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The Relative Importance of Key Factors for Integrating Enterprise Resource Planning (ERP) Systems and Performance Management Practices in the UAE Healthcare Sector

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Abstract: This study examines integrating Enterprise Resource Planning (ERP) systems with performance management (PM) practices in the UAE healthcare sector, identifying key factors for successful adoption. It addresses a critical gap by analyzing the interplay between ERP systems and PM to enhance operational efficiency, patient care, and administrative processes. A literature review identified thirty-six critical factors, refined through expert interviews to highlight nine weak integration areas and two new factors. An online survey with 81 experts, who rated the 38 factors on a five-point Likert scale, provided data to calculate the Relative Importance Index (RII). The results reveal that employee involvement in performance metrics and effective organizational measures significantly impact system effectiveness and alignment. Mid-tier factors such as leadership and managerial support are essential for integration momentum, while foundational elements like infrastructure, scalability, security, and compliance are crucial for long-term success. The study recommends a holistic approach to these factors to maximize ERP benefits, offering insights for healthcare administrators and policymakers. Additionally, it highlights the need to address the challenges, opportunities, and ethical considerations associated with using digital health technology in healthcare. Future research should explore ERP integration challenges in public and private healthcare settings, tailoring systems to specific organizational needs.

1. Introduction

Due to the dynamic and competitive environment of industries, organizations have recognized the criticality of implementing efficient processes. In today's increasingly interconnected and complex markets, operational performance, precise data management, and well-informed decision-making have become essential requirements [1]. As such, organizations must establish appropriate processes and systems to effectively address these challenges. Because of the increasing awareness of the importance of seamless data integration across different departments, Enterprise Resource Planning (ERP) solutions have become essential for improving operational efficiency [2]. These systems enable the integration of data from different departments, ensuring consistent access to information throughout the entire organization. The comprehensive integration of various factors is essential for facilitating better decision-making and strategic planning. As a result, ERP systems have become an essential tool across multiple industries [3].

ERP systems are advanced information systems specifically developed to effectively manage and coordinate all the resources, data, and operations necessary for efficient organization operations [4]. These systems integrate multiple operations, including finance, human resources, manufacturing, materials management, and sales and distribution, into a single software platform. This platform successfully adapts to different organizational

requirements through specialized ERP modules [5]. Moreover, ERP systems can reduce costs in operational and administrative procedures by improving process optimization. This optimization can enhance reporting and planning capabilities, enabling firms to conveniently generate customized reports and facilitate improved analysis across departments [6]. Hence, the integrated database in ERP systems facilitates a single approach to exchanging data across the firm, thereby improving collaboration, and eliminating isolated information within departments [7]. In contrast, ERP systems have a high degree of scalability and can be conveniently adapted to include new business initiatives and departments as an organization expands, therefore providing a practical long-term investment [8]. It serves an important role in supporting organizations in maintaining regulatory compliance through the use of technologies designed specifically to monitor and control compliance to laws and regulations, thus minimizing compliance risks [9]. In addition, ERP systems improve customer service by offering improved access to customer data, consequently enhancing customer relationship management initiatives [10].

On the other hand, organizations are required to continuously enhance their performance to maintain an integrated system to retain their position in the market [11]. Consequently, performance management (PM) is extensively implemented in many sectors. This approach emphasizes process optimization and aligning improvements with customer satisfaction, resulting in economic advantages for stakeholders and shareholders [12]. Consequently, PM serves as a comprehensive framework for value creation that aids in decision-making and planning, utilized by organizations through various strategies to achieve their objective [13]. This framework integrates operational and financial information, employing multiple methodologies such as strategy mapping, balanced scorecards, costing, forecasting, and planning for resource capacity needs. Despite this, PM is frequently viewed as a human resources and personnel system for individual employees [14]. In contrast, the essence of PM lies in its methodologies, metrics, processes, software tools, and systems that oversee the performance of an entire organization, aiming to generate value for customers, stakeholders, and employees. Additionally, within any organization, two principals in performance management business processes are defined: the front office system, focused on customer satisfaction, and the back-office system, focused on administrative tasks [15]. The most widespread systems employed in the back office is the ERP system, identifying itself as the backbone of the PM framework for value creation [16].

In today's competitive business environment, efficient and strategic management decisions necessitate effective ERP systems. The healthcare sector is similarly affected by this requirement [17]. Heavily reliant on customer data, pharmacies, and other service provision processes, the healthcare industry is exploring new methods to enhance service quality in response to increasing service demands [18]. This growing demand has not only intensified competition among healthcare providers but also led these organizations to modify their strategies recently, aiming to improve the effectiveness and productivity of their service delivery [19]. Such changes highlight the critical importance of enhancing performance management within healthcare, particularly the back-end operational efficiencies that are vital for achieving these objectives and adding value for customers [20]. Consequently, enhancing ERP systems has emerged as not merely beneficial but essential in the field of healthcare, with the need of integrating various operations such as finance, healthcare personnel management, medical supply chain management, and patient care into a unified and effective system [21].

In general, ERP solutions are considered as a potential breakthrough in enhancing performance management in organizations [22]. However, the successful implementation and effectiveness of these systems can be influenced by various factors. Particularly, a significant number of ERP projects demonstrate poor success rates, with 75% of these implementations failing, which raises challenges concerning the effective integration of these systems and their influence on PM [23]. While the challenges and benefits of implementing ERP systems are widely recognized [24] and PM is well-defined through structured approaches that incorporate a range of tools aimed at enhancing organizational effective-

ness [14], the integration of both ERP systems and performance management is a complex endeavor that involves multiple factors and drivers [25]. This complexity highlights a gap in understanding the key drivers and factors that influence the successful integration of ERP systems with performance management processes. Therefore, this study aims to assess this gap, examining the drivers and the factors that impact the effective adoption and integration of ERP systems and their role in supporting robust performance management.

The general architecture of systems that integrate ERP and performance management involves several interconnected layers, each playing a crucial role in ensuring a smooth data flow and comprehensive analytics. At the core of this architecture lies the ERP system [26]. This system collects and processes vast amounts of operational data, which are then funneled into the data integration layer. This layer is essential for harmonizing data from various ERP modules and ensuring they are ready for analysis and performance evaluation. Above the data integration layer is the performance management layer, which includes tools for financial planning, budgeting, forecasting, and reporting. This layer uses advanced analytics and business intelligence (BI) tools to monitor key performance indicators (KPIs) and gain insights from the data. It is closely connected to the data visualization layer, providing interactive dashboards and reports [27]. The final component is the user interface layer, where end-users interact with the system. This layer is designed to be intuitive, providing executives, managers, and analysts with easy access to real-time data and insights. Through this architecture, organizations can seamlessly align their operational data with performance metrics, facilitating more informed decision-making and strategic planning [26].

Several studies were conducted on ERP systems in the healthcare sector and their impact on the organization's performance [28]. These studies have extensively investigated the implementation and impacts of ERP systems in the healthcare sector, focusing on various aspects such as efficiency, patient care, financial management, and supply chain costs. However, these studies do not directly link ERP system implementations with performance management practices within healthcare organizations [29]. This disconnect represents a significant gap in the research, underscoring the need for further exploration into how ERP systems could be effectively integrated with performance management practices to optimize healthcare operations and outcomes [30].

In this regard, the United Arab Emirates (UAE) has experienced significant growth in the healthcare sector, where the healthcare system is a key priority in its agenda. The government continues to seek advancements across an integrated healthcare framework that emphasizes institutional and service quality, resource utilization, cost control, and tangible health outcomes for its population [31]. This includes implementing comprehensive medical reforms and renovations, fostering private sector involvement, and clearly delineating between regulatory bodies and healthcare delivery organizations. However, The UAE faces numerous challenges in implementing both Electronic Medical Records (EMRs) and Health Information Systems (HISs). Technical barriers include inadequate infrastructure, data loss risk, and software complexity. Human resource barriers include lack of computer knowledge, lack of experienced professionals, and unawareness of HIS benefits. Organizational barriers include resistance to transition, lack of integration, and insufficient management support. Legal and regulatory barriers involve system compatibility and uniform standards, while privacy and confidentiality concerns affect trust between healthcare professionals and patients. Financial barriers include high costs for HIS setup and maintenance, and cultural and psychological barriers can lead to discomfort and dissatisfaction among healthcare providers [32]. Given these challenges, it becomes important to comprehensively understand the currently employed systems and see how those systems are linked to the healthcare ERP system, evaluate how it interacts with performance management practices, and understand the factors that contribute to the successful implementation of ERP systems within healthcare in the UAE with the goal of enhancing performance management.

Therefore, the primary objective of this study is to explore the integration of ERP systems with performance management practices within the healthcare sector in the United Arab Emirates (UAE), focusing on identifying and assessing the key drivers and factors that influence their successful adoption and functionality in the UAE's unique context. A notable research gap identified is the insufficient linkage between ERP implementations and PM practices in healthcare, an oversight that this research aims to rectify. The relevance and impact of these factors will be thoroughly examined, offering valuable practical insights that contribute to the existing knowledge base. The expected outcomes include a ranking of factors that address integration challenges and enhance operational performance, establishing a benchmark for future ERP implementations in healthcare environments.

This research aims to address the above gaps by investigating the following questions:

- RQ1—How do ERP systems impact the efficiency and effectiveness of performance management in healthcare settings?
- RQ2—What challenges do healthcare organizations face during the implementation of ERP systems aimed at enhancing performance management?
- RQ3—What are the key factors influencing the successful integration of ERP systems with performance management practices in healthcare organizations?
- RQ4—What are the most critical factors for the successful integration of ERP systems with performance management practices in healthcare organizations within the UAE healthcare sector?

This research contributes to the existing body of knowledge by providing a detailed analysis of the interplay between ERP systems and performance management within healthcare settings. It aims to bridge the identified gap by detailing how ERP systems can be effectively integrated with PM practices to enhance operational efficiencies, improve patient care, and streamline administrative processes. The novelty of this research lies in its systematic approach to investigating the unique factors that facilitate the integration of ERP systems with performance management practices, specifically in healthcare. This is significant as it provides a targeted insight into optimizing ERP deployments to maximize system capabilities and support performance management, a relatively underexplored area in healthcare management research.

Theoretically, this study enhances the understanding of the dynamic interplay between technological integration and performance management, providing a framework that can be used to examine other sectors. Practically, it offers healthcare administrators and policymakers actionable insights into deploying ERP systems more effectively, aligning them with performance management objectives to achieve better healthcare outcomes and operational excellence. This research not only contributes to academic discourse but also serves as a guide for practitioners looking to implement integrated systems within complex healthcare environments.

This paper is organized into four main sections to guide the research systematically. The first section provides a detailed literature review, exploring the current use of ERP systems within healthcare organizations and examining existing performance management research in the field, with an emphasis on identifying the factors that influence both to maximize their benefits and values in healthcare organizations. The second section describes the methodology employed in the study. The third and fourth sections present the analysis of findings and the conclusions drawn from the research, respectively.

2. Literature Review

This section systematically examines existing research on the implementation of ERP systems and performance management practices within healthcare, with a focus on their integration and the factors influencing this process. Initially, the deployment and implementation of ERP systems across different healthcare contexts are detailed, emphasizing their functions and impact on various operational aspects. Subsequently, performance management practices within the healthcare industry are explored, highlighting their current applications and the challenges and opportunities they present. The integration of

ERP systems with these practices is then critically analyzed, identifying gaps and potential benefits, concluding with a focus on the UAE context and the factors that influence the integration of ERP systems and PM practices. This structured approach is informed by foundational texts and peer-reviewed articles, providing a comprehensive overview that addresses the study's objectives and fills the identified literature gaps.

ERP systems support various business functions, including manufacturing, supply chain management, financials, and customer relationship management. ERP systems are known for streamlining processes, improving efficiency, and providing accurate and reliable information networks [33,34]. ERPs were initially designed to address the needs of manufacturing industries. The evolution of enterprise systems (ESs) reflects a continuous development process aimed at improving business process integration, particularly in manufacturing environments [35,36]. As outlined in [35], the first significant breakthrough in enterprise systems was the development of Material Requirements Planning (MRP), which later evolved into Manufacturing Resource Planning (MRP II), and eventually into Enterprise Resource Planning (ERP) systems. These systems were primarily designed to integrate various business planning processes, including logistics and manufacturing. Over time, ERP systems have been adapted for use in a wide range of industries beyond manufacturing, including healthcare and the food industry. The transition from a manufacturing-focused system to a more generalized tool involved the integration of additional modules and functionalities tailored to the specific needs of other industries.

For example, in the food industry, ERP systems have been used in various industries, including food manufacturing and healthcare. In food manufacturing, they streamline processes, ensure a smooth supply chain, and support unique requirements like traceability and food safety compliance [35]. ERP systems like SAP ERP have been used in healthcare to improve efficiency and streamline operations. However, their manufacturing roots can pose challenges when applied to service industries like hospitals. For example, a large university hospital's ERP system failed to optimize operation room utilization due to micropolitical dynamics, highlighting the rigid structure of ERP systems that may not be as effective in environments where human factors and micropolitics are significant. This example demonstrates that the rigid structure of ERP systems, which works well in manufacturing, may not be as effective in environments where human factors and micropolitics play a significant role [36].

While ERP systems have successfully transitioned from their manufacturing origins to be applied in various industries, their effectiveness in service contexts like healthcare can be limited by their inherent design, which may not fully account for the complexities of human behavior and organizational politics. The adaptability and customization of ERP systems are essential in overcoming these challenges, but they require a careful consideration of the unique dynamics of each industry.

2.1. ERP in Healthcare

Within the healthcare industry, ERP systems can be referred to by several names that reflect their specific uses within the sector [37]. For instance, these systems are commonly referred to as Healthcare Information Systems (HISs), which typically encompass systems specifically built to oversee every aspect of hospital information processing, from patient data to administrative duties [17]. Clinical Information Systems (CISs) highlight the systems' focus on clinical matters such as treatment and diagnosis. These systems integrate capabilities that specifically correspond to the operational demands of the medical staff [38]. Furthermore, when these systems oversee every aspect of hospital operations, involving administrative activities and patient care, they are commonly known as Hospital Management Systems (HMSs) [39]. As [40] clarified, the naming of these systems can differ based on their particular purpose and the extent to which they are integrated within a healthcare facility. This underscores the wide range of uses of ERP systems in improving healthcare delivery and operational effectiveness.

ERP systems in healthcare organizations act as a central framework for consolidating and streamlining processes and data flows among various information systems used in healthcare settings such as Hospital Information Systems (HISs), Laboratory Information Systems (LISs), Radiology Information Systems (RISs), Decision Support Systems (DSSs), Pharmacy Information Systems (PISs), electronic health records (EHRs), Revenue Cycle Management (RCM), customer relationship management (CRM), Supply Chain Management Systems (SCMSs), and Picture Archiving and Communication Systems (PACSs), as shown in Figure 1. This interconnectivity underscores the benefits that an ERP system can bring to a healthcare organization, emphasizing its crucial role as the backbone of the facility's information ecosystem [41].

The analysis of ERP systems in the healthcare industry reveals many benefits, including its potential to significantly enhance operational efficiency and patient management. In particular, ERP solutions facilitate the integration of various healthcare operations, resulting in enhanced decision-making capabilities and the comprehensive management of patient care [17]. In addition, ERP systems have been commended for their ability to optimize processes, improve the exchange of data between departments, and eventually improve the operational effectiveness of healthcare organizations [42].

Numerous research findings indicate a range of advantages associated with the implementation of ERP systems within healthcare sittings. For instance, a study conducted by [43] highlights that ERP systems have been shown to significantly improve resource management and patient data handling in the healthcare system of Trans-Nzoia County, leading to more effective healthcare delivery. Furthermore, a recent empirical study found that ERP systems in hospitals resulted in a more efficient supply chain and a statistically significant correlation between their adoption and improved healthcare delivery outcomes. ERP systems also contribute to operational efficiency and the quality of patient care in healthcare organizations [44]. Furthermore, A comprehensive analysis of ERP system integration in healthcare settings showed that they aid in decision-making processes and provide high-quality healthcare services. ERP systems offer the necessary framework for thorough data analysis and management, which is crucial in the healthcare sector [43]. The implementation of ERP systems in healthcare has demonstrated their ability to enhance operations across various departments, such as warehouse management, integration with electronic health records, user interface redesign for dental clinics, pharmacy supply management, nursing education support, and the coordination of radiological activities [44].

Although ERP systems provide various advantages to healthcare systems, implementing them can be difficult. These systems frequently require significant modifications to accommodate the specific needs of healthcare settings [43]. ERP systems, while being powerful optimization tools, also pose significant implementation challenges in the healthcare sector due to their dual nature, which can be complex and expensive to integrate and maintain. This is demonstrated by [45], where the authors highlighted the challenges faced by healthcare organizations in integrating ERP systems, highlighting the need for significant modifications to meet specific requirements, potentially impacting patient care and data integrity. The costs of ERP system adoption and the cost of educating healthcare professionals on using advanced systems can also have financial consequences. This can lead to extended adjustment periods, reducing healthcare delivery efficiency and effectiveness. Customization is also a significant challenge, particularly for efficient patient information management and compliance with regulations [46]. Customization is a costly process that not only extends the amount of time required to implement the ERP system, but also has the potential to cause delays that can disrupt the delivery of services and patient care.

Implementing an ERP system in a healthcare company presents numerous challenges, including operational issues like user unwillingness and data entry mistakes, as well as managerial difficulties in data analysis and forecasting [47]. Cultural resistance and security issues can also pose challenges, as employees may struggle to adjust to the new system due to workplace changes. Technical challenges, such as system downtimes and integration

with existing systems, can lead to discrepancies between the ERP system's functionality and the organization's strategic objectives [48]. To address these issues, a holistic approach involving careful planning, continuous training, technical assistance, and stakeholder involvement is necessary. This ensures that the ERP system aligns with the company's long-term objectives and contributes to operational efficiency and scalability [49].

However, despite the documented benefits of ERP applications in specific healthcare departments, there remains a considerable gap in system-wide integration, leading to a fragmented network that falls short of optimizing healthcare service effectiveness and efficiency [50]. This highlights the compartmentalized nature of ERP deployments, underscoring that the services provided by different healthcare departments using ERP systems remain isolated, failing to capitalize on the advantages of a fully integrated system-wide data flow [51].

In order to address these gaps, challenges, and enhance the comprehensive integration of ERP systems in healthcare, it is essential to put emphasis on certain key factors. At the forefront of these factors is the key role of top management support. According to [52], top management's commitment and engagement are crucial for securing resources and fostering the organizational acceptance of the ERP project. This strong leadership aligns the ERP initiative with the organization's strategic objectives, mobilizing the entire organization towards the adoption of the new system. Clear objectives and requirements are also essential for successful management support. According to [53], this unified vision of the project's goals is crucial for steering the project in the right direction and evaluating its success against predefined benchmarks. Another critical factor is the alignment with business processes [54], where integrating an ERP system with existing business processes is crucial for a seamless flow of information and operational continuity. However, challenges can disrupt the data flow and create bottlenecks, often due to technical incompatibilities, data format discrepancies, or a lack of a coherent integration strategy. This fragmentation can undermine the objectives of implementing an ERP system, such as improving efficiency and providing a unified view of organizational operations [55]. Furthermore, [56] reveals that the implementation of ERP systems significantly impacts firm performance. Factors such as the system's source and chosen implementation strategy significantly influence performance enhancements. Companies that choose customized ERP solutions report greater benefits due to their tailored fit with their specific processes and needs. Effective project management and meticulous planning are crucial for successful implementation in healthcare settings. Clear timelines, key milestones, and clear responsibilities are essential for the management process. Therefore, the choice of a customized ERP solution is essential for achieving performance enhancements. A well-orchestrated approach ensures that all phases of the ERP rollout align with the organization's strategic objectives and operational capabilities [37]. Simultaneously, adherence to regulatory compliance is paramount. The implemented ERP system must conform to the prevailing healthcare regulations and standards. This ensures the protection of sensitive patient information and upholds the quality of healthcare services, which is a legal imperative as well as a best practice [57]. Furthermore, the technological infrastructure of the healthcare facility profoundly influences the efficacy and success of an ERP system. The existing capabilities in terms of hardware and software, as well as the readiness of the IT environment, dictate the performance parameters of the ERP system [58]. An infrastructure that supports the ERP's technological demands is essential for a seamless integration and operation [59].

Moreover, as per [60], to address the human aspect of ERP implementation, effective change management is crucial, and involves strategies to manage resistance, communicate benefits, and ensure smooth transition for employees. Emphasizing clear communication, comprehensive training, and engaging initiatives builds support among the workforce and fosters a positive attitude towards change, allowing the organization to navigate the transformation period with minimal disruption. Moreover, user involvement and training are fundamental [61]. Implementing a system that involves end-users from various departments in the process ensures a smooth transition, builds a sense of ownership, and

ensures adequate training for users to fully utilize the new system. However, customization overload can pose a significant challenge [62]. Another research project highlights that technical competence is crucial for the successful implementation of ERP systems and improved firm performance. It involves managing technical aspects of ERP systems, from design and customization to integration and ongoing support. This expertise ensures that ERP systems are aligned with the firm's specific business processes and needs, adaptable to changing environments and technological advancements. Effectively managing technical challenges allows firms to leverage ERP systems to streamline operations, enhance decision-making, and achieve superior business outcomes. Therefore, investing in technical skills and knowledge development is essential for maximizing the benefits of ERP implementations [63].
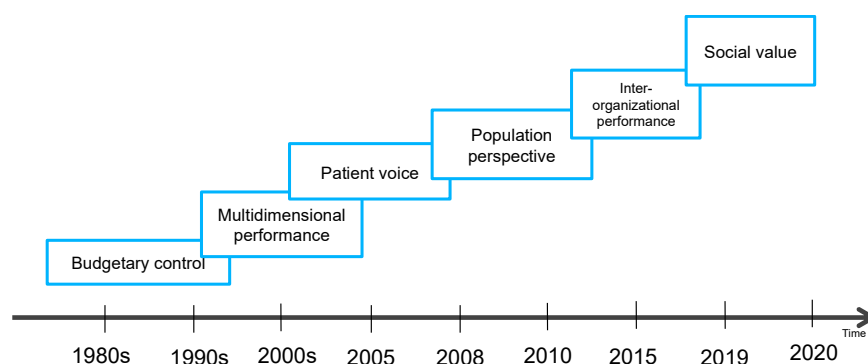
Figure 1. Development of performance management in healthcare: an overview of trends. Source: adapted from [55].

In addition, customizing the ERP system to align with the unique processes and workflows of the organization can significantly enhance productivity and operational efficiency. This alignment ensures that the ERP system acts as a catalyst for achieving greater efficiency, by supporting the organization's strategic goals and adapting to its specific operational needs [64]. Although tailoring the ERP system to meet specific organizational needs is often necessary, excessive customization can lead to unintended consequences. It can complicate the maintenance of the system, making updates and upgrades more cumbersome and risk laden. Furthermore, an overly customized ERP system may hinder scalability, limiting the organization's ability to adapt and grow [55]. Vendor support and expertise also bring invaluable assets to the table during the ERP implementation process. Opting for a vendor known for their strong track record and profound expertise in ERP systems equips the organization with the necessary technical guidance and support. This partnership is crucial for navigating the implementation's technical complexities, from initial customization to ongoing maintenance and support [64]. Furthermore, data quality and migration are paramount for the system's effectiveness. The integrity of data, its accuracy, completeness, and consistency during the ERP system implementation cannot be overstressed. High-quality data underpins reliable decision-making and operational processes, necessitating diligent planning and the meticulous execution of data migration strategies to prevent errors and ensure integrity throughout the system [65]. Lastly, overlooking security and compliance is a risk that can have significant implications. ERP systems, which centralize and manage critical business data, become a focal point for security and compliance concerns. Failure to address these risks can expose organizations to vulnerabilities, such as data breaches, unauthorized access, and non-compliance with regulatory requirements. This can lead to legal penalties, financial losses, and damage to the organization's reputation [66].

In summary, these interconnected factors form the backbone of a successful ERP system implementation. Each factor contributes to a comprehensive framework that addresses the technical, strategic, and human elements of implementing an ERP system, laying the groundwork for transformative organizational efficiency and growth.

2.2. Performance Management in Healthcare

Performance management in healthcare is defined as the framework that aims to optimize the economic value of a healthcare organization while also enhancing the efficiency and effectiveness of its service delivery [67]. The development of performance management in healthcare has been through substantial changes in recent decades, as shown in Figure 1, driven by broader trends in public administration and specific challenges within the healthcare industry. The New Public Management (NPM) movement, which emerged in the late 20th century, initially pushed the integration of private sector practices into public services, such as healthcare. This strategy emphasized efficiency, productivity, and market processes, providing the foundation for early performance management systems that focused on financial outcomes and the volume of services provided. These methods were designed to enhance performance by quantifying outcomes and defining responsibilities within organizational structures. In the early 2000s, the recognition of specific weaknesses and unanticipated results of these initial systems prompted the creation of more advanced performance management systems. These more recent systems were designed to tackle the complex nature of healthcare delivery by integrating many aspects of performance and encouraging cooperation amongst organizations. This move acknowledged the necessity of a more comprehensive assessment of performance that includes patient outcomes and experiences, rather than only focusing on organizational outputs. However, the emergence of alternative frameworks like Public Service Logic (PSL) turns the focus away from NPM's managerialism and market-oriented techniques and toward a more comprehensive view of value co-creation between public service providers and citizens. This viewpoint stresses the significance of relational and network-based governance, in which public institutions are considered as facilitators of value rather than just service providers [68].

The concept of healthcare performance has evolved to include value, resilience, and sustainability. The value-based approach focuses on optimizing patient health benefits while ensuring that resource allocation aligns with patient and community demands. Resilience refers to healthcare systems' ability to adapt to unforeseen crises and disruptions. Healthcare performance management systems now need to consider not only the efficiency and productivity of healthcare professionals but also the quality of treatment, patient satisfaction, and overall health outcomes. This integration requires sophisticated systems that can manage complex data and provide valuable insights into health, enabling strategic decisions aligned with long-term sustainability and resilience goals [69].

The primary objective of most organizations, including healthcare these days, is to maintain their continued existence and success. Hence, an essential component of an organization's ability to survive is the evaluation of its performance [70]. Effective management needs access to accurate and timely real information to make informed decisions [71]. Based on this, assessing the performance of hospitals is considered a crucial element of strategic management in healthcare systems [70]. Performance measurement offers hospital administrations empirical data on current practices, values, beliefs, and assumptions, allowing them to establish a systematic approach to detecting deficiencies and enhancing future performance [71]. Many organizations adopt performance metrics and measurement tools for accurate assessment and the enhancement of performance. The deployment of suitable tools and technologies facilitates the real-time tracking and analysis of performance data, thereby enabling swift, informed decision-making and the ability to make strategic adjustments as necessary [72].

The analysis of performance measurement systems in a specific healthcare context reveals a strategic shift towards capturing long-term outcomes and addressing disparities in care [73]. Clear goals and objectives stand at the forefront of this initiative. The establishment and communication of explicit performance goals are instrumental in guiding employees' efforts towards the organizational aims, significantly boosting productivity and motivation across the board. This clarity serves as a beacon, guiding employees through their roles and contributions towards achieving collective success [74]. From another perspective, the inconsistent implementation of performance management systems can

negatively impact their success due to differences in adoption rates, commitment levels among managers, and discrepancies in performance measurement and reward across the organization. This can lead to perceptions of unfairness and bias, diminishing trust and reducing system effectiveness. To combat this, organizations should adopt a unified approach with clear guidelines, training, and support for all managers and employees [75]. Traditional financial and operational metrics are being replaced by a growing emphasis on valuing care quality and effectiveness. Despite robust methods for evaluating service effectiveness and accessibility, there is a need to enhance patient-centered metrics. Effective leadership is crucial for driving the evolution of healthcare systems, which are now embracing a wider spectrum of services. A comprehensive approach is advocated, expanding performance measurements to encompass patient satisfaction and overall health outcomes alongside financial and operational efficiencies [73].

In parallel, managerial support and involvement emerge as pivotal elements in steering employees towards their performance targets. Managers play a dual role, acting both as mentors and motivators by offering timely feedback, coaching, and recognition. Their active engagement is a cornerstone in cultivating an environment ripe for continuous improvement and the pursuit of excellence [76]. Employee involvement in performance goal development and active participation in performance discussions is crucial for fostering accountability and ownership. This dual engagement makes the performance management system more relevant and effective, as employees are not just participants but active contributors to the dialogue surrounding performance expectations and achievements [77]. However, employee involvement and engagement require a high focus on providing the employee with continuous feedback and coaching, performance recognition and rewards [78], and effective communication [79] to encourage the employee to support the enhancement of the organization's performance and reduce the potential of resistance to change [80].

On the other hand, ref. [73] identified three dimensions of performance measurement: individual performance measures, performance measurement systems as an entity, and relationships between performance measurement systems and the environment. Individual performance measures focus on quality, time, cost, and flexibility metrics, while performance measurement systems are comprehensive entities that encompass all key performance aspects. They ensure the alignment of individual measures with overarching goals, maintaining balance among varying metrics. Consistency prevents conflicting messages within the organization and drives towards common strategic goals. The relationship between performance measurement systems and the environment involves internal organizational dynamics and external market forces. The system must align with organizational culture, strategy, and structure, while also being responsive to market dynamics, customer demands, and competitive landscapes. It must evolve with strategic shifts and environmental changes, considering stakeholder interests to maintain a holistic approach to organizational performance. Performance measurement exists at national/system, organizational, and individual levels within health systems, with the key difference being the degree of aggregation.

Many studies have evaluated the performance of hospitals using different performance measures. In this regard, ref. [81] investigates technological improvements in performance measurement in public university hospitals, focusing on resolving challenges related to system fragmentation and management. Moreover, ref. [71] proposed a performance measurement framework for the healthcare sector, categorizing parameters into efficiency, effectiveness, and flexibility. Efficiency measures the success of hospital management in using resources, effectiveness measures the overall outcomes of a service, and flexibility measures the system's adaptability to change. The framework allows healthcare units to directly assess their performance, benchmarking organizations, and provide customers with a clear understanding of the value of their service. Also, ref. [82] introduces a systematic approach for assessing the influence of implementing enterprise systems on corporate operations, specifically emphasizing the employee's knowledge and performance measurements. On other hand, ref. [83] examines the influence of information systems on healthcare

performance, with a specific focus on the key aspects that contribute to the success of mobile collaboration, with a goal of creating a framework that improves healthcare delivery and increases patient engagement via the use of advanced mobile technologies.

Furthermore, ref. [84] highlights that the healthcare sector's success relies on key performance indicators that measure communication, provider experience, and responsiveness to customer needs. Customer involvement is assessed through active participation throughout the project lifecycle, and the customer's organization's support and familiarity with simulation methodologies. However, a lack of follow-up and accountability can weaken the performance management system. Regular review meetings, updates on progress, and accountability measures for employees and managers can lead to a bureaucratic exercise rather than a valuable tool for development and improvement. This lack of engagement can result in missed opportunities for feedback, coaching, and recognition, which are crucial for employee motivation and development. Ensuring follow-up and accountability requires clear processes and expectations for ongoing dialogue about performance and mechanisms to track and address compliance with these expectations [85].

Hence, the primary aim for healthcare organizations is not just to sustain operations but to thrive, making performance evaluation an essential practice. Effective management requires access to real-time, accurate information to make informed decisions, and in this light, hospital performance assessment becomes a crucial element of strategic healthcare management. Performance measurement provides critical data that allow for the identification of deficiencies and the enhancement of future outcomes. A strategic shift towards long-term outcomes, patient satisfaction, and managing disparities in care is emerging, necessitating a comprehensive approach that expands performance metrics beyond traditional financial and operational indicators to encompass a broader spectrum of healthcare service quality. This evolution towards a more holistic understanding of performance underscores the importance of clear goals, active management, employee engagement, and continuous improvement within the healthcare sector.

2.3. Integration of ERP in Healthcare for Enhanced PM

ERP systems have significantly improved hospital operations by enhancing care delivery, reducing waiting times, and improving patient outcomes. They facilitate efficient information sharing and collaboration among healthcare workers, resulting in effective resource allocation. These capabilities enable quick adjustments to patient requirements and operational demands, establishing patient-centered care. ERP systems also enhance financial and administrative efficiency by decreasing costs related to administrative and clinical activities while enhancing service quality. They improve operational management, optimize operations, and provide enhanced patient care by automating procedures for collecting, organizing, and accessing patient information. ERP systems also integrate clinical pathways and offer decision support tools for medical personnel, aligning medical practices with global patient care standards.

In terms of system integration and communication, ERP systems enhance healthcare supply chain integration, communication, and collaboration among stakeholders. They improve patient data administration, reduce paperwork, and facilitate rapid information exchange across departments, promoting organizational adaptability. ERP systems also reduce inventory levels and wastage, while indirectly improving patient experience by reducing waiting times and expediting registration procedures. These solutions not only enhance patient care but also increase hospital profitability and competitive positioning by improving productivity, efficiency, and cost savings [43,86]. Integrating ERP systems with performance management in organizations is a multifaceted process that requires strategic alignment across various functional areas to achieve enhanced operational efficiency and business performance. The integration significantly impacts multiple dimensions of organizational performance, including planning, cost management, productivity, and decision-making [87].

One study, ref. [88], examined the deployment and effects of ERP systems in healthcare, highlighting the benefits, obstacles, and successful approaches for implementation. Another study [89] investigated the adoption of Balanced Scorecard (BSC) methodologies into the performance management framework of a major Canadian healthcare institution. Moreover, different research explores the impact of ERP systems on hospital operations. In particular, the authors of [44] focus on how ERP systems can optimize resource management to reduce supply chain costs and enhance the quality of care. Additionally, refs. [90,91] evaluated the integration of ERP systems with business strategies in healthcare, noting the essential support of management for successful ERP integration. Furthermore, ref. [92] examined the design of ERP systems for improving warehouse management in Indonesian public hospitals, emphasizing their role in enhancing health services and streamlining inventory processes.

Although there have been numerous studies on the capabilities and impacts of ERP systems and performance management, the specific focus on their integration is often indirect and scattered across broader research topics. Most academic and industry analyses tend to explore the functionalities and benefits of ERP systems or delve into the methodologies of performance management independently. This indirect approach results in a fragmented understanding of how seamlessly integrating these systems can enhance organizational efficiency and decision-making. For example, the integration of ERP systems and PM in healthcare, as explored by [93], underscores ERP's role as a mediator in enhancing organizational performance through efficient knowledge management. The study explores the relationship between knowledge management practices, ERP implementation, and organizational performance in developing countries' healthcare organizations. It reveals that ERP significantly enhances organizational performance by facilitating better knowledge creation, sharing, and implementation. This mediating effect enhances overall knowledge management, leading to improved performance metrics in the healthcare sector. The research contributes to understanding how ERP systems can optimize performance in healthcare settings.

Moreover, the integration of ERP and PM in healthcare significantly improves operational efficiency and decision-making. ERP systems streamline administrative and clinical processes, providing a unified platform for data management, leading to better accuracy and availability of critical information. PM systems enable healthcare providers to monitor, analyze, and optimize clinical outcomes and business operations, fostering a more agile, responsive, and efficient healthcare environment. Aligning ERP and performance management systems plays a crucial role in driving operational excellence and strategic advantage in the healthcare sector [29]. Another study explores how ERP systems, when combined with Heuristics Process Miner techniques, can effectively reduce patient waiting times by streamlining the scheduling and management of hospital resources. This approach not only enhances the utilization of hospital infrastructure, such as MRI machines, but also significantly improves patient throughput. By providing a detailed analysis of real data from hospital operations, the paper underscores the potential of ERP systems to facilitate more accurate and timely healthcare delivery, thereby improving both operational efficiency and patient satisfaction. This integration represents a forward step in leveraging technology to solve traditional healthcare management challenges [28].

Furthermore, ref. [94] conducted a study on the impact of ERP systems and PM integration on job satisfaction among healthcare professionals and found that goal awareness and IT self-efficacy contribute to higher job satisfaction. The study, involving 352 healthcare ERP system users, found that both factors independently contribute to higher job satisfaction. However, the expected interactive effect between these factors was not observed, suggesting their impacts are additive rather than synergistic. The study highlights the importance of ERP systems in healthcare for operational management and employee satisfaction through clear goal setting and IT skill enhancement. This dual approach can lead to more effective and satisfying healthcare delivery environments [95]. The integration of ERP systems with PM, as discussed in a study on private hospitals in Saudi Arabia [96], highlights the signifi-

cant role of ERP systems in improving hospital operational efficiencies and patient care services. The paper reveals that a high percentage of hospitals have successfully adopted ERP systems, noting an 83% implementation rate with a 77% success level in achieving anticipated performance outcomes. Key to this success is the commitment of top management and the effective management of change during ERP implementation. Furthermore, the study emphasizes the importance of ERP systems in consolidating hospital functions and enhancing information flow, which in turn supports better decision-making and enhances overall hospital performance. This comprehensive approach not only addresses immediate operational needs but also sets a foundation for continuous improvement and integration within the healthcare sector. Lastly, [30] highlights the pivotal role of organizational fit in leveraging the business benefits of an Integrated Healthcare Information System (IHIS). It underscores that the success of IHIS implementation in hospitals is contingent upon aligning the system with organizational needs and characteristics. Furthermore, the study identifies five critical success factors that moderate this relationship: adjustments in information systems and business processes, minimizing organizational resistance, robust support from top management, and the capabilities of key team members.

Building on the earlier discussions that separately explored the factors influencing the successful implementation of ERP systems and the effectiveness of performance management systems, it is crucial to recognize that additional factors come into play when integrating these two critical components. This integration, essential for maximizing operational efficiency and strategic goal alignment, is influenced by unique considerations beyond those impacting their individual implementations, as stated by [87].

In conclusion, Table 1 effectively summarizes the various factors derived from the literature concerning the implementation of ERP systems and the factors driving performance management in the healthcare setting. These factors will serve as the basis for evaluating the central objective of this study, which is to understand the key factors that impact the successful integration of ERP systems with performance management practices in healthcare settings.

Table 1. Factors that impact ERP implementation and/or PM.

Categories	Factors	Ref.
	Availability of financial resources to invest in system direct and indirect cost	[44]
	Readiness of healthcare organization to adopt and accommodate ERP system	[46]
	Availability of system-wide integration to reduce silos	[50]
	Availability of top management support	[52]
	Clear objectives and requirements for ERP system implementation	[53]
	Source of the ERP system	[56]
	Chosen implementation strategy	[56]
	Present of effective change management plan	[60]
	Alignment of ERP systems with business processes	[55]
	Vendor support and expertise	[64]
	Availability of data quality and migration process	[65]
	User involvement and training during implementation	[62]
	Customization overload	[32,55,64]
	Technical competence of employee	[63]
	Readiness for integration	[55]
	Availability of project management plan with clear timelines, the establishment of key milestones, and the delineation of responsibilities	[37]
	Adherence to regulatory compliance	[58]
	Current technological infrastructure of the healthcare facility	[59]
	Availability of balance security requirement and compliance	[66]

Table 1. *Cont.*

Categories	Factors	Ref.
PM	Access to accurate and timely real information	[71]
	Availability of performance metrics and measurement tools	[72]
	Clear long-term goals and objectives	[73]
	Availability of patient-centered metrics	[73]
	Effective leadership	[73]
	Managerial support and involvement	[76]
	Employee involvement and engagement in designing performance metrics	[77]
	Effectiveness of organizational individual performance measures (quality, time, cost, and flexibility)	[96]
	Effectiveness of performance measurement system (alignment of individual measures with overarching goals, maintaining balance among varying metric)	[96]
	Alignment with organizational culture, strategy, and structure	[96]
	Responsiveness to market dynamics, customer demands, and competitive landscapes	[96]
	Level of organizational technological improvements in performance measurement	[81]
	Organizational efficiency in success use of hospital management resources	[71]
	Effectiveness of the overall outcomes of a healthcare service	[71]
	Flexibility and system's adaptability to change	[71]
	Availability of key performance indicators	[84]
	Availability of follow-up and accountability system	[85]

This study investigates the integration of Enterprise Resource Planning (ERP) systems with performance management to boost operational efficiency in healthcare. Despite the critical importance of this synergy, there is a notable gap in the literature specifically focusing on healthcare settings. By consulting with healthcare experts, this research identifies key factors that influence the effective fusion of ERP systems and performance management. The study explores how ERP systems can be tailored to enhance performance metrics, streamline decision-making, and optimize resource management in healthcare. The findings are expected to provide actionable insights that help healthcare organizations leverage ERP technologies that are aligned with performance management goals. This will not only enhance operational effectiveness but also contribute significantly to the academic discourse by outlining strategies to achieve a seamless integration of technology and strategic management in healthcare.

3. Materials and Methods

3.1. Stage 1—Factors Validation

The initial phase involved validating 36 factors identified from the literature through expert feedback from the healthcare industry, with the goal of creating a consolidated list to serve as the foundation for subsequent research. To ensure a thorough and context-specific understanding, semi-structured interviews were conducted with healthcare industry experts in the UAE, chosen for their pivotal roles in ERP system implementation decision-making. The primary objective of these interviews was to validate insights from these experts and streamline the identified factors, focusing only on those most relevant to the UAE healthcare context. The interviews were organized into three distinct phases. The first phase focused on collecting demographic information, including the experts' years of experience and the specific healthcare sector in which they operated. The second phase aimed to validate the key factors identified, drawing on the experts' extensive experience in the healthcare industry. The final phase involved gathering in-depth insights into the unique challenges, requirements, and strategic considerations critical for effectively integrating ERP systems and performance management within healthcare environments.

Engaging these experts ensures the study's validity and reliability, and conducting comparative analyses across diverse expert roles enriches the findings and applicability

to real-world ERP implementation dynamics in healthcare, advancing knowledge and practice in healthcare ERP systems. These steps aim to (1) enhance the understanding of the current landscape of ERP system usage within the healthcare sector; (2) verify the relevance of a pre-identified list of factors specifically within the UAE healthcare context; and (3) add and consolidate expert inputs to finalize the factors that are most relevant. The feedback from this interview was crucial in shaping the basic factors that have an impact on the integration process.

In this phase, validating the data collected from the interview will be accomplished by using the Content Validity Ratio (CVR) to assess the adequacy of the evaluations. This approach guarantees that the factors considered in the evaluation are both relevant and reflective of the specific field they are designed to assess [97]. The results of this phase can then be applied to improve the measures' accuracy and dependability in preparation for further testing. The CVR is based on the selection of the experts to the factors they perceive as applicable for integration between ERP and PM. The ratio is calculated using Equation (1):

$$\text{CVR} = \frac{n_e - \frac{N}{2}}{\frac{N}{2}} \tag{1}$$

where n_e is the number of experts that selected "applicable for integration" and *N* is the total number of experts interviewed. CVR values vary from -1, indicating perfect disagreement, to $+1$, which signifies perfect agreement. A CVR value above zero suggests that more than half of the panel members consider an item to be essential [97]. In the case of this research, for a panel consisting of six experts, the CVR values must exceed 1 to meet the selection criteria, based on Lawshe's threshold [98].

3.2. Stage 2—Expert Importance Rating of Factors

A survey was developed for healthcare experts to assess the ERP integration factors identified in the first stage. The survey used a five-point Likert scale. Participants included a diverse mix of healthcare IT professionals, hospital administrators, clinical leaders, and healthcare management consultants, all with significant experience in utilizing ERP systems within the healthcare sector. The target sample size for this research is 75 respondents, based on the study's design and methodology. This target falls within the recommended range of 50 to 100 respondents, which is considered sufficient for achieving reliable and valid results in studies of this nature [99]. This sample size ensures a sufficient level of statistical power while balancing the practical considerations of resource availability and data manageability.

Participants for the survey were selected using the snowball sampling technique, a method particularly effective in reaching specialized populations with relevant expertise [100]. Initially, the experts in stage 1, who are healthcare professionals known for their extensive experience with ERP systems, were invited to participate. These initial participants were then asked to recommend other experts in the field, expanding the pool of respondents in the UAE. This technique allowed us to access a broader network of qualified individuals, ensuring that the survey gathered insights from a diverse and highly knowledgeable group of professionals. The snowball sampling approach was instrumental in obtaining a sample size that is both representative and sufficient for the study's objectives, particularly in a specialized area such as ERP integration in healthcare.

The survey consisted of two parts: a first section that provided an overview of the study's objectives and collected demographic information from the participants, and a second section where the participants were asked to evaluate the factors related to ERP and PM integration. These factors, selected from the initial phase, were to be evaluated on a scale ranging from "very high importance" to "very low importance". The survey was presented in a digitized format to optimize the efficiency of collecting responses and analyzing the data.

Before participating, all experts and survey respondents received detailed information about the study's purpose, methods, potential risks, and benefits. They were assured of

confidentiality and the voluntary nature of their participation, with the option to withdraw at any time without penalty. Moreover, participants fully understand their involvement and the handling of their data. This process upholds ethical standards and aligns with both local and international guidelines on research ethics.

3.3. Stage 2—Factors Ranking

Based on the insight gained from the first and the second stages, the Relative Importance Index (RII) was used to quantify the importance and relevance of each factor. Respondents were provided with the 5-point Likert scale to assess the importance of each identified factor. The scale started with the score of 5 for "very high importance", followed by 4 for "high importance", 3 for "moderate importance", 2 for "low importance", and 1 for "very low importance". The ratings were utilized in the RII formula as per Equations (2) and (3), to calculate the weighted importance of each item.

$$RII = \frac{\Sigma W}{A \times N} \tag{2}$$

$$\Sigma W = 5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1 \tag{3}$$

where the variables are defined as follows:

ΣW: The sum of the weights of each factor multiplied by the frequency of the answer;
A: The highest criteria score, which was 5 in this study;
N: the number of respondents, which was 81 in this study [101].

Lastly, RII outcomes circled back to the phase 1 experts to validate the ratings given to the ERP system and PM integration factors. This was conducted to ensure that the ratings were accurate and agreed upon by the experts. After receiving confirmation, the completed list of factors was concluded, with each component being accompanied by its RII, which provides a measurable indication of their importance. A detailed summary of the methodology used is presented in Table 2.

Table 2. The detailed study processes.

Stages	Steps	Process
Stage 1: Factor validation Semi-structured interview One-to-one interviews with healthcare experts in the decision-making process	1	Understand the current situation of ERP system implementation within the healthcare sector
	2	Ask experts to verify the list of factors extracted from the literature review based on their relevance within the healthcare sector in UAE and recommend factors that impact the integration of ERP and PM, their importance, as well as additional factors as they see fit
	3	Consolidate responses from all experts and finalize the shortlisted factors
	4	Validate the responses using Content Validity Ratio (CVR)
Stage 2: Expert importance rating of factors Online survey sent to healthcare administration experts that utilize the ERP systems in healthcare	1	The consolidated list of factors is shared with the experts in the administrative departments in healthcare organizations to rate each factor based on its importance 1 = Very low importance 2 = Low importance 3 = Moderate importance 4 = High importance 5 = Very high importance
	2	Refine consolidated list to remove low rating factors
Stage 3: Factor ranking Online survey sent to the original experts interviewed in phase 1	1	Confirm the rating of the factors with the experts in phase 1
	2	Publish the final list of factors and their RII
Development of the main contribution		To develop a set of recommended guidelines that guide healthcare organizations to facilitate a seamless connection between these systems, enhancing operational efficiencies and improving overall healthcare delivery

4. Results

This section highlights the results of the data collection and analysis. The first section discusses the analysis of the interview and the factor validation and consolidation; the second section highlights the ranking of the factors based on the expert survey; and the last section illustrates the results of the confirmation of the RII calculation to develop the guidelines for seamless connection between these systems.

4.1. Factor Validation and Consolidation—Semi Structured Interview

As highlighted above, 36 factors were extracted from the literature to be validated based on expert feedback. As identified in stage 1 of the methodology, the factors were rated by the experts based on their importance. Table 3 illustrates the experts' backgrounds and affiliations.

Table 3. Demographic and professional background of study participants.

Sr	Participant	Designation	Organization	Years of Experience
1	Participant 1	Senior IT developer	Public	17
2	Participant 2	Consultant (healthcare solutions and user experience)	Private	6
3	Participant 3	Supply chain and ERP expert	Private	5
4	Participant 4	CEO of healthcare solution provider	Private	14
5	Participant 5	Head of healthcare solution	Public	25
6	Participant 6	Senior systems analyst	Private	15

At the beginning of this section, all the 36 factors were sent to the expert panel, asking them to identify which factor is applicable for integration. In addition, the experts were also asked to rank the factors based on their importance in each category (factor related to ERP and factor related to performance alone) to understand the importance of the identification factors. Furthermore, each expert was asked to identify additional factors they deemed relevant to the analysis. Lastly, the experts were asked to contextualize their insights regarding ERP system integration, usage, and its impact on performance management within healthcare settings in the UAE.

In the interview, several key topics were discussed, each providing valuable insights into the utilization and performance of ERP systems in healthcare organizations.

Firstly, the adoption and performance of the ERP system were discussed. Expert 1 highlights that they utilize HISs more than ERP systems in their organization. The organization is planning to upgrade the current HIS and add additional ERP features such as inventory management, HR management, and stock management with the aim of effectively managing processes and resources across the entire organization. The system is comprehensive, encompassing planning, system deployment, data migration, and user training, covering many aspects in the organization such as financial management, risk management, and administrative tasks. However, it does not integrate all the features of an ERP system. Expert 6 states that the ERP system at their organization is fully integrated across all hospital departments, managing critical functions like patient management, supply chain operations, finance, and human resources. This integration improves operational uniformity and efficiency. Experts 2, 3, and 4 discussed current performance management practices, highlighting that, in their experience with ERP systems in healthcare across regions such as Japan and the UAE, the vast majority of globally installed ERP systems are not specifically designed for the healthcare sector. They emphasize the need for a national system capable of scalability, managing scarcity, and connecting the entire supply chain transparently. Expert 5 discusses issues like understaffing, improper use, and the need for audits affecting ERP efficiency. Expert 5 also highlights the separation of ERP and HISs and recommends merging them to streamline processes and improve efficiency.

The impact and efficiency of ERP systems was another major discussion point. Expert 1 emphasizes that integrating ERP systems with performance management systems is crucial for any healthcare organization, as patient safety and service quality are directly tied to this integration. Their organization assesses various KPIs for different departments annually to gauge performance. Expert 6 notes that the implementation of the ERP system has significantly improved operational efficiency by automating many administrative processes. This improvement has led to better data accuracy and a reduction in overhead costs, which in turn has streamlined patient information management and enhanced the overall responsiveness of services.

Regarding organizational integration and feedback, Expert 1 highlights challenges faced during the implementation of the Cerner system, including hardware installation, adapting the existing network infrastructure, staff training, customizing the ERP system to meet the organization's specific needs, and ensuring the availability of the support team. The primary challenge for IT staff was supporting and encouraging hospital personnel throughout the implementation journey. Expert 6 remarks that overall feedback from staff has become overwhelmingly positive, particularly after users became accustomed to the system's benefits in terms of ease of use and efficiency. Patient engagement and experience were also key topics. Expert 1 highlights the importance of features like customer satisfaction surveys to assess patient experience. Expert 5 discusses the potential for a disjointed patient experience due to the separation of ERP systems and HISs and recommends merging them to streamline processes, improve data flow, and enhance overall system efficiency and patient experience. Expert 6 notes that full compatibility with the EHR system facilitates seamless data flow and accessibility, which is essential for efficient patient care and operational management.

The interview also addressed interoperability and data sharing. Expert 1 points out that an ERP system should serve as a centralized platform connecting the entire hospital supply chain that is seamlessly integrated with medical equipment to generate accurate, validated patient reports. Expert 6 highlights that the ERP system's design supports interoperability with external healthcare providers and regulators, enabling standardized data exchange that enhances collaborative care and regulatory compliance. Security and compliance were also covered. Expert 1 discusses the importance of technical competence and strategic alignment for integrating ERP systems. They note that if the current technological infrastructure is outdated, integrating it directly with new ERP modules might not be feasible without major upgrades. Expert 6 mentions that robust security measures such as data encryption, role-based access control, and regular audits are implemented to protect patient and organizational data. Compliance with local healthcare regulations is maintained continuously through regular updates to the ERP system. Adaptation to emerging technologies was discussed by Expert 1, who stresses the importance of adaptability and technological infrastructure for integrating ERP systems. They note that outdated technological infrastructure may temporarily hinder direct integration until the technological baseline is elevated. Expert 6 mentions plans to expand telehealth capabilities to meet the growing demand for remote healthcare services, with the ERP system providing detailed analytics that aid in strategic decision-making and resource allocation. The interview touched on innovation and research support; Expert 1 emphasizes the importance of ERP systems in supporting research through accurate data management. Expert 5 highlights that while research primarily targets clinical outcomes through HISs, ERP systems could improve operational efficiencies in healthcare. Expert 6 mentions that the ERP system provides detailed analytics that aid in strategic decision-making and resource allocation, supporting innovation and research efforts. Quality management and continuous improvement were emphasized by Expert 1 in terms of the annual assessment of various KPIs for performance evaluation. Expert 6 highlights that the integration of the ERP system is central to quality management processes, ensuring compliance with healthcare standards and facilitating continuous improvement. Additional factors such as ongoing user feedback mechanisms could be added to ensure continuous system improvement and refinement.

Sustainability and environmental aspects were covered by Expert 5, who discusses the fact that ERP systems in healthcare primarily focus on patient care, limiting their direct impact on sustainability. However, integrating sustainability into ERP systems could enhance resource management and promote broader environmental responsibilities within the healthcare sector. Expert 6 does not specifically mention sustainability but emphasizes overall operational efficiency improvements, which can indirectly contribute to sustainable practices. Future plans and decision support for ERP systems were mentioned by Expert 1; this expert recommends adding another ERP system that is focused on inventory and HR management while working on integrating this new system with their existing setup. Expert 6 states that plans are in place to expand telehealth capabilities, leveraging the ERP system for detailed analytics and strategic decision-making.

Based on the interview, the results from all of the experts were tabulated and consolidated for analysis. The initial phase involves validating the data collected using the Content Validity Ratio (CVR) to assess the adequacy of the evaluations. The analysis reveals that eight factors failed to meet the necessary CVR threshold, indicating that they are inadequate for inclusion in the final list of factors. Importantly, there was complete consensus among experts that "customization overload" is not suitable for inclusion, warranting its immediate removal. For the remaining seven factors, at least one expert raised doubts about their appropriateness for inclusion, marking them as candidates for exclusion. In addition, the expert's importance analysis of each category independently was also tabulated. The analysis of these important categories provides insights into which factors were deemed most important for both ERP systems and PM practices independently within healthcare organizations, regardless of their integration applicability. As shown in Table 4, the results highlight the CVR values of the factors.

Moreover, the experts identified two additional factors that impact the integration of both ERP and PM in healthcare organizations, as listed in Table 5.

Upon examining the outcomes of the CVR, the authors conducted detailed discussions with experts to understand the reasoning behind the suggestion to exclude specific factors from consideration in ERP and PM system implementations.

The discussions for the availability of financial resources to invest in the system, including direct and indirect costs, highlight that when adopting ERP systems, it is crucial to carefully analyze the allocation and priority of financial resources, especially when comparing the needs and structures of public and private healthcare sectors. Experts argue that the differing priorities, funding models, and stakeholder expectations in these sectors necessitate a tailored approach to how financial resources are managed and allocated during ERP implementation. Public healthcare organizations typically rely on government allocations or public funds as their primary financial resources, which are generally subject to strict regulations and limitations. Cost-effectiveness is of the highest priority in such circumstances. Experts urge that public healthcare systems prioritize the allocation of financial resources in a way that optimizes the benefits to the public and complies with strict budget limitations. This frequently involves prioritizing crucial ERP functions that directly improve patient care and operational efficiency, rather than extensive customization or advanced features that do not fit with immediate healthcare delivery requirements.

In contrast, private healthcare organizations often function with different financial dynamics. Private funds or revenues can give them more freedom in terms of investment, enabling a wider range of customization options for ERP systems and the adoption of cutting-edge technology that could offer competitive advantages. In these situations, financial resources may be actively focused on improving patient experience and integrating modern data analytics capabilities, which can stimulate business development and enhance service delivery.

Experts stress the need for strategically utilizing financial resources in ERP installations, regardless of the sector. This should be accomplished with a thorough comprehension of the organization's main goals and the particular healthcare setting it operates in. Public sectors may choose a conservative financial strategy that prioritizes compliance, broad accessibility,

and cost management. On the other hand, private sectors can decide for a more flexible spending approach with an emphasis on technology leadership and market distinction. Therefore, it is essential to have a detailed comprehension of the financial foundations that are unique to both public and private healthcare sectors. This understanding is necessary to ensure that ERP systems are not only financially viable but also in line with the overall objectives of the organization, whether they focus on optimizing public health results or enhancing business efficiency and patient satisfaction.

Table 4. CVR values and importance analysis of key ERP and PM factors in healthcare organizations.

Sr	ERP Factors	CVR	PM Factors	CVR
1	Readiness of healthcare organization to adopt and accommodate ERP system	1.0	Access to accurate and timely real information	1.0
2	Availability of financial resources to invest in system direct and indirect cost	0.7	Availability of performance metrics and measurement tools	1.0
3	Availability of system-wide integration to reduce silos	1.0	Clear long-term goals and objectives	0.7
4	Availability of top management support	1.0	Availability of patient-centered metrics	1.0
5	Clear objectives and requirements for ERP system implementation	0.7	Effective leadership	1.0
6	Source of the ERP system	1.0	Managerial support and involvement	1.0
7	Chosen implementation strategy	1.0	Employee involvement and engagement in designing performance metrics	1.0
8	Presence of effective change management plan	1.0	Effectiveness of organizational individual	1.0
9	Alignment of ERP systems with business processes	1.0	Effectiveness of performance measurement system	1.0
10	Vendor support and expertise	1.0	Alignment with organizational culture, strategy, and structure	1.0
11	Availability of data quality and migration process	1.0	Responsiveness to market dynamics, customer demands, and competitive landscapes	0.3
12	User involvement and training during implementation	1.0	Level of organizational technological improvements in performance measurement	0.7
13	Customization overload	−1.0	Organizational efficiency in success use of hospital management resources	1.0
14	Technical competence of employee	0.7	Effectiveness of the overall outcomes of a healthcare service	1.0
15	Readiness for integration	1.0	Flexibility and system's adaptability to change	0.7
16	Availability of project management plan with clear timelines, the establishment of key milestones, and the delineation of responsibilities	1.0	Availability of key performance indicators	1.0
17	Adherence to regulatory compliance and standards	0.7	Availability of follow-up and accountability system	1.0
18	Current technological infrastructure of the healthcare facility	1.0		
19	Availability of balance security requirement and compliance	1.0		

Table 5. Additional factors identified by experts.

Sr	Additional Factors
1	Ease of ERP system scalability
2	Transparency of data sharing in ERP systems

For both clear long-term goals and objectives and clear objectives and requirements for ERP system implementation with the dynamic healthcare industry, experts underscore the critical importance of flexibility over rigidity in setting clear objectives and requirements for ERP system implementations. This adaptability is essential to accommodate rapid

technological advancements, regulatory changes, and organizational growth, allowing healthcare systems to integrate new technologies and comply with evolving regulations seamlessly. Furthermore, a flexible approach facilitates scalability, encourages stakeholder engagement by incorporating real-time feedback, and mitigates implementation risks. By prioritizing flexibility, healthcare organizations can ensure that their ERP systems are not only aligned with current operational needs but are also robust enough to adapt to future challenges and opportunities, maximizing the ERP investment and enhancing its strategic utility.

In addition, while responsiveness to market dynamics is important, experts cautioned against allowing these external factors to dominate core system functionalities. The primary focus, they advised, should remain on internal efficiencies and patient care, with market dynamics playing a secondary role in informing strategic decisions. Furthermore, when discussing the "level of organizational technological improvements in performance measurement", experts emphasize the need for considering the different strategies employed by the public and private healthcare sectors. Public sector healthcare institutions, due to economic constraints and the requirement for public responsibility, typically take a cautious approach when making technology investments. The main emphasis is on optimizing current technology and ensuring that any improvements provide a definite return on investment (ROI), in line with public health goals and regulatory requirements. On the other hand, private healthcare companies typically have fewer financial limitations and operate in a competitive environment where the quick adoption of technology may improve the quality of service and the happiness of patients. Nevertheless, both industries are putting a greater emphasis on strategic technological enhancements that are in line with their long-term objectives and provide clear advantages in terms of operational efficiency and patient care. This strategic alignment guarantees that technical expenditures are not only justifiable but also make a significant contribution to the organization's overall objectives.

Also, the experts generally discourage the extensive customization of ERP systems, highlighting that such practices make maintenance more complex, increase expenses, and impede critical improvements. They promote the use of standardized practices, which improves the long-term stability and scalability of the system. Extensively customizing ERP systems can result in organizations being stuck with outdated software versions, since upgrading may cause problems with the customized modifications, resulting in higher operational risks and expenses. Furthermore, conventional ERP solutions are specifically engineered to effectively expand and integrate industry-leading methodologies, which are essential for preserving a competitive edge and adhering to regulatory requirements. Therefore, using a standardized strategy not only streamlines system maintenance but also enables organizations to quickly adjust to changes and capitalize on growth possibilities, making it a more viable option in dynamic industries such as healthcare.

In addition, the experts recommend deprioritizing placing an excessive emphasis on technical expertise when implementing an ERP system. Instead, they propose adopting a balanced strategy that values both wider operational talents and soft skills. It is recommended to make this adjustment since excessively focusing on technical aspects might result in a specialization that may not be in line with the real operational requirements of the company, which could lead to inefficiencies. Furthermore, it might disregard crucial soft skills like flexibility, communication, and teamwork, which are vital for the effective integration and usage of ERP systems. This discrepancy may prevent innovation and comprehensive problem-solving, hence reducing the system's ability to adapt to the ever-changing healthcare landscape. In addition, there may be difficulties in integrating the ERP system, even if it is technically capable, since it may not adequately fulfill the practical requirements of its users. This can have a negative impact on user acceptance and the overall efficacy of the system. Hence, the specialists highly recommend adopting a holistic strategy that prioritizes technical expertise while developing operational comprehension and interpersonal abilities to guarantee a more efficient and comprehensive deployment of ERP.

Although flexibility and adaptability are essential features for ERP systems, overly stressing them from the beginning can lead to substantial disadvantages. According to the experts, an excessive emphasis on flexibility could prevent the growth of core functionality, resulting in a system that lacks depth in crucial areas necessary for daily operations. This can compromise the stability of the system, leading to frequent maintenance problems and possibly preventing accurate performance assessment. In addition, the frequent modification of system settings can make user training more complex and prevent user acceptance, since the ongoing need for flexibility might overwhelm users. Alternatively, experts suggest using a gradual and systematic method to enhance flexibility. This involves initially establishing a strong and reliable core system, followed by planned stages for future expansions or alterations. This approach guarantees that the system effectively fulfills the current organizational requirements while also maintaining the ability to adapt to future changes in a controlled and controllable manner.

Lastly, ensuring compliance with regulations and standards during ERP adoption should not excessively restrict the system, which would limit innovation and adaptability. Although compliance is essential, particularly in regulated sectors like healthcare, seeing it just as a checklist task might restrict innovative solutions and make the system inflexible and difficult to adjust to evolving business or technical requirements. Instead, it is important to incorporate compliance from the beginning in a manner that enhances the functionality and adaptability of the ERP system. This method creates a balance between compliance and innovation, enabling the ERP system to adapt and expand with regulatory changes and organizational expansion. Although compliance is crucial, it should not excessively control the system at the expense of operational flexibility and innovation.

4.2. Ranking of the Factors

In this step, all of the 38 factors identified from the previous step were built into the rank survey, which was sent to subject matter experts as a target respondent from the healthcare industry in the UAE. The evaluation of all 38 factors by a diverse group of experts helps assess the relative importance of every factor and determine whether some factors may not be necessary for the implementation of ERP in the healthcare sector of the UAE. This method not only optimizes the ERP system by prioritizing truly influential elements, but also guarantees that a diverse variety of viewpoints are considered, hence boosting the credibility and accuracy of the analysis. Incorporating a wide range of experts helps prevent bias.

A total of 81 responses were collected. The identified target respondents were the most suitable to reflect the possible factors from all perspectives. Figures 2 and 3 illustrate the demographics of the respondents.
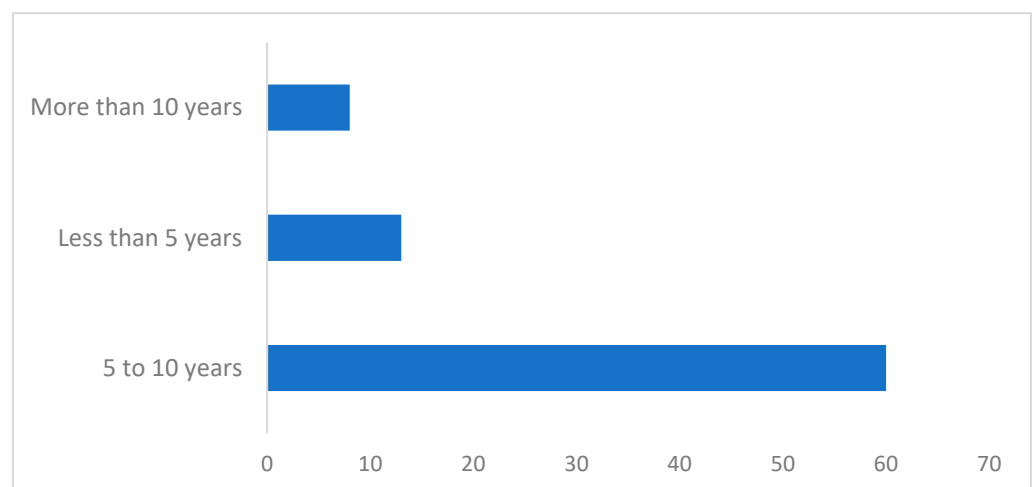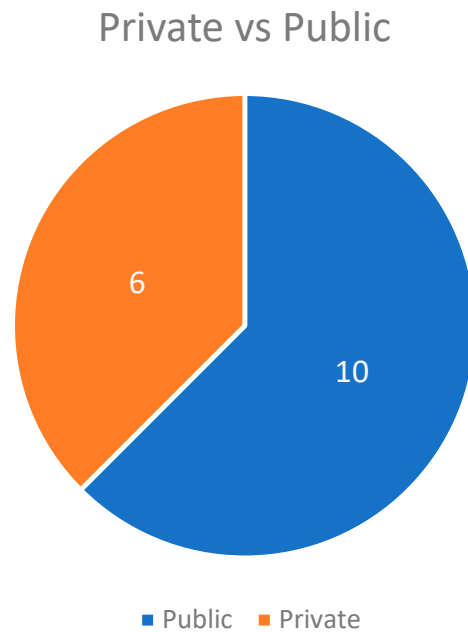

Figure 2. Respondents' years of experience.

Private vs Public

Figure 3. Distribution of healthcare sector experience among survey respondents.

In examining the results from the survey that asked respondents to rank factors impacting the effectiveness of ERP systems in healthcare, it is evident that certain elements are viewed as significantly more critical than others when calculating their RII, as shown in Table 6. The RII scores, which range from 0 to 1, gauge the relative importance of various factors, with 0 indicating minimal importance and 1 signifying maximum importance. Notably, several factors were tied with a perfect score of 1, such as the "employee involvement and engagement in designing performance metrics", and the "effectiveness of organizational individual performance measures". These crucial elements highlight the integral role that well-defined, inclusive, and efficient metrics serve in the effective integration of ERP systems and performance management practices within healthcare settings.

Moreover, the RII ratings indicate that a significant emphasis is placed on the accessibility of precise and timely information, as well as the availability of performance measures and measurement tools. This reflects the healthcare industry's need for accuracy and efficiency. Nevertheless, factors such as the "availability of balance security requirement and compliance" and "readiness of healthcare organizations to adopt and accommodate ERP system", although still considered important, obtained slightly lower RII values. This implies a refined viewpoint on the key factors that impact the effectiveness of the integration of ERP systems and performance management practices.

During the study, a particular approach was employed to handle cases of tie scores while generating the RII for the listed factors. If multiple factors obtained the same RII scores, the approach would assign the highest rank to the first factor that achieved that score. Following the criteria, factors with the same scores were subsequently ordered in a sequential manner. This strategy guarantees that all factors are ranked consistently, while it implies that the ranking of a factor could be influenced by its position among factors with similar scores. This suggests the need for future research to strengthen the methodology in these areas.

The complete evaluation of the factors in the survey confirms the first evaluations provided by the experts. The survey outcomes show that lower RII values are given to factors that were first considered irrelevant by the experts. This association confirms the initial hypothesis regarding the relative importance of these factors, highlighting a widespread agreement among healthcare sector professionals.

Table 6. Relative importance and ranking of factors.

Factors	RII	Rank
Effectiveness of organizational individual performance measures (quality, time, cost, and flexibility)	0.8963	1
Employee involvement and engagement in designing performance metrics	0.8667	2
Effectiveness of performance measurement system (alignment of individual measures with overarching goals, maintaining balance among varying metric)	0.8667	2
Availability of performance metrics and measurement tools	0.8642	4
Readiness for integration	0.8568	5
User Involvement and training during implementation	0.8568	5
Clear long-term goals and objectives	0.8519	7
Effective leadership	0.8494	8
Managerial support and involvement	0.8444	9
Availability of follow-up and accountability system	0.8444	9
Access to accurate and timely real information	0.8420	11
Availability of data quality and migration process	0.8321	12
Organizational efficiency in success use of hospital management resources	0.8296	13
Availability of patient-centered metrics	0.8272	14
Availability of key performance indicators	0.8272	14
Alignment of ERP systems with business processes	0.8272	14
Alignment with organizational culture, strategy, and structure	0.8173	17
Effectiveness of the overall outcomes of a healthcare service	0.8173	17
Vendor support and expertise	0.8173	17
Chosen implementation strategy	0.8148	20
Availability of balance security requirement and compliance	0.8148	20
Transparency of data sharing in ERP systems	0.8074	22
Source of the ERP system	0.8074	22
Ease of ERP system scalability	0.8025	24
Readiness of healthcare organizations to adopt and accommodate ERP system	0.8025	24
Availability of top management support	0.8000	26
Presence of effective change management plan	0.7951	27
Availability of system-wide integration to reduce silos	0.7951	27
Current technological infrastructure of the healthcare facility	0.7926	29
Adherence to regulatory compliance and standards	0.7901	30
Availability of project management plan with clear timelines, the establishment of key milestones, and the delineation of responsibilities	0.7852	31
Responsiveness to market dynamics, customer demands, and competitive landscapes	0.7802	32
Level of organizational technological improvements in performance measurement	0.7753	33
Flexibility and system's adaptability to change	0.7704	34
Customization overload	0.7630	35
Availability of financial resources to invest in system direct and indirect cost	0.7556	36
Clear objectives and requirements for ERP system implementation	0.7531	37
Technical competence of employee	0.7481	38

4.3. Confirmation of the RII Calculation

The last part of the analysis involves verifying the RII results and rankings with the experts interviewed at the initial stage. In order to guarantee the accuracy and reliability of these results, a validation survey was carried out with the six experts who took part in the initial interviews. This strategy enhances the credibility of the data, hence reinforcing the validity of the research findings. The outcomes of this validation procedure are displayed in Table 7.

Table 7. Final list and rank of integration factors.

Factors	Rank
Effectiveness of organizational individual performance measures (quality, time, cost, and flexibility)	1
Employee involvement and engagement in designing performance metrics	2
Effectiveness of performance measurement system (alignment of individual measures with overarching goals, maintaining balance among varying metric)	2
Availability of performance metrics and measurement tools	4
Readiness for integration	5
User involvement and training during implementation	5
Clear long-term goals and objectives	7
Effective leadership	8
Managerial support and involvement	9
Availability of follow-up and accountability system	9
Access to accurate and timely real information	11
Availability of data quality and migration process	12
Organizational efficiency in success use of hospital management resources	13
Availability of patient-centered metrics	14
Availability of key performance indicators	14
Alignment of ERP systems with business processes	14
Alignment with organizational culture, strategy, and structure	17
Effectiveness of the overall outcomes of a healthcare service	17
Vendor support and expertise	17
Chosen implementation strategy	20
Availability of balance security requirement and compliance	20
Transparency of data sharing in ERP systems	22
Source of the ERP system	22
Ease of ERP system scalability	24
Readiness of healthcare organizations to adopt and accommodate ERP system	24
Availability of top management support	26
Presence of effective change management plan	27
Availability of system-wide integration to reduce silos	27
Current technological infrastructure of the healthcare facility	29
Adherence to regulatory compliance and standards	30
Availability of project management plan with clear timelines, the establishment of key milestones, and the delineation of responsibilities	31
Responsiveness to market dynamics, customer demands, and competitive landscapes	32
Level of organizational technological improvements in performance measurement	33
Flexibility and system's adaptability to change	34
Customization overload	35
Availability of financial resources to invest in system direct and indirect cost	36
Clear objectives and requirements for ERP system implementation	37
Technical competence of employee	38

Overall, the factors are ranked based on their perceived impact on the integration of the ERP system and performance management. The results indicate that the factors can be grouped based on their RII values. High-ranked factors have an RII of 0.85 and above, mid-tier factors have an RII between 0.83 and 0.85, and lower-ranked factors have an RII of less than 0.83.

High-ranked factors have an RII of 0.85 and above, signifying the highest level of relative importance. These factors are considered critical and have the most significant impact on the overall outcomes. These include essential aspects like the effectiveness of individual performance measures, employee involvement, and readiness for integration. They ensure that the system's core operations are aligned with organizational goals and that the system is readily accepted and utilized by the workforce. Middle-tier factors consist of elements with slightly lower RII values but are vital for supporting the system's sustainable operation and strategic management. Lower-tier factors include a broader range of elements that are critical for the ERP system's adaptability and scalability. Grouping the factors based on their RII values provides a clear framework for prioritizing actions and resources, ensuring that the most critical areas receive the attention they need for optimal performance and improvement. Hence, to maximize the benefits of ERP systems and enhance performance management in healthcare, it is essential for organizations to address these factors holistically. By strengthening top-ranked factors, ensuring robust mid-tier support, and proactively planning for lower-ranked elements, healthcare organizations can achieve successful ERP integration and improved performance outcomes.

The top-tier factors are critical in enhancing operational efficiency, ensuring user engagement, and facilitating seamless system integration. These include the effectiveness of individual performance measures, which directly impact operational outcomes; employee involvement in designing these metrics, which boosts acceptance and adherence; and the alignment of these measures with overarching organizational goals to maintain balance and holistic success. Additionally, the availability of performance metrics and tools is crucial for real-time management and decision-making. The readiness for integration and user involvement from the outset, coupled with thorough training, ensures that the ERP system is not only adopted smoothly but is also used to its full potential. These top-tier factors collectively ensure that ERP systems are effectively implemented, leading to improved performance and operational efficiencies within healthcare organizations. Therefore, higher-ranked factors directly and significantly impact the integration of ERP systems and performance management practices in healthcare. By focusing on these critical areas, healthcare organizations can enhance system effectiveness, employee engagement, and organizational alignment, leading to improved performance outcomes.

Middle-tier factors play a crucial role in supporting and sustaining the initial gains made from top-tier priorities in ERP system implementation. Clear long-term goals and objectives establish a roadmap for the organization, guiding ongoing efforts and ensuring alignment with strategic visions. Effective leadership is key for driving the initiative forward, fostering an environment that embraces change and technological advancement. Managerial support and involvement ensure that the ERP system's adoption and operation have the necessary backing from decision-makers, which is essential for overcoming challenges during implementation phases. The availability of a follow-up and accountability system guarantees that the system's deployment and utilization are monitored, and corrective actions are taken as necessary. Access to accurate and timely information enables informed decision-making and efficient operations, while the availability of data quality and migration processes ensures that the data within the ERP system remain reliable and robust, providing a solid foundation for all users. By focusing on these mid-tier factors, healthcare organizations can ensure robust support for ERP integration and performance management, leading to successful outcomes and improved organizational performance.

Lower-tier factors, though ranked lower in immediate priority, address the broader and often more complex challenges of integrating and scaling the ERP system within the healthcare organization. Organizational efficiency in using hospital management resources

ensures that the ERP system enhances rather than burdens operational capabilities. The availability of patient-centered metrics and the alignment of ERP systems with business processes are critical for ensuring that the system supports core healthcare operations effectively. Alignment with organizational culture, strategy, and structure ensures that the ERP system is congruent with the existing work environment, which is vital for its acceptance and effectiveness. The effectiveness of overall outcomes of healthcare services indicates the ultimate impact of the ERP on service delivery, which must be positive to justify the investment. Factors like vendor support and expertise, security and compliance, data transparency, and system scalability address the technical and strategic dimensions of ERP management. Lastly, elements such as change management, system-wide integration, and financial resource availability are fundamental for adapting to evolving technological and market conditions, ensuring that the ERP system remains relevant and capable of supporting the healthcare organization's dynamic needs. These foundational elements, though ranked lower, are fundamental for creating a robust environment that supports the successful deployment and ongoing effectiveness of ERP systems and performance management practices.

On the other hand, the results reveal a surprising prioritization by respondents, who ranked the "availability of performance metrics and measurement tools" higher than factors such as "user involvement and training during implementation", "availability of key performance indicators", and "availability of patient-centered metrics". This suggests a strong focus on tangible, measurable outcomes over process-oriented elements, raising questions about the representativeness of the study group. The emphasis on performance measures may reflect a bias towards technical and analytical aspects of ERP systems, potentially influenced by the respondents' professional backgrounds or experiences. While this prioritization underscores the importance of metrics, it also highlights the need for a balanced approach that equally values user engagement, effective training, and alignment with patient-centered goals to ensure the holistic success of ERP implementations in healthcare.

By addressing these factors comprehensively—strengthening high-impact factors, ensuring robust support for mid-tier elements, and proactively managing foundational aspects—healthcare organizations can achieve successful ERP integration and enhanced performance management outcomes. This holistic approach promotes a high-performance culture and aligns with strategic goals, leading to improved patient care and organizational efficiency.

5. Discussion

Based on the above analysis, this study recommends a guideline to maximize the benefits of the integration of ERP systems and performance management practices in healthcare:

1. Strengthening Top-Ranked Factors: Stress the importance of prioritizing top-tier factors such as employee involvement, effective performance measurement, and accurate data utilization; these elements are fundamental, as they ensure the ERP system aligns with real operational needs and engages employees by reflecting their input and impact. By focusing on these high-impact factors, healthcare organizations can directly enhance system effectiveness, increase employee engagement, and ensure organizational alignment.

2. Robust Mid-Tier Support: Effective leadership and managerial involvement are crucial in maintaining the momentum of ERP integration. Leaders and managers play crucial roles in bridging the gap between strategic goals and operational execution. They ensure that the ERP system is used correctly and that its data are accurate, facilitating alignment with organizational objectives. This support is essential for configuring ERP systems that complement strategic directions and operational needs for healthcare organizations.

3. Proactively Planning for Lower-Ranked Elements: Infrastructure, scalability, security, and compliance, though ranked lower, are foundational for the successful deployment

and ongoing effectiveness of ERP systems. Proactively managing these aspects to prepare for future growth, technological advancements, and evolving performance management needs, is recommended. Ensuring that the ERP system is scalable and secure helps maintain its relevance and effectiveness over time.

4. Holistic Integration: A comprehensive integration strategy that addresses all factors—high, mid, and lower-ranked factors—is recommended to create a balanced and effective ERP system. This approach not only enhances the immediate effectiveness and efficiency of the ERP implementation but also ensures its long-term sustainability and adaptability within the healthcare setting.

5. Address the Ethical Considerations, Opportunities, and Challenges of Digital Health Technology: To safeguard data and performance indicators, organizations should deploy strong cybersecurity protections. Standard protocols for system compatibility will streamline the data flow and improve performance measurement. Staff should receive comprehensive training to reduce resistance and maximize ERP and digital health technology utilization. Performance management and patient engagement can be improved by incorporating advanced analytics, telemedicine, and mobile health apps. The use of ethical technology requires patient confidentiality, informed consent for data use, and equal access to digital health solutions. Clear ethical norms and procedures are essential to stakeholder trust. ERP systems and performance management practices remain effective, relevant, and up to date by reviewing and modifying practices to keep up with changing ethical standards and technology and involving stakeholders for feedback.

By addressing these factors comprehensively, healthcare organizations can better prepare for future challenges and opportunities. This preparation involves technological readiness but also cultural and operational readiness to adapt to changes and capitalize on the capabilities provided by ERP systems. In addition, by following these guidelines, healthcare organizations can enhance both the process and outcomes of ERP integration, leading to improved performance management and ultimately better patient care and organizational efficiency. These recommendations aim to create a resilient framework within which ERP systems can evolve and adapt to meet the demands of a dynamic healthcare environment.

However, it is important to note that the sample selected for this study comprised experts specifically within the UAE healthcare context. To improve the generalizability of the findings, future research should include a broader and more diverse range of regions, rather than limiting the focus to a single geographic area. This broader approach would provide a more comprehensive understanding and enable the results to be applied globally. Additionally, since the implementation of ERP systems is relatively new in the UAE healthcare sector, future research could consider increasing the sample size of experts interviewed.

Moreover, utilizing frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT), which is used to understand and predict the adoption and use of technology within organizations, allows for a more detailed analysis of the factors influencing user acceptance and system integration [102]. By incorporating the UTAUT, future studies can provide deeper insights into how different constructs, such as performance expectancy and facilitating conditions, impact the successful deployment of these integrated systems in healthcare settings [103]. Finally, further investigation into the factors' rankings is recommended to explore the underlying reasons for their current rankings, both within the UAE context and across a wider region, using a standardized sample.

6. Conclusions

In conclusion, this study aimed to address the significant challenge of integrating Enterprise Resource Planning (ERP) systems with performance management practices within the healthcare sector of the United Arab Emirates (UAE). The main objective was to identify and evaluate the key factors that influence the successful adoption and implementation of ERP systems in the unique context of UAE healthcare. Through a structured methodology

involving expert validation and ranking, this research has provided important insights into the essential elements that contribute to the effective integration of ERP systems and performance management.

The findings indicate that the most critical factors for successful integration include the effectiveness of organizational performance measures, active employee involvement, and the alignment of ERP systems with existing business processes. These high-priority factors are crucial in ensuring that ERP systems not only meet operational requirements but also engage employees and align with the strategic objectives of the organization. Mid-level factors such as effective leadership, managerial support, and the availability of accurate data further strengthen the integration process by providing necessary guidance and infrastructure. Lower-ranked factors, while fundamental, address broader challenges such as system scalability, security, and compliance, ensuring that the ERP system remains adaptable and effective over time.

This study makes a significant contribution by offering comprehensive guidelines for healthcare organizations in the UAE to enhance ERP integration with performance management. It provides practical advice that addresses the technical, strategic, and human aspects that are essential for successful implementation. The research highlights the importance of a holistic approach, where all factors—whether high, mid, or lower-ranked—are considered to create a balanced and effective ERP system capable of adapting to the dynamic healthcare environment.

However, the study's focus on the UAE healthcare sector limits the generalizability of the findings. Future research should extend the geographic scope to include a wider range of regions and consider a larger sample of experts to further validate the findings. Additionally, exploring the underlying reasons for the current rankings of factors, both within the UAE and across broader regions, could provide deeper insights into the factors influencing the integration of ERP systems and performance management.

In summary, this study provides a solid foundation for future research and practice in the integration of ERP systems with performance management in healthcare, offering clear guidelines for enhancing operational efficiency, improving patient care, and achieving strategic objectives.

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