

Analyzing the impact of various integration strategies on business enterprises

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ABSTRACT

Modern business enterprises have become largely dependent on the successful integration of systems to ensure competitiveness, efficiency, and survival in the current market. Integration strategies, such as point-to-point, horizontal, and star, have been identified as essential elements of integration processes, applications, and data within organizations. With time, more modes of integration have been invented, and this has provided more choices that a business can follow. However, the choice of the strategy is not always easy, and this will define the extent to which an enterprise can utilize the strategy that has been identified. The research will offer an evaluation of the importance of different integration strategies applied by business enterprises in terms of technical, business, and operational aspects. These integration strategies are API-based, iPaaS/Cloud-based, and Microservices. Three of the most recent and used integration strategies in the market are. Its methodology will follow four phases, which are greatly elaborated in the study, to provide a detailed account of the implementation of the various integration policies and relate the outcome to the processes involved. The initial phase defined which integration strategies are most utilized and identified the major challenge business enterprises face when implementing them, showing statistics of utilization among these methods. Phase 2 consisted of a literature review guided by IEEE Xplore and Scopus. Phase 3 dealt with the creation of an Impact Analysis Framework, which classified the integration impacts. The last phase validated the framework and its relationships. The study's findings show that integration strategies are best used when they are familiar and when combined. It is also revealed to have a positive organizational impact for all three perspectives discussed. Therefore, it can be concluded that no single integration strategy is universal, and the effectiveness is affirmed when the strategies are combined.

Keywords: integration strategies, business enterprise, scalability, operational efficiency, organizational performance, impact analysis, systematic literature review, iPaaS, API, microservices

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INTRODUCTION

The modern age has been characterized by globalization and technological upgrades, which have consequently resulted in the growth of competition in the market. This causes business enterprises to seek out new solutions to compete in the current market's ever-changing and rapidly evolving state. Currently supported by technology, among the most important ways in which businesses ensure survivability is the establishment of integration strategies within their companies.

In this case, integration can be viewed as the exploitation of various forms of system integration to establish a smooth and integrated operational platform, which would guarantee the achievement of business objectives. However, despite this growing reliance on integration strategies, there is always a different outcome depending on the strategy implemented. Some

business enterprises may experience a positive impact, such as increased productivity, sales, and even lower costs. Nonetheless, some find themselves having problems related to such issues as high costs and organizational resistance, despite the fact that the same integration strategy used is the one chosen by a company with positive results. This matter reflects the fact that a more adequate, consistent study is required to determine how these diversified strategies can be practically applied to business organizations.

Statement of the problem

The paper will aim to examine the impacts of the various forms of integration on business enterprises since they are the major users of these strategies. It will concentrate on the analysis of the advantages and disadvantages, as well as the implications of the implementation of the chosen strategy over the long term. API based, Microservices, and cloud-based integration will be the main center points of the study, as these are what are believed to be important by 97% of IT leaders. This will open an opportunity for this research to be used in the development and maintenance of businesses in the modern industry.

METHODOLOGY

The study employed a comprehensive and multi-phase methodological approach to systematically analyze the impact of various integration strategies on business enterprises. The research utilized a descriptive and analytical design, incorporating both qualitative and quantitative methods to ensure objectivity and accuracy. The methodology was divided into four major phases: problem identification and scope establishment, systematic literature review and data collection, development of the impact analysis framework, and framework evaluation and validation. Each phase was designed to build upon the previous one, ensuring a logical progression from problem identification to framework validation, thereby enhancing the credibility and reliability of the findings.

The first phase involved identifying the problem and defining the scope of the study. In today's competitive global market, numerous integration strategies are being utilized by business enterprises to streamline processes and improve operational efficiency. Among these, the study focused on five major strategies—API-based integration, microservices, cloud-based or iPaaS (Integration Platform as a Service), and Enterprise Service Bus (ESB). The central dilemma faced by organizations lies in determining which strategy is most appropriate for their structure, resources, and long-term objectives. The study acknowledged the significance of these strategies and the challenges businesses face when making decisions that could critically affect their operations. Adoption trends indicated that APIs were adopted by 79% of enterprises and regarded as important by 98% of respondents. Microservices showed an 81% adoption rate, with an additional 18% of organizations planning to utilize them. Meanwhile, cloud-based or iPaaS integration had a 59% adoption rate, with 74% recognizing their importance out of 413 respondents. The percentage of acknowledgment for each strategy was calculated using a probability-based formula: %Acknowledge Only = %Believers - %Adopters, resulting in 19% for APIs, 18% for microservices, and 15% for iPaaS. The analysis suggested that the cost of

selecting an unsuitable integration strategy could be crippling to a business, affecting its scalability, efficiency, and competitive advantage. Therefore, the study limited its detailed examination to three key approaches—API-based, microservices, and cloud-based/iPaaS—due to their widespread use and significant influence on enterprise performance.

To gather comprehensive and unbiased data, the second phase of the study employed a Systematic Literature Review (SLR) following the guidelines of Kitchenham and Charters (2007). This phase ensured methodological transparency and minimized selection bias. The guiding research question was formulated as follows: “How can variations in integration strategies impact the technical, business, and operational performance of business enterprises?” The literature review was conducted through two major academic databases—IEEE Xplore and Scopus—to ensure broad and credible coverage of peer-reviewed journals, conference papers, and review articles related to enterprise integration. The inclusion criteria specified that studies must have empirically or theoretically analyzed API-based, microservices, or cloud-based/iPaaS integration strategies and discussed their quantifiable outcomes in an enterprise context. Studies that were conceptual, non-enterprise in setting, or not peer-reviewed were excluded. The collected data underwent rigorous screening, following strict inclusion and exclusion criteria, to ensure that only high-quality, relevant research was retained. The synthesis of the data involved identifying recurring patterns, common themes, contradictions, and gaps in the existing literature, which collectively served as the empirical foundation for the framework’s development. The process was visually represented through a funnel diagram illustrating how the wide initial search was systematically filtered to yield a refined set of reliable sources for in-depth analysis.

The third phase focused on the development of an Impact Analysis Framework that synthesized findings from the previous phase. The framework was designed to identify and categorize key performance indicators (KPIs) influenced by integration strategies across three main domains: technical, business, and operational. The technical domain encompassed factors such as maintainability, security, scalability, and system complexity. The business domain included total cost of ownership (TCO), return on investment (ROI), and adaptability, while the operational domain covered data integrity, performance, and automation. The framework’s structure provided an organized means of evaluating the implications of each strategy. For example, APIs were found to enhance interoperability between systems and applications but required strong governance due to potential scalability and security issues. Microservices improved flexibility and scalability, providing a modular structure that allows independent service deployment and long-term ROI benefits. Cloud-based or iPaaS solutions facilitated automation, workflow efficiency, and faster time-to-market but were associated with recurring subscription costs and risks related to vendor lock-in. These factors collectively informed the development of a radar chart illustrating the relative impact of each strategy across the defined KPIs. The chart demonstrated how API-based, microservices, and iPaaS integrations performed in terms of technical efficiency, business value, and operational reliability, providing a visual representation of their respective strengths and weaknesses.

The fourth and final phase involved evaluating and validating the developed Impact Analysis Framework. This was achieved through enterprise case studies and expert validation involving enterprise architects and integration specialists. The primary objective of this phase was to test how effectively the framework could measure the performance of the three

integration strategies against the identified KPIs in real-world business environments. By combining theoretical insights with practical applications, the validation process ensured that the framework was relevant, comprehensive, and aligned with current industry practices. The experts assessed the framework's applicability, completeness, and clarity, confirming its potential to guide decision-making in enterprise integration. The findings were then benchmarked against recent studies to ensure consistency and robustness. Previous research findings demonstrated that supply chain performance is strongly influenced by integration practices and that digital business process integration significantly enhances operational efficiency and environmental management among small and medium-sized enterprises (SMEs). Moreover, Industry 4.0 technology integration was shown to support strategic objectives and sustainable competitive advantage. These related findings reinforced the framework's empirical validity and demonstrated its capacity to provide practical, evidence-based recommendations for enterprises selecting the most suitable integration strategy.

Throughout all stages of the study, ethical research standards were strictly upheld. The researchers ensured proper acknowledgment of all sources, adhered to intellectual property rights, and maintained the integrity and transparency of the research process. Data collected from secondary sources were used responsibly, and all findings were presented objectively without bias or manipulation. In analyzing the data, both qualitative synthesis and comparative evaluation methods were employed to interpret relationships, trends, and performance variations among different integration strategies. The results of the methodological process contributed to a robust, systematic, and ethically grounded approach to understanding how integration strategies—specifically API-based, microservices, and cloud-based/iPaaS—impact the technical, business, and operational performance of modern business enterprises. The methodological design not only ensured a structured and comprehensive assessment but also produced findings that could be applied to real-world contexts, providing enterprises with a reliable framework for evaluating and improving their integration strategies.

RESULTS AND DISCUSSION

The results and discussion present the findings derived from the four methodological phases outlined in the study—problem identification, systematic literature review, framework development, and framework validation. The data gathered came from a total of 413 respondents and multiple enterprise case studies obtained from peer-reviewed journals and industry reports indexed in IEEE Xplore and Scopus. These respondents and documented enterprises represented diverse sectors that employ integration strategies such as API-based, Microservices, and Cloud-based or iPaaS systems. Through the Impact Analysis Framework developed and validated by enterprise architects and integration specialists, the study analyzed the technical, business, and operational implications of each strategy and determined how their combined implementation affects organizational performance, scalability, and competitiveness. The results are presented as a comprehensive synthesis of quantitative data, qualitative insights, and comparative evaluations derived from existing literature and the constructed framework.

Identified problems and defined scope

The study first examined the extent to which various integration strategies are utilized by modern enterprises and identified the underlying challenges in their adoption. According to the literature and data gathered from large-scale surveys, the utilization rates of integration strategies vary substantially. Microservices recorded the highest usage rate at 81%, followed closely by API-based integrations at 79%, and Cloud-based or iPaaS systems at 59% [2, 11]. Among 413 respondents, 97% of IT leaders expressed that they do not rely solely on one integration approach but instead use a combination of two or three strategies depending on their organization's size, goals, and technical capabilities. This demonstrates that integration has evolved beyond isolated systems, emphasizing hybrid approaches that improve interoperability and adaptability.

The high adoption rate of microservices is attributed to their proven stability, modularity, and efficiency in handling complex enterprise architectures. Their strong documentation and maturity within the software development community make them more reliable than emerging integration models. Conversely, iPaaS and Cloud-based integrations, though increasingly relevant, are relatively newer technologies and still face constraints such as vendor dependence, recurring subscription costs, and potential scalability issues when enterprises attempt system migration without vendor assistance. The study also emphasized that enterprises that adopt inappropriate strategies can incur crippling costs that hinder productivity and growth. These challenges reinforce the importance of a structured framework to guide decision-making in integration adoption.

The analysis further revealed that while APIs are crucial for enabling system communication and digital transformation, they must be carefully governed to avoid security and compatibility issues. In contrast, microservices allow independent service deployment, making them ideal for large enterprises with complex workflows. Meanwhile, iPaaS or Cloud-based integrations facilitate rapid data flow between applications and improve automation in retail and manufacturing settings, enhancing overall performance. The data from the literature indicated that the formula used to determine acknowledgment-only rates ($\% \text{Acknowledge Only} = \% \text{Believers} - \% \text{Adopters}$) yielded values of 19% for APIs, 18% for Microservices, and 15% for iPaaS, highlighting the varying levels of awareness and actual implementation across enterprises. These figures collectively underscore the diversity of integration practices in business operations and the critical need for evaluating their distinct impacts on performance metrics.

Technical, business, and operational impact

The analysis of data using the Impact Analysis Framework revealed how integration strategies influence the three main dimensions of enterprise performance: technical, business, and operational. From a technical perspective, microservices offer the highest flexibility and scalability, which are advantageous for growing organizations and enterprises with evolving digital infrastructures. Their modular structure enables independent updates and fault isolation, reducing downtime and improving system reliability. However, microservices require high technical expertise, long-term maintenance, and careful configuration to prevent architectural complexity. APIs, by contrast, allow seamless interoperability between applications and platforms but demand robust governance to maintain security and performance consistency.

They are relatively simple to deploy and less expensive to implement, but their scalability may be limited when not paired with microservices or iPaaS.

Cloud-based or iPaaS integration strategies exhibit strong cross-platform compatibility and fast deployment, making them highly suitable for organizations that rely on multiple third-party systems. They support data synchronization, automated workflows, and scalable storage solutions. Despite these advantages, the study identified challenges related to vendor lock-in, recurring subscription costs, and migration complexities when businesses attempt to manage transitions independently. These recurring costs can be substantial for enterprises that prefer maintaining control over system customization. Nonetheless, iPaaS solutions remain a popular choice for organizations prioritizing automation and speed-to-market.

In terms of business impact, APIs are cost-effective in terms of total cost of ownership (TCO) and provide a low entry barrier for integration due to their affordability and compatibility with existing systems. Microservices, while requiring significant upfront investment, deliver long-term return on investment (ROI) by increasing system resilience and supporting continuous scalability. Cloud-based or iPaaS solutions, on the other hand, offer adaptability and faster time-to-market through subscription-based models that enable flexible scaling of services. The findings indicate that enterprises using these strategies experience varying levels of business efficiency depending on their chosen approach and the degree of integration maturity within their organizations.

Operationally, the results show that each strategy enhances specific aspects of enterprise functionality. Microservices improve performance through service isolation, ensuring that the failure of one component does not affect the entire system. iPaaS or Cloud-based integration automates workflows and enhances data integrity across platforms, leading to smoother operations and reduced manual errors. APIs facilitate interoperability and enable real-time data exchange across applications, which is essential for digital ecosystems, though they require secure governance mechanisms to maintain data protection. Collectively, these findings confirm that combining all three integration strategies—API-based, Microservices, and iPaaS—produces optimal outcomes. This combination enhances automation, scalability, performance efficiency, and overall enterprise agility, as illustrated in Figure 6, where the intersecting benefits of the three strategies demonstrate synergistic performance improvements across key performance indicators (KPIs).

Summary of the discussion

The study demonstrates that in the fast-evolving technological landscape, the integration of various systems is no longer optional but essential for business survival and competitiveness. The findings confirm that there is no one-size-fits-all approach to system integration. The effectiveness of each strategy depends on the organization's unique characteristics, including its size, available resources, infrastructure maturity, and long-term objectives. APIs and iPaaS strategies are found to be particularly effective for smaller businesses that require affordable, easily deployable, and flexible solutions. In contrast, microservices are most suitable for large-scale enterprises that demand robust scalability, long-term ROI, and a high degree of customization.

These conclusions are consistent with prior studies that link integration strategies with enhanced supply chain performance, operational efficiency, and competitive advantage [9]. The developed Impact Analysis Framework proved to be a practical and empirical tool for systematically assessing the effects of different integration approaches. It enabled the classification of key performance indicators and provided enterprises with evidence-based insights for selecting strategies aligned with their strategic goals. The validation phase of the study—conducted with the help of enterprise architects and integration specialists—confirmed that the framework is both theoretically sound and operationally applicable. It was benchmarked against recent findings from digital business integration studies, such as those of Aboelmaged et al. (2025), which emphasize the connection between digital integration, sustainability, and efficiency, as well as Al-Omoush et al. (2022), who highlighted Industry 4.0's contribution to competitive advantage.

The comparative analysis further established that APIs offer quick and cost-effective interoperability, microservices provide stability and scalability, and iPaaS enables automation and faster delivery cycles at the cost of recurring subscription fees. When implemented in combination, these strategies yield the best overall results—balancing cost, flexibility, and efficiency. The research concludes that enterprises aiming for sustainable digital transformation should employ a hybrid integration model that merges the strengths of API-based, Microservices, and iPaaS approaches. Such integration supports adaptability, automation, and innovation, positioning organizations to respond effectively to technological disruptions and market demands. Ultimately, the findings affirm that integration strategies, when properly aligned with business goals and supported by a validated analytical framework, significantly enhance an enterprise's operational excellence, scalability, and long-term competitiveness in the digital economy.

CONCLUSION

The research was able to investigate the possible effect of the different integration approaches, which are API-based integration, microservices, IPaaS, or cloud-based integrations, on the technical, business, and operational performance of the different approaches to integration. It represents the scalability of microservices, the property of API flexibility, and the automation of IPaaS. By integrating these strategies, the company will not only be able to reach higher results but also be able to employ them according to the company's resources and long-term objectives. It is the practical work and the development stage of the impact analysis framework that permitted exploring and analyzing the possibilities, competencies, and weaknesses of the capital of each strategy to a full extent. The results show that it may not only be the availability of sustainable scalability but also the stability with the adoption of microservices. Meanwhile, APIs can provide cost-effective integration, and iPaaS or cloud-based solutions can provide fast and automated solutions, but they have to be charged regularly. The parallel to the existing literature is that the integration strategies are critical in enhancing and improving the competitiveness, operations performance, and adaptability in the rapidly changing digital world. Finally, the paper reveals the necessity of developing integration strategies that are not conditioned by current trends but by the needs of the particular organization. The framework structure that would be created within the frames of the identified research would be suggested to

the companies and would allow them to provide evidence-based information on how the issue of integrations could be addressed.

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