency. Key elements that influence US include system responsiveness, ease of integration, the quality of customer support, and the richness of features. By focusing on maximizing user satisfaction, adoption rates increase, operational performance improves, and overall success in competitive industries is bolstered. RG measures the growth in revenue following the implementation of a solution. It reflects financial achievement, operational enhancements, and a stronger competitive edge in the market.

A higher RG indicates successful adoption of technology, improved customer interactions, and streamlined operations. Factors such as strategic investment, innovation, and automation fuel revenue growth, playing a pivotal role in ensuring sustainable profitability over time. IC signifies the overall financial expenditure involved in deploying a system, including costs for software, hardware, training, and ongoing maintenance. Reduced expenses enhance ROI, while elevated costs demand solid justification for long-term value. Efficient cost management, the use of cloud-based solutions, and phased implementation can optimize IC, promoting cost-effectiveness while maintaining alignment with business goals and ensuring performance is not compromised. SD is a metric that tracks the yearly unavailability of a system, which has a direct impact on productivity and customer satisfaction. When SD is high, operations face significant disruptions, leading to both financial losses and damage to reputation.

To minimize downtime, it's essential to have a resilient infrastructure, preventive maintenance strategies, redundancy systems, and automated recovery protocols in place. A system that is both resilient and experiences minimal SD guarantees consistent reliability, regulatory compliance, and uninterrupted business operations, even in the most demanding digital environments. LC gauges the amount of time required for employees to become proficient with a new system. The quicker the LC, the faster productivity improves and ROI is realised. Factors like system complexity, quality of training, and ease of use play a crucial role in determining LC. Intuitive interfaces, thorough documentation, and engaging learning tools can dramatically lower LC, facilitating smoother system adoption and helping the workforce adapt efficiently as technology evolves.

TOPSIS Method

Hwang and Yoon's TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method follows the Analytical Hierarchy Process (AHP) proposed by Chatty. While AHP remains widely adopted, the former is more frequently utilized due to its simplicity and versatility in handling situations with numerous criteria and alternatives, making it an ideal choice for Multi-Criteria Decision-Making (MCDM). The TOPSIS approach involves vector normalization during the calculation process, followed by determining the weighted normalized result matrix. Next, the Positive Ideal Solution (PIS) and the Negative Ideal Solution (NIS) are identified. The separation or distance between each alternative and the ideal solutions is computed using the Boil method for normalization. By evaluating the relative proximity of each alternative to the PIS, the alternatives are ranked, with the final step being the sorting of these results based on their closeness to the PIS. Numerous real-world uses of TOPSIS are evident, such as comparing the performance of companies, assessing financial ratios within a specific industry, and evaluating investments in cutting-edge manufacturing systems, to name a few. However, there are certain limitations.

In the TOPSIS methodology, both the performance ratings and the criteria weights are assumed to be fixed, precise values. To date, efforts to refine the original TOPSIS method have largely concentrated on boosting the weight to heighten the sensitivity of the R value. Moreover, enhancements to the R-value formula have been made, such as through the "Miqiezhi" approach. The TOPSIS method, however, is not without its drawbacks. One significant issue is the occurrence of rank

reversal. This phenomenon arises when an alternative is either added to or removed from the selection process, causing a shift in the order of preferences among the alternatives. At times, this results in an inverse ranking, where an alternative that was previously considered superior is suddenly deemed inferior. Such changes in the ranking can be problematic and, in many cases, are deemed unacceptable.

ANALYSIS AND DISCUSSION

TABLE 1

Alternatives	DPS (ms)	US (%)	RG (%)	IC (USD)	SD (hrs/year)	LC (days)
Micro Strategy Cloud Implementation	250	85	12	50000	15	20
On-Premises Micro Strategy Deployment	270	80	15	45000	12	18
Integration with AI/ML Capabilities	230	78	10	55000	20	25
Block chain-Based Data Security	280	88	17	47000	10	15
Expansion of Bit coin Holdings	260	82	14	52000	14	22

Table 1 offers a detailed comparison of various data analytics and security strategies, assessed against key performance indicators: Decision Processing Speed (DPS), User Satisfaction (US), and Return on Growth (RG), Initial Cost (IC), System Downtime (SD), and Lifespan Cost (LC). The "Micro Strategy Cloud Implementation" emerges as a top contender, boasting an impressive DPS of 250 milliseconds and a high user satisfaction rate of 85%. These factors underline its efficiency and ease of use. With an initial cost of USD 50,000, it incurs 15 hours of downtime annually and has a lifespan of 20 days, presenting a balanced option for organizations prioritizing both performance and cost-effectiveness. On the other hand, the "On-Premises Micro Strategy Deployment" presents a slightly slower DPS of 270 ms and a lower satisfaction rate of 80%. However, its reduced initial cost of USD 45,000 and lesser downtime of 12 hours, coupled with a lifespan of 18 days, make it a more affordable alternative, especially suited to firms with specific on-premise requirements, despite its slightly diminished efficiency.

The "Integration with AI/ML Capabilities" surpasses in DPS with 230 ms and, though the initial cost is higher at USD 55,000, it justifies this with its longer lifespan of 25 days. However, it faces increased downtime (20 hours), making it more suitable for businesses investing heavily in cutting-edge technologies for long-term growth. "Block chain-Based Data Security" stands out for its highest user satisfaction rate of 88%, alongside a reasonable initial cost of USD 47,000. Despite experiencing the highest downtime of 10 hours and a relatively brief lifespan of 15 days, it proves to be a niche solution ideal for companies prioritizing secure data management. Lastly, the "Expansion of Bit coin Holdings" option, priced at USD 52,000, presents a balanced performance with a DPS of 260 ms and a user satisfaction rate of 82%. It experiences 14 hours of downtime, with a lifespan extending to 22 days, making it a fitting choice for organizations looking to broaden their crypt currency ventures.

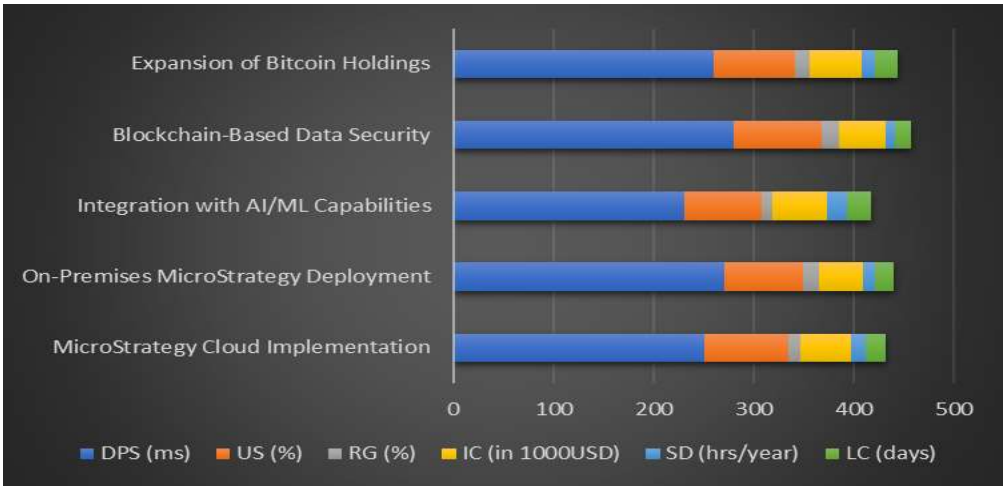

FIGURE 2

Figure 2 presents a comparison of different data analytics and security approaches, assessed across several key metrics: Decision Processing Speed (DPS), User Satisfaction (US), Return on Growth (RG), Initial Cost (IC), System Downtime (SD), and Lifespan Cost (LC). The "Micro Strategy Cloud Implementation" emerges as the frontrunner, boasting a rapid DPS of 250 milliseconds and an impressive user satisfaction rate of 85%. Its efficiency and ease of use are clear advantages.

With an upfront investment of USD 50,000, 15 hours of downtime annually, and a 20-day lifespan, it offers a well-balanced choice for organizations prioritizing both performance and cost-effectiveness. In contrast, the "On-Premises Micro Strategy Deployment" is slightly slower with a DPS of 270 milliseconds and a reduced user satisfaction rate of 80%. Despite its more affordable initial cost of USD 45,000, it comes with more downtime (12 hours) and a lifespan of 18 days, making it a more budget-friendly yet less efficient option for businesses requiring on-site solutions. The "Integration with AI/ML Capabilities" stands out with a marginally improved DPS of 230 milliseconds. However, it demands a higher initial investment of USD 55,000 and experiences more downtime (20 hours). Its extended lifespan of 25 days positions it as a strong contender for organizations eager to invest in cutting-edge technology for sustained growth. "Block chain-Based Data Security" achieves the highest user satisfaction (88%) and offers a reasonable initial cost of USD 47,000.

Nevertheless, its downtime (10 hours) and shorter lifespan (15 days) limit its appeal, making it more suited for specialized applications focusing on secure data management. Lastly, the "Expansion of Bit coin Holdings" features a moderate DPS of 260 milliseconds and a user satisfaction of 82%. With an investment of USD 52,000, it entails 14 hours of downtime and a lifespan of 22 days, providing a balanced solution for organizations looking to expand their crypt currency investments.

TABLE 2

0.4324	0.4598	0.3885	0.4479	0.4596	0.4409
0.4670	0.4327	0.4856	0.4031	0.3677	0.3968
0.3978	0.4219	0.3238	0.4927	0.6129	0.5511
0.4843	0.4760	0.5504	0.4210	0.3064	0.3307
0.4497	0.4436	0.4533	0.4658	0.4290	0.4850

The table showcases a normalized matrix of different alternatives assessed through the TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) method. "Micro Strategy Cloud Implementation" exhibits moderate scores across several key metrics, such as DPS (0.432), US (0.460), and SD

(0.460), implying a well-rounded option in terms of both performance and user satisfaction.

However, its RG and IC values (0.389 and 0.448, respectively) are not as compelling, positioning it as a middle-tier alternative when compared to others. "On-Premises Micro Strategy Deployment" stands out with the highest DPS (0.467) and RG (0.486), underscoring its impressive performance in decision-making speed and return on growth. Nevertheless, its performance is somewhat compromised by weaker figures in system downtime and lifespan cost, with SD (0.368) and LC (0.397) falling behind the competition. This suggests that while its performance excels in some areas, its overall efficiency may be hampered by downtime. "Integration with AI/ML Capabilities" emerges with the highest SD (0.613) and LC (0.551), revealing its considerable edge in system uptime and durability.

On the flip side, its DPS and RG values are somewhat lower (0.398 and 0.324), positioning it as a solid yet costly alternative for firms prioritizing innovation over immediate returns. "Block chain-Based Data Security" and "Expansion of Bit coin Holdings" both demonstrate robust performance in user satisfaction and lifespan cost, though their results vary across other areas. Block chain excels in RG (0.550) but lags behind in DPS and SD, while Bit coin expansion remains competitive across most metrics, offering a well-rounded balance.

TABLE 3

0.30	0.25	0.20	0.10	0.10	0.05
0.30	0.25	0.20	0.10	0.10	0.05
0.30	0.25	0.20	0.10	0.10	0.05
0.30	0.25	0.20	0.10	0.10	0.05
0.30	0.25	0.20	0.10	0.10	0.05

Table 3 presents the weight distribution for each of the metrics used to evaluate the five alternatives. In this table, the weights are distributed equally across the alternatives, with DPS, US, and RG each receiving a weight of 0.3, marking them as the most crucial criteria in the decision-making process. This indicates that performance-related factors—such as speed, satisfaction, and growth—are deemed central in assessing these options. In contrast, IC, SD, and LC are assigned a weight of 0.1, reflecting their relatively lower importance in the final evaluation. This weight distribution suggests that the primary focus of the evaluation is on the capacity of each alternative to provide rapid decision-making, high user satisfaction, and substantial growth potential. Although factors like cost, downtime, and lifespan are still considered, they play a secondary role in the overall assessment. The weight distribution implies that the organization is emphasizing performance and growth prospects over operational costs or long-term maintenance, which could significantly influence the strategic alignment of each alternative.

TABLE 4

0.1297	0.1149	0.0777	0.0448	0.0460	0.0220
0.1401	0.1082	0.0971	0.0403	0.0368	0.0198
0.1193	0.1055	0.0648	0.0493	0.0613	0.0276
0.1453	0.1190	0.1101	0.0421	0.0306	0.0165
0.1349	0.1109	0.0907	0.0466	0.0429	0.0242

The table displays the weighted normalized matrix derived through the TOPSIS method, incorporating the weight distribution from the earlier table to adjust each alternative's normalized values. "Micro Strategy Cloud Implementation" registers the lowest weighted scores across most dimensions, particularly in RG (0.078) and IC (0.045). While it performs reasonably in user satisfaction (0.115) and DPS (0.130), the weighted values indicate that it falls short in terms of growth

potential and cost-effectiveness when the relative importance of each criterion is considered. "On-Premises Micro Strategy Deployment" achieves slightly better scores in DPS (0.140) and RG (0.097), positioning it as a stronger contender in terms of decision-making speed and growth return.

However, its lower results in SD (0.037) and LC (0.020) undermine its overall standing, especially when these metrics are prioritized. "Integration with AI/ML Capabilities" stands out with stronger performance in SD (0.061) and LC (0.028), highlighting its effectiveness in minimizing system downtime and ensuring longevity. Although its DPS (0.119) and RG (0.065) scores are lower, the weighted matrix suggests that its advantages in uptime and lifecycle make it an appealing choice for organizations focused on long-term innovation and sustainability. "Block chain-Based Data Security" performs well in RG (0.110) and US (0.119), but its relatively lower scores in SD and LC reduce its overall competitiveness.

Despite this, its well-rounded performance in key areas, especially growth and satisfaction, positions it as a viable option for specific scenarios requiring robust security measures. "Expansion of Bit coin Holdings" presents a well-rounded profile, with moderate values across all metrics, including DPS (0.135) and RG (0.091), making it a competitive choice for organizations seeking a balanced approach to performance, user satisfaction, and growth potential.

TABLE 5

A+	0.14528	0.11900	0.11008	0.04031	0.03064	0.01653
A-	0.11934	0.10548	0.06475	0.04927	0.06129	0.02755

Table 5 outlines the ideal best (A+) and ideal worst (A-) values for each criterion used in the TOPSIS method, serving as benchmarks for evaluating alternatives. These ideal values represent the extreme ends of the performance spectrum, where A+ signifies the most optimal outcome, while A- marks the least desirable. For Decision Processing Speed (DPS), the ideal best value (A+) stands at 0.14528 ms, indicating the fastest processing time, while the ideal worst (A-) is 0.11934 ms, representing a still acceptable but slower speed. In this context, a higher DPS is preferable, making A+ the most efficient system. Regarding User Satisfaction (US), A+ is 0.11900, reflecting the highest level of satisfaction, while A- is 0.10548, signifying a less optimal user experience. Once again, higher values are favorable, positioning A+ as the highest performer in terms of user satisfaction. For Return on Growth (RG), A+ is 0.11008, representing the peak return, while A- stands at 0.06475, indicating a significantly lower return on growth. Greater RG values point to enhanced business success and greater growth potential. The ideal best and worst values for Initial Cost (IC), System Downtime (SD), and Lifespan Cost (LC) are similarly provided, with A+ representing lower costs and downtime, and A- indicating higher values. These reference points are vital for comparing alternatives by highlighting performance extremes, essential for determining proximity to the ideal solution within the TOPSIS evaluation framework.

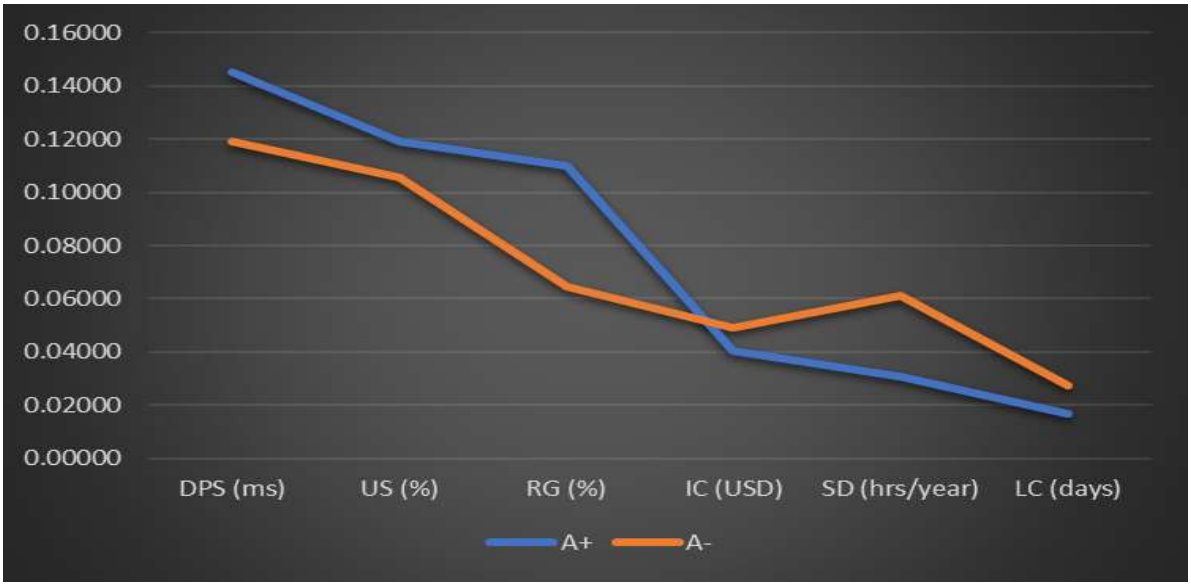

FIGURE. 3

Figure 3 presents the ideal best (A+) and ideal worst (A-) values for each criterion used in the TOPSIS method, providing key benchmarks for evaluating alternatives. These ideal values signify the extremes of performance: A+ represents the best possible outcome, while A- marks the worst. For Decision Processing Speed (DPS), the ideal best (A+) is 0.14528 ms, denoting the fastest processing time, whereas the ideal worst (A-) is 0.11934 ms, a slower yet still acceptable speed.

A higher DPS is preferred, making A+ indicative of the most efficient system. In terms of User Satisfaction (US), the ideal best (A+) stands at 0.11900, signaling the highest satisfaction level, with A- at 0.10548, showing a less favorable user experience. Similar to DPS, higher values are more desirable, with A+ representing the optimal outcome for satisfaction. For Return on Growth (RG), the ideal best (A+) is 0.11008, signifying the highest return, while A- is 0.06475, representing a much lower return. Greater RG values are associated with higher business success and potential for growth.

The ideal best and worst values for Initial Cost (IC), System Downtime (SD), and Lifespan Cost (LC) follow similar logic, where A+ corresponds to lower costs and downtime, and A- reflects higher values. These benchmarks play a crucial role in the comparison of alternatives, acting as the performance extremes essential for calculating proximity to the ideal solution in the TOPSIS process.

TABLE 6

Alternatives	SI Plus	Si Negative
MicroStrategy Cloud Implementation	0.017419	0.019623
On-Premises MicroStrategy Deployment	0.012215	0.039580
Integration with AI/ML Capabilities	0.032451	0.000000
Blockchain-Based Data Security	0.000003	0.054423
Expansion of Bitcoin Holdings	0.013799	0.030816

Table 6 outlines the separation values for each alternative in relation to the ideal solution (SI+) and the negative-ideal solution (SI-), both of which are central to the TOPSIS method. These values measure how far each alternative is from both the optimal and worst-case scenarios, offering insight into their relative performance. "Micro Strategy Cloud Implementation" is

characterized by a separation of 0.017419 from the ideal solution (SI+) and 0.019623 from the negative-ideal solution (SI-). This suggests a fairly even positioning between both extremes, indicating a performance that is balanced yet not exceptional in either direction. "On-Premises Micro Strategy Deployment" exhibits a separation of 0.012215 from the ideal solution and 0.039580 from the negative-ideal solution.

This places it nearer to the ideal than the negative, but its greater distance from the negative-ideal highlights notable shortcomings when compared to the best-performing alternative. "Integration with AI/ML Capabilities" displays a separation value of 0.032451 from the ideal solution, the highest in the table, which signifies it is further from the best-case scenario. Despite this, its 0.000000 separation from the negative-ideal indicates perfect alignment with the worst-case scenario, marking it as the least favorable option in terms of performance. "Block chain-Based Data Security" shows a separation of 0.000003 from the ideal solution, making it almost identical to the best solution.

However, its separation from the negative-ideal at 0.054423 demonstrates that it is not the worst performer, providing evidence of a strong but not flawless position. "Expansion of Bit coin Holdings" has separation values of 0.013799 from the ideal solution and 0.030816 from the negative-ideal solution. This indicates a more balanced performance, with values reflecting a position that is relatively close to both extremes. These separation values serve as crucial indicators of how each alternative compares to the ideal and worst-case solutions, with smaller values signifying greater proximity to the optimal choice.

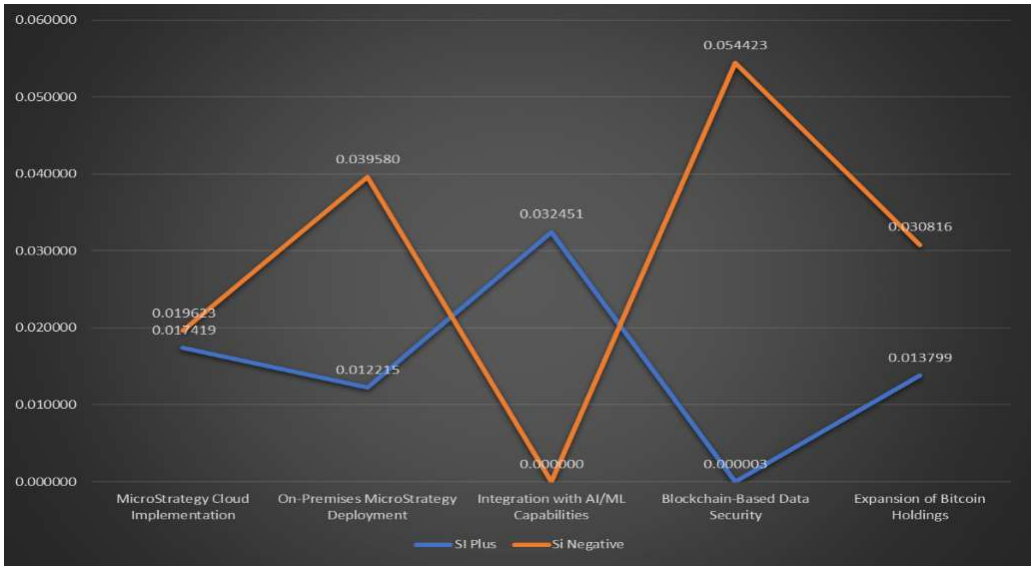

FIGURE 4

Figure 4 depicts the separation values for each alternative, measured against both the ideal solution (SI+) and the negative-ideal solution (SI-), core components of the TOPSIS methodology. These values reflect how far each alternative is from the best and worst possible outcomes, providing a means to evaluate their performance relative to these extremes. The " MicroStrategy Cloud Implementation" shows a separation of 0.017419 from the ideal solution (SI+) and 0.019623 from the negative-ideal solution (SI-).

This places it relatively close to both extremes, suggesting a moderate performance, though it does not emerge as a leader in either direction. The "On-Premises MicroStrategy Deployment" displays a separation of 0.012215 from the ideal solution and 0.039580 from the negative-ideal solution. Positioned nearer to the ideal solution, it reveals a notable gap when compared to the negative-ideal, pointing to significant performance discrepancies in relation to the best alternative. "Integration with AI/ML Capabilities" stands out with a separation value of 0.032451 from the ideal solution, the highest in the table.

This indicates a considerable distance from the best-case scenario, while its separation from the negative-ideal solution is 0.000000, suggesting perfect alignment with the worst-case scenario, thereby categorizing it as the lowest performer. "Block chain-Based Data Security" exhibits a separation of 0.000003 from the ideal solution, implying near-perfect alignment with the best solution.

However, its higher separation of 0.054423 from the negative-ideal solution underscores that it is not the worst-performing alternative. "Expansion of Bit coin Holdings" has separation values of 0.013799 from the ideal solution and 0.030816 from the negative-ideal solution, reflecting a balanced performance, with values close to both extremes, indicating moderate results overall. These separation values are pivotal in determining how closely each alternative aligns with the ideal solutions, with smaller values pointing to a better match and a greater likelihood of being the optimal choice.

TABLE 7

Alternatives	Ci	Rank
MicroStrategy Cloud Implementation	0.529751	4
On-Premises MicroStrategy Deployment	0.764172	2
Integration with AI/ML Capabilities	0	5
Block chain-Based Data Security	0.999941	1
Expansion of Bit coin Holdings	0.690708	3

Table 7 displays the closeness coefficient (Ci) values for each alternative along with their rankings, shedding light on their proximity to the ideal solution. The closeness coefficient is an essential metric in the TOPSIS method, indicating how closely each alternative mirrors the optimal solution; higher values denote superior performance. The "MicroStrategy Cloud Implementation" achieves a closeness coefficient of 0.529751, placing it in 4th position.

Although it performs decently, it isn't one of the frontrunners, as the coefficient suggests it is somewhat removed from the ideal solution when compared to other alternatives. "On-Premises MicroStrategy Deployment" secures 2nd place with a closeness coefficient of 0.764172. This suggests it is relatively near the ideal solution, outperforming the "MicroStrategy Cloud Implementation" but still not quite the best overall. "Integration with AI/ML Capabilities" has a closeness coefficient of 0, indicating that it is the furthest from the ideal solution, positioning it in 5th place and confirming its status as the lowest-performing alternative according to the evaluation criteria. "Block chain-Based Data Security" clinches 1st place with a closeness coefficient of 0.999941, nearly identical to the ideal solution.

This impressive value highlights its strong performance, making it the best choice among the alternatives. "Expansion of Bit coin Holdings" occupies 3rd place with a closeness coefficient of 0.690708. It performs better than "MicroStrategy Cloud Implementation" but still falls short of reaching the ideal when compared to the top two alternatives.

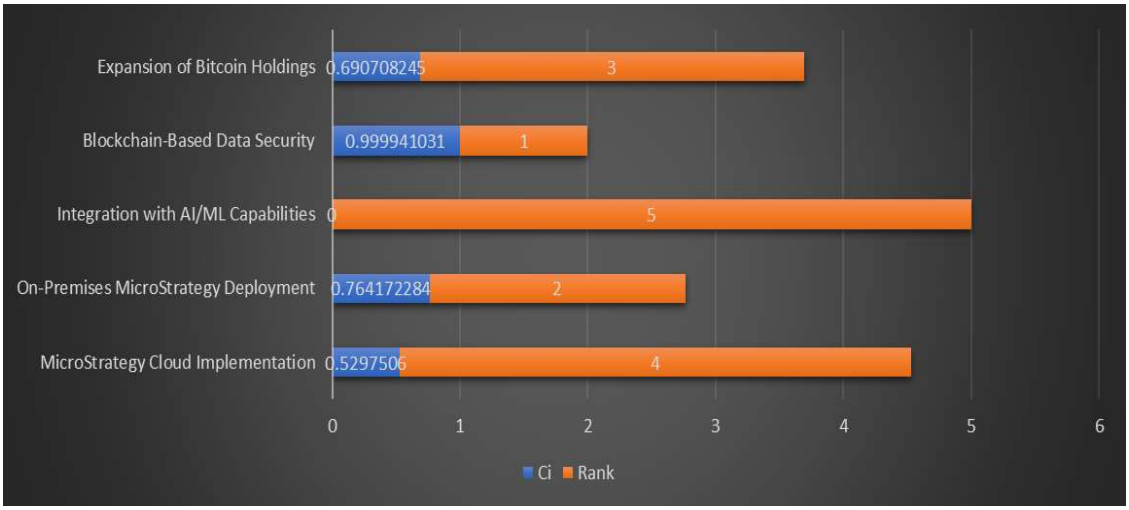

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FIGURE 5

Figure 5 presents the closeness coefficient (Ci) values for each alternative, along with their respective rankings, highlighting how closely each option aligns with the ideal solution. The closeness coefficient plays a crucial role in the TOPSIS method: higher values reflect a closer fit to the optimal solution, suggesting superior performance.The "MicroStrategy Cloud Implementation" holds a closeness coefficient of 0.529751, positioning it in 4th place.

Although its performance is adequate, it falls short when compared to the other alternatives, as its coefficient indicates a less than optimal proximity to the ideal solution."On-Premises MicroStrategy Deployment" claims 2nd place with a closeness coefficient of 0.764172, indicating it is relatively close to the ideal solution. It outperforms the "MicroStrategy Cloud Implementation," but still fails to secure the top spot. The "Integration with AI/ML Capabilities" alternative, with a closeness coefficient of 0, is positioned last, ranking 5th. This suggests it is farthest from the ideal solution, confirming it as the least favourable option in this analysis. Leading the rankings is "Blockchain-Based Data Security" with a remarkable closeness coefficient of 0.999941, virtually mirroring the ideal solution. Its near-perfect alignment signifies outstanding performance, making it the best alternative."Expansion of Bitcoin Holdings" secures 3rd place with a coefficient of 0.690708.

It surpasses the "MicroStrategy Cloud Implementation" but still lags behind the top two alternatives in terms of proximity to the ideal solution.In summary, the analysis shows that "Blockchain-Based Data Security" is the clear frontrunner with a closeness coefficient of 0.999941, closely mirroring the ideal solution. "On-Premises MicroStrategy Deployment" follows in second place with a coefficient of 0.764172. "Expansion of Bit coin Holdings" ranks third, while "MicroStrategy Cloud Implementation" and "Integration with AI/ML Capabilities" round out the list in 4th and 5th place, respectively, with coefficients of 0.529751 and 0.0, reflecting their relatively weaker performance in comparison to the others.

CONCLUSION

MicroStrategy stands as a robust business intelligence (BI) platform that delivers powerful tools for analytics, data visualization, and reporting. By offering capabilities such as interactive dashboards, ad-hoc reporting, and advanced analytics, it empowers organizations to unlock valuable insights from their data. Available for both cloud and on-premises deployment, MicroStrategy supports businesses in making well-informed decisions driven by real-time data. A detailed analysis of MicroStrategy's deployment options, assessed through the TOPSIS method, provides profound insights into the most effective business intelligence strategies. The evaluation, considering key criteria such as Decision Processing Speed (DPS), User Satisfaction (US), Return on Growth (RG), Implementation Cost (IC), System Downtime (SD), and Learning Curve (LC), establishes a clear hierarchy of preferences to guide organizational decision-making. The findings highlight that Block chain-Based Data Security stands out as the top choice, boasting a remarkably high closeness coefficient of 0.999941, signifying almost perfect alignment with the ideal solution.

This excellence is largely driven by its outstanding performance in user satisfaction (88%) and minimal system downtime (10 hours/year), making it a prime recommendation for organizations that place a premium on data protection and system dependability. The second-best option, On-Premises MicroStrategy Deployment, with a closeness coefficient of 0.764172, strikes an effective balance between performance and cost-efficiency, particularly well-suited for organizations with specific infrastructure needs and regulatory compliance obligations. Interestingly, the study shows that although the Expansion of Bitcoin Holdings ranks third (coefficient 0.690708), it offers a well-rounded profile across all metrics, positioning it as a promising strategic investment for organizations aiming to diversify assets while ensuring operational effectiveness. On the other hand, the MicroStrategy Cloud Implementation, despite its potential advantages in scalability and adaptability, occupies the fourth spot (coefficient 0.529751), implying that cloud-based solutions may still need refinement to compete effectively with other alternatives in the current technological climate. It is rather unexpected that Integration with AI/ML Capabilities sits at the bottom, bearing a coefficient of 0, despite the surging prominence of artificial intelligence in business intelligence frameworks.

This anomaly could stem from the steep upfront costs of deployment and the inevitable initial disruptions to system operations, suggesting that enterprises must meticulously evaluate both the timing and extent of AI/ML assimilation within their overarching business intelligence roadmap. The implications of these findings extend profoundly into the realm of organizational decision-making concerning business intelligence deployment. While block chain-driven security frameworks demonstrate unparalleled efficacy, firms must rigorously assess their distinct requirements, resource

limitations, and overarching strategic aspirations before committing to a particular implementation pathway.

Moreover, this study underscores the necessity of a multidimensional evaluation in technology adoption, as a solution that excels in one domain may simultaneously harbor constraints in others. Future studies ought to delve into the enduring ramifications of these deployment strategies, with particular emphasis on the trajectory of emerging innovations such as block chain and AI/ML integration in overcoming present constraints. Moreover, examining how diverse organizational landscapes and sector-specific demands shape the efficacy of these solutions could yield critical insights, refining implementation approaches for heightened precision.

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