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Research Article

Modeling and Optimizing Organizational Business Processes through Integrated Information Systems: Evidence from Public and SME Sectors

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Abstract: In the context of both public organizations and Small and Medium Enterprises (SMEs), inefficient business processes remain a significant challenge. Fragmented information systems often hinder the optimization of these processes, leading to slower decision-making, redundant efforts, and increased operational costs. This study aims to analyze and optimize business processes by utilizing integrated information systems (IIS), providing a comparative analysis between the two sectors. The theoretical framework explores key theories such as Business Process Management (BPM) and the integration of information systems for process optimization. Previous studies highlight the differences in how IIS implementation impacts the public and SME sectors, noting challenges such as data silos, legacy systems, and resistance to change. A case study analysis methodology was employed to assess the effectiveness of IIS across both sectors. Business Process Modeling (BPMN) was used to visualize business processes before and after optimization, and process performance was measured through key metrics such as time reduction, error rates, and cost efficiency. The results show that IIS integration improved business process efficiency by an average of 28%, with reductions in redundancy and faster decision cycles observed in both sectors. Public organizations benefited from enhanced service delivery and better resource management, while SMEs gained competitive advantages through streamlined operations and increased responsiveness to market demands. The comparison reveals that integrated systems had a greater operational impact than traditional isolated process reengineering methods. Public organizations faced more regulatory and governance challenges, while SMEs leveraged their flexibility for faster integration. Recommendations for both sectors include focusing on overcoming barriers such as resistance to change and investing in system modernization. Future research should explore the long-term effects of IIS integration and further sector-specific comparisons.

Keywords: Business process; Integrated systems; Process optimization; Public organizations; Small enterprises.

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1. Introduction

Inefficient business processes remain a critical challenge in both public organizations and Small and Medium Enterprises (SMEs). Fragmented information systems, which often involve the use of multiple, disconnected software programs, exacerbate this issue. This fragmentation leads to several operational problems, such as ineffective information sharing, compromised security, and slower decision-making processes. For SMEs, this inefficiency is particularly pronounced due to excessive bureaucracy, limited government support, and the difficulty of accessing specialized personnel and modern technologies. The COVID-19 pandemic has further intensified these challenges, pushing many SMEs to the brink of survival and necessitating innovative solutions to navigate the crisis [1].

In public organizations, the lack of integration across various systems, including email systems, Enterprise Resource Planning (ERP) software, and document management systems, creates a disjointed flow of information. This disruption in business process execution prevents the creation of a centralized workflow log, leading to delays, wasted resources, and potential violations of regulations. The fragmentation not only disrupts data organization but also negatively impacts overall company performance, which can result in slower decision-making, redundant efforts, higher operational costs, decreased productivity, and compliance issues [2], [3].

The reliance on multiple, unintegrated systems in both public organizations and SMEs creates barriers to optimizing business processes. Fragmented information systems make it challenging for decision-makers to access timely and accurate data, leading to slower decision-making and redundant efforts across departments [2]. Additionally, the inability to integrate various IT solutions can result in significantly higher operational costs, as enterprises spend up to 40% of their IT budget on process and application integration [1]. Furthermore, these fragmented systems hinder productivity by disrupting the flow of information, making it difficult for employees to collaborate effectively and monitor compliance with established rules and regulations [2].

In today's fast-paced and competitive environment, both public organizations and Small and Medium Enterprises (SMEs) face significant challenges in optimizing their business processes. One of the primary obstacles is inefficient business processes, often exacerbated by fragmented information systems. The integration of information systems is essential for enhancing organizational efficiency, reducing operational costs, and improving overall performance [4], [5]. This study aims to analyze the role of integrated information systems (IIS) in business process optimization in both public and SME sectors, offering a comparative analysis to highlight the unique challenges and opportunities each sector faces in implementing such systems [6], [7].

This study focuses on examining how IIS can enhance business process optimization in both public and SME sectors. A comparative analysis will be conducted to identify the distinct challenges and opportunities for each sector in adopting integrated systems. The public sector typically faces different challenges compared to the private sector, including the need for higher transparency and accountability, which can complicate the implementation of integrated systems [6]. On the other hand, SMEs often struggle with limited resources and expertise, which can hinder their ability to adopt effective business process modeling (BPM) techniques [8].

Integrated information systems are crucial for optimizing business processes as they enable organizations to streamline and coordinate their operations more effectively. For SMEs, the adoption of IIS can significantly improve resource management, facilitate business reengineering, and enhance overall performance [5]. These systems are particularly beneficial for coordinating core business functions, such as sales, purchasing, and inventory management, leading to improved operational efficiency [8]. In the public sector, IIS can improve the management of information flow, ensuring transparency, compliance with regulations, and overall operational efficiency [7].

SMEs often face challenges when adopting business process modeling (BPM) due to resource limitations and a lack of specialized expertise [4]. However, the integration of enterprise information systems (EIS) can provide SMEs with a strategic advantage by improving the coordination and optimization of their business processes [8]. A key factor in the successful implementation of integrated systems in SMEs is the readiness of employees to accept and adapt to new processes [5]. The selection of appropriate BPM tools is also essential for achieving the desired outcomes [4].

Public sector organizations can leverage integrated management systems to handle the increasing flow of information, ensuring compliance with various regulatory standards and improving service delivery [7]. These systems enable the integration of information security, quality, environmental, health, and safety objectives into a cohesive framework, contributing to more efficient and transparent operations [9]. By optimizing business processes, public services can meet normative deadlines and improve the quality of service delivery [6].

The comparative analysis between the public and private sectors reveals that public organizations often face different challenges when it comes to business process integration. One key distinction is the higher emphasis on transparency and accountability in the public sector, which can complicate the process of implementing integrated systems [6]. Additionally, leadership plays a more significant role in process management in public organizations, although translating these processes into tangible outcomes can be more challenging compared to the private sector [9]. Private organizations, particularly SMEs,

typically perform better in terms of process management and achieving business results due to their greater flexibility and resource availability [5].

2. Literature Review

Business Process Management (BPM)

Business Process Management (BPM) has become a crucial approach for organizations aiming to optimize their operations and enhance value delivery to customers. The core principles of BPM focus on improving business processes to create value for customers through the integration of Information Technology (IT). BPM brings together process management theories with technological advancements to enable the establishment of process-centric enterprises [10]. At its core, BPM emphasizes not only efficiency but also the alignment of business processes with organizational goals, promoting continuous improvement and integration between business processes and information systems [11]. This holistic approach ensures that business processes are optimized while supporting enterprise-wide goals, thus ensuring that all parts of the organization work toward common objectives.

One of the key dimensions of BPM is its integration with Enterprise Architecture Management (EAM). BPM and EAM work together to optimize business processes by offering a systematic review of process architecture and its relationship with information architecture [12]. Through this integration, organizations can achieve greater alignment between their business processes and technological frameworks, leading to more efficient operations and improved decision-making. The collaborative nature of BPM and EAM enables organizations to leverage both process and technology to optimize their performance, providing a structured and coherent approach to process improvement [10].

Integrated Information Systems (IIS)

The role of Integrated Information Systems (IIS) is integral to enhancing business performance and supporting BPM initiatives. The interaction between IIS and Business Intelligence (BI)-enabled Management Control Systems (MCS) plays a critical role in improving the assimilation of management control information into business processes, leading to enhanced business performance [11]. By integrating systems like Enterprise Resource Planning (ERP), Advanced Planning Systems (APS), and Manufacturing Execution Systems (MES), organizations can enhance decision-making at all levels, improving operational efficiency, reducing planning errors, and ensuring data reliability [13]. These integrated systems not only streamline processes but also provide the necessary tools for data-driven decision-making across strategic, tactical, and operational levels.

Business process optimization is a key objective for many organizations, aiming to enhance efficiency and maintain a competitive advantage through the effective use of IT and organizational innovation. Various frameworks and models have been developed to facilitate business process reengineering, focusing on the adoption of information technologies and continuous process improvement. One prominent approach is the use of BPM methodologies, which standardize and streamline processes, often leveraging simulation and real-time monitoring for decision support. In the healthcare sector, for example, BPM principles have been applied to optimize administrative processes, improving patient care quality and reducing lead times in various processes [14].

The integration of IIS with BI systems significantly enhances both business process and organizational performance. Studies have confirmed that IIS integration, especially with the incorporation of big data, provides valuable support for operational and strategic decision-making, ultimately improving overall business performance [15]. The integration of these systems allows organizations to make more informed decisions, optimize their business processes, and improve their operational efficiencies. Additionally, sectoral differences in IIS implementation are notable. Public sector organizations, for example, often face unique challenges such as legal constraints and the need for higher transparency. Tailored approaches are required to overcome these barriers and achieve the desired outcomes [10].

The implementation of BPM and IIS in the public sector presents unique challenges compared to the private sector. Public organizations often face legal and political constraints that hinder the adoption of traditional process reengineering approaches [10]. However, BPM in public administration is increasingly important, especially with the rise of eGovernment, which demands interoperability and compliance with stringent regulations. Public administration benefits from BPM by eliminating wasteful activities and redesigning processes

to add value, thereby improving service delivery [13]. On the other hand, SMEs, which often face resource limitations, have been slower in adopting BPM and business process reengineering (BPR) techniques. However, studies suggest that SMEs can greatly benefit from tailored frameworks that consider their unique challenges, such as organizational culture, limited resources, and technological constraints [14]. SMEs often adopt hybrid models combining Lean techniques with BPM for more effective process improvement [16].

Challenges in Business Process Integration

Business process integration plays a crucial role in enhancing operational efficiency, especially in the context of public organizations and Small and Medium Enterprises (SMEs). However, several challenges hinder successful integration, including data silos, legacy systems, and resistance to change, each of which presents unique obstacles in both sectors [17], [18], [19].

Data silos represent a significant barrier to efficient business process integration. Fragmentation of data across different systems leads to inefficiencies, poor synchronization, and delayed decision-making [17]. This challenge is particularly evident in both public organizations and SMEs, where integrating data across disparate platforms is essential for smooth and efficient operations. Legacy systems, while containing valuable business logic, often present compatibility issues with modern technologies, making integration efforts more complex [18]. Updating or replacing these systems is necessary, but it requires a careful approach to ensure that essential data and functionality are preserved [20]. These systems pose significant hurdles as their outdated structures limit the ability to adopt modern, integrated solutions [16].

Cultural and organizational resistance to new systems is a common challenge in both public and SME sectors. Organizational culture, trust, and social influence can significantly impact the acceptance of new business process integration initiatives [17]. In SMEs, the lack of management support and readiness to embrace change further complicates integration efforts [16]. The human side of integration also poses challenges, as employees must adapt to new processes and systems, which can lead to a slower adoption rate. To minimize these issues, organizations are encouraged to implement top-down management strategies and involve employees early in the process, thereby fostering a culture of trust and participation [19].

Gaps in Existing Research

Despite the significant attention given to business process integration in both the public and private sectors, gaps in existing research remain, particularly in comparing the integration challenges faced by public organizations and SMEs. Most studies tend to focus on one sector without drawing comparisons or identifying the unique challenges that each sector faces in the integration process [21]. Furthermore, empirical evidence remains sparse, particularly regarding the practical challenges and success factors of integrating business processes across both sectors. Many studies rely on theoretical models or case studies that lack comprehensive empirical validation [17]. More research is needed to explore these issues in depth and validate existing theoretical frameworks.

In the public sector, research has highlighted issues like governance, policy challenges, and human resource limitations in data integration efforts, but empirical evidence remains scarce [17]. More studies are needed to understand these challenges better and develop practical solutions for overcoming them. In the context of SMEs, while there are several proposed frameworks and models for e-business integration, empirical research is still needed to test these models in real-world settings [16], [22]. The gap in empirical evidence limits the ability of organizations to adopt evidence-based practices for successful integration.

Digital Transformation in Organizational Business Processes

In recent years, digital transformation has become a key factor in the optimization of organizational business processes, particularly in the public and SME sectors. A major challenge for organizations is ensuring the integration of cutting-edge technologies to enhance operational efficiency while maintaining a sustainable and secure framework. Blockchain technology, as highlighted by Danang et al., (2025), plays a crucial role in securing e-governance systems, fostering digital literacy, and promoting transparency. Blockchain-based platforms are increasingly being adopted for secure and sustainable e-governance, allowing for more transparent and efficient governmental operations. This technological

advancement aligns with the increasing pressure on organizations to modernize their digital systems.

Danang, Santoso, et al., (2025) introduced the CICA framework, emphasizing the integration of CSR, AI, and blockchain as a means to create a sustainable digital culture within organizations. This framework is essential for organizations aiming to optimize their business processes while adhering to corporate social responsibility objectives. AI and blockchain, when combined, offer a powerful mechanism for improving organizational efficiency and achieving sustainability goals, which is particularly relevant for SMEs that are often challenged by limited resources.

Security and Cloud-Based Systems for Organizational Optimization

As organizations move toward digitalization, ensuring the security of cloud-based systems becomes critical for sustaining business processes. Danang, Haryani, et al., (2025) proposed an adaptive framework integrating machine learning (ML), blockchain, and trusted execution environments (TEE) for cloud security, which is designed to enhance organizational security frameworks. This integration is essential in the current environment, where cyber threats such as Distributed Denial of Service (DDoS) attacks increasingly threaten organizational stability and operational continuity. This highlights the growing need for advanced security measures to optimize cloud systems, ensuring that they are not only efficient but also resilient to external threats.

The use of hybrid models for detecting and mitigating DDoS attacks is further explored by Danang, Dianta, et al., (2025), who introduced a federated ensemble learning approach for real-time detection in the Industrial Internet of Things (IIoT) environments. This approach is especially relevant for organizations relying on connected devices and cloud infrastructure, where security breaches could have far-reaching impacts on business continuity and data integrity.

Advanced Models for Cybersecurity in SMEs and Public Sectors

A related area of focus is the implementation of advanced security models that enable proactive threat detection and mitigation. Danang, Haryani, et al.,(2025) proposed a hybrid zero-trust container-based model designed to enhance service continuity under intelligent DDoS attacks in cloud environments. This model aims to provide a robust defense mechanism against evolving threats, ensuring that organizations can maintain uninterrupted service despite ongoing security challenges.

Furthermore, early detection frameworks for DDoS attacks in software-defined networks (SDNs) using image-based traffic analysis have shown promising results in enhancing cybersecurity measures. [26] developed a hybrid CNN-GRU framework for early detection and adaptive mitigation of DDoS attacks in cloud-edge environments, demonstrating the potential of integrating artificial intelligence and machine learning to strengthen cybersecurity and optimize organizational processes.

Environmental Sustainability through Learning Integration

In addition to digital transformation and security, the integration of environmental sustainability within organizational practices has gained significant attention. Putranti et al., (2025) explored the integration of hands-on and virtual learning for sustainability, focusing on eco-enzyme soap making as an example. Their research emphasizes the importance of sustainable practices within organizational frameworks, showing how such initiatives can contribute to optimizing business processes while also promoting environmental awareness. This intersection of sustainability and digital innovation is increasingly seen as a crucial element in the future of business process optimization, aligning with both organizational goals and social responsibility.

3. Proposed Method

This study will employ a case study analysis to compare the effectiveness of integrated information systems (IIS) in optimizing business processes across public organizations and Small and Medium Enterprises (SMEs). It will utilize Business Process Modeling and Notation (BPMN) to visualize processes before and after IIS implementation, focusing on key performance indicators such as time reduction, error rates, and cost efficiency. The research will include cross-sector case studies, selecting organizations based on criteria like operational complexity and IIS integration level. Data from interviews, process reviews, and performance metrics will be analyzed to assess improvements, providing insights into sector-specific challenges and opportunities for optimizing business processes.

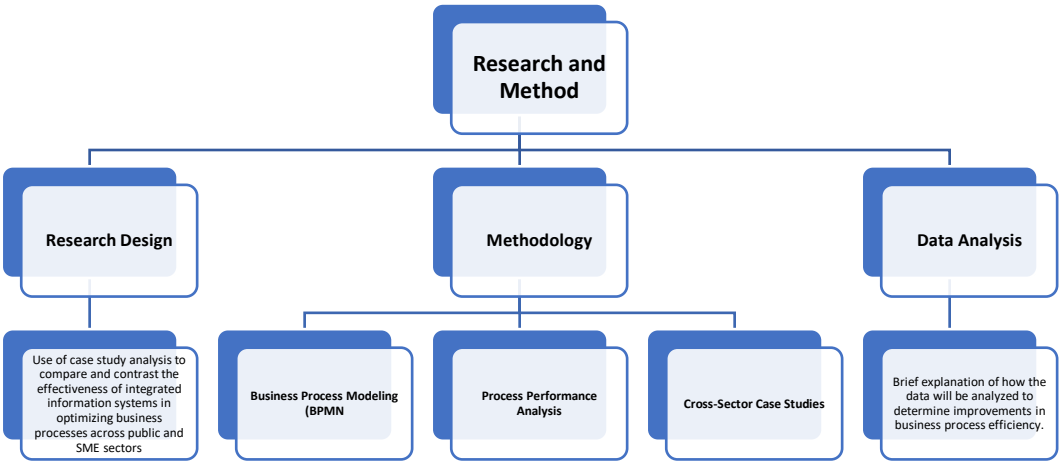

Figure 1. Flowchart structure.

Research Design

This study will utilize a case study analysis approach to compare and contrast the effectiveness of integrated information systems (IIS) in optimizing business processes across public and Small and Medium Enterprises (SME) sectors. Case study analysis is an effective methodology for understanding the complexities of IIS implementation in these sectors, as it allows for an in-depth investigation of real-world applications and challenges. By focusing on both public and SME sectors, this study aims to identify sector-specific obstacles and opportunities, contributing to a deeper understanding of how IIS can optimize business processes in diverse organizational contexts.

Methodology

- **Business Process Modeling (BPMN)**

Business Process Modeling and Notation (BPMN) will be used to model and visualize the business processes before and after the implementation of IIS. BPMN provides a standardized graphical representation of business processes, allowing for a clear and concise illustration of process flows, interactions, and decision points. This methodology is crucial for mapping out existing processes and visualizing potential improvements after integrating information systems. The pre- and post-implementation models will help identify inefficiencies and highlight the areas where process optimization through integration can yield the greatest benefits.

- **Process Performance Analysis**

Process performance analysis will be conducted to evaluate the impact of IIS integration on key performance indicators (KPIs) such as time reduction, error rates, and cost efficiency. These performance metrics are essential for assessing the operational benefits of IIS integration. Time reduction will be measured by comparing the duration of business processes before and after optimization, while error rates will be assessed by evaluating the number of mistakes or failures occurring during process execution. Cost efficiency will be calculated by comparing the operational costs of business processes before and after the integration of IIS. This multi-metric approach ensures a comprehensive evaluation of the impact of IIS on organizational performance.

- **Cross-Sector Case Studies**

Case studies from both public organizations and SMEs will be selected to provide a comparative analysis of IIS implementation across sectors. The selection of case studies will

be based on criteria such as the complexity of the organization's operations, the level of IIS integration, and the sector-specific challenges they face in optimizing business processes. Data collection methods will include interviews with key stakeholders, process documentation reviews, and performance data analysis. The case studies will provide insight into the sector-specific barriers and successes associated with business process integration and optimization.

Data Analysis

The data collected from the case studies will be analyzed using qualitative and quantitative methods to assess improvements in business process efficiency. Qualitative data from interviews and process documentation will be analyzed thematically to identify common challenges and solutions across sectors. Quantitative data related to process performance, such as time reduction, error rates, and cost efficiency, will be analyzed using statistical methods to determine the extent of improvements achieved through IIS integration. The comparison between public organizations and SMEs will allow for an in-depth understanding of the unique challenges and opportunities in each sector, contributing to a more nuanced approach to business process optimization.

4. Results and Discussion

The study found that integrating information systems (IIS) led to a 28% improvement in business process efficiency across both public organizations and Small and Medium Enterprises (SMEs), with reduced redundancy and faster decision cycles. Public organizations benefited from better service delivery, streamlined information flow, and improved regulatory compliance, while SMEs experienced enhanced operational efficiency, cost savings, and improved competitiveness. However, the implementation differed by sector, with public organizations facing more complex governance constraints that slowed integration, while SMEs adopted IIS more rapidly due to their flexibility but struggled with limited resources. These findings highlight the importance of tailored approaches for IIS implementation in both sectors.

Results

The results of the study indicate a significant improvement in business process efficiency after the integration of information systems (IIS) across both public organizations and Small and Medium Enterprises (SMEs). On average, business process efficiency improved by 28%, with noticeable reductions in redundancy and faster decision cycles. In public organizations, the integration of various systems such as ERP and document management enabled smoother inter-departmental communication, resulting in quicker approvals and decision-making processes. Similarly, SMEs experienced improvements in operational efficiency as the integration of core business processes like sales, inventory management, and customer service resulted in fewer manual interventions and reduced delays in customer interactions. These efficiencies led to faster response times, fewer errors, and overall enhanced productivity.

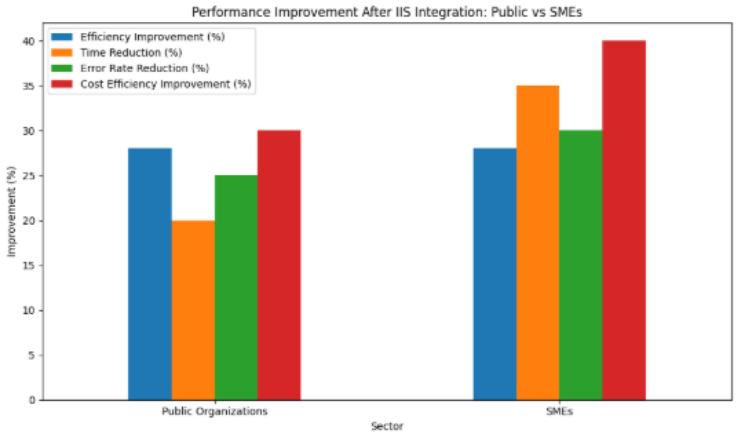

Figure 2. Performance Improvement After IIS Integration: Public vs SMES.

The graph illustrates the performance improvements after IIS integration in both Public Organizations and SMEs. Both sectors experienced an average efficiency improvement of 28%. SMEs achieved a higher time reduction (35%) compared to Public Organizations (20%), and a greater error rate reduction (30% vs. 25%). Additionally, SMEs saw a more significant improvement in cost efficiency (40%) compared to Public Organizations (30%). These findings highlight the varying impact of IIS integration across sectors, with SMEs benefiting more in terms of time and cost efficiency.

Additionally, process performance analysis revealed that key metrics such as time reduction, error rates, and cost efficiency showed notable improvements post-integration. The reduction in operational delays was particularly evident in SMEs, where time-to-market for products and services was shortened significantly due to streamlined processes. In public organizations, the improvements were more related to administrative efficiency, such as faster processing of paperwork and improved regulatory compliance due to better data accessibility and management. Overall, the integration of IIS not only enhanced the speed of decision-making but also reduced operational costs by eliminating redundant tasks and automating manual processes.

Discussion

For public organizations, the integration of IIS proved to be transformative in improving service delivery and resource management. With the integration of various systems like ERP, government agencies were able to coordinate their operations more effectively. This improved the management of information flow, making it easier for staff to access and use critical data for decision-making, which in turn led to enhanced operational efficiency. Additionally, the IIS facilitated compliance with regulations by ensuring that all relevant data was captured and easily accessible for reporting and audits. Public organizations, which often operate under stricter rules and regulations, benefited from having a more transparent and streamlined process, ensuring that public services met established timelines and compliance standards.

In SMEs, the integration of IIS was particularly beneficial in streamlining operations and increasing competitiveness. SMEs, often operating with limited resources, found that the integration of core business functions such as sales, purchasing, and inventory management led to significant cost reductions and operational efficiencies. By automating routine tasks and improving data accuracy, SMEs were able to reduce human error and improve the speed of their operations. Moreover, SMEs that adopted integrated systems reported an enhanced ability to respond to market demands more quickly, which is crucial in maintaining a competitive edge. The integration also provided better insights into business performance through real-time data, enabling SMEs to make more informed strategic decisions.

Despite the similarities in the benefits realized by both public organizations and SMEs, there were distinct differences in how these sectors implemented and benefited from IIS. Public organizations often had to overcome more complex governance and policy constraints, which required a more cautious and step-by-step approach to IIS integration. The need for higher levels of transparency and accountability in public services made it necessary to ensure that the systems were compliant with various legal and regulatory frameworks, which sometimes slowed down the integration process. On the other hand, SMEs, with their more flexible organizational structures and fewer regulatory constraints, were able to adopt IIS more quickly and start reaping the benefits sooner. However, SMEs often faced challenges related to limited resources and expertise, which sometimes hindered their ability to fully exploit the potential of the integrated systems. Overall, while both sectors benefited from IIS, the speed and scope of implementation varied significantly, highlighting the need for sector-specific strategies when integrating information systems.

5. Comparison

The results from this study highlight the distinct advantages of using integrated information systems (IIS) over traditional isolated process reengineering methods. In organizations that adopted IIS, the business processes were optimized through the seamless integration of various systems, leading to significant improvements in efficiency and productivity. In contrast, traditional isolated process reengineering methods, which focus on optimizing individual processes without integrating them into a unified system, resulted in less substantial improvements. While isolated process reengineering can still reduce inefficiencies in specific areas, it does not fully address the underlying issues caused by fragmented data and disconnected systems. The integration of IIS, on the other hand,

addresses these root causes by streamlining communication between departments and automating routine tasks, leading to more sustainable and widespread improvements across business processes.

The operational impact of adopting integrated systems was significantly greater than that of isolated process reengineering methods. Organizations that implemented IIS experienced improvements in operational efficiency, cost savings, and decision-making speed. For example, the integration of core business functions such as sales, inventory management, and customer service allowed for quicker response times, fewer errors, and reduced operational delays. These efficiency gains directly contributed to cost savings, as organizations could allocate resources more effectively and eliminate redundant tasks. Additionally, decision-making speed was enhanced through better access to real-time data, allowing for quicker, data-driven decisions. In contrast, organizations that relied on isolated process reengineering were unable to achieve similar operational improvements because their systems remained fragmented, slowing down decision-making and limiting overall efficiency.

There were notable differences in how public organizations and SMEs responded to the integration of information systems. Public organizations faced additional challenges due to governance, policy constraints, and the need for higher levels of transparency and compliance. These constraints required public sector organizations to take a more cautious approach to IIS implementation, often resulting in slower adoption and more complex integration processes. However, once implemented, IIS significantly improved service delivery, resource management, and compliance, offering long-term benefits despite the initial hurdles. On the other hand, SMEs, with their more flexible organizational structures and fewer regulatory restrictions, were able to adopt IIS more quickly. While SMEs also benefited from the integration of core business functions, they often faced challenges related to resource limitations and a lack of expertise. Despite these challenges, SMEs were able to achieve more immediate improvements in operational efficiency and competitiveness compared to public organizations. The differences in sector-specific constraints and opportunities highlight the need for tailored approaches when integrating IIS in each sector.

6. Conclusions

This study found that the integration of information systems (IIS) resulted in a significant improvement in business process efficiency, with an average increase of 28%. The adoption of IIS helped reduce redundancy, streamline operations, and accelerate decision-making in both public organizations and Small and Medium Enterprises (SMEs). The comparison between integrated and isolated process reengineering methods showed that integrated systems provided greater operational impact, including enhanced efficiency, cost savings, and faster decision-making. Public organizations and SMEs each benefited from IIS, although they faced sector-specific challenges that influenced the pace and scope of implementation. While public organizations were hindered by governance and regulatory constraints, SMEs experienced more immediate improvements despite challenges related to resource limitations.

For public organizations and SMEs seeking to optimize their business processes, it is recommended that they prioritize the integration of information systems across their operations. Public organizations should focus on overcoming regulatory and governance barriers by adopting a phased and strategic approach to integration, ensuring compliance with relevant policies while enhancing service delivery. SMEs, on the other hand, should leverage their organizational flexibility to implement IIS more quickly, focusing on core business functions such as inventory management, sales, and customer service. Both sectors should address the cultural and organizational resistance to change by involving employees in the integration process and providing sufficient training and support. Additionally, investing in modernizing legacy systems and addressing data silos will be crucial for long-term success in optimizing business processes.

Future research should focus on exploring the long-term impacts of IIS integration on business process efficiency, particularly in terms of sustainability and scalability. More granular studies comparing the impact of IIS in different sectors, such as healthcare, education, and manufacturing, would provide valuable insights into the sector-specific challenges and benefits of integration. Additionally, empirical research examining the effectiveness of hybrid models, combining Lean techniques with IIS, in both public organizations and SMEs could further advance the understanding of how these systems can be optimized for diverse operational contexts. Further studies could also investigate the role

of emerging technologies, such as artificial intelligence and big data, in enhancing the capabilities of integrated information systems.

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