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A Conceptual Overview of Enterprise Resource Planning Systems

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Abstract

As digital transformation reshapes modern enterprises, Enterprise Resource Planning (ERP) systems have become essential tools for integrating and optimizing core business processes. This conceptual paper provides a comprehensive overview of ERP systems by synthesizing recent academic literature on their evolution, definitions, technical architecture, key characteristics, and modular structure. Emphasizing ERP's role as both a technological platform and a strategic enabler, the study highlights how ERP systems facilitate organizational efficiency, cross-functional coordination, and data-driven decision-making. The paper also explores emerging themes such as system flexibility, modularity, and integration in light of technological advancements. By offering a structured synthesis, this research serves as a foundational reference for scholars and practitioners seeking to understand ERP systems in the context of enterprise-wide digital innovation.

Keywords: Enterprise Resource Planning (ERP), ERP Architecture, ERP Modules, Business Integration, Digital Transformation, Modular Systems, Conceptual Framework, Information Systems

Introduction

In the contemporary era of digital transformation, Enterprise Resource Planning (ERP) systems have emerged as foundational technological infrastructures that drive operational excellence, strategic agility, and sustained competitiveness across industries. Initially developed to address the fragmented and siloed nature of enterprise information systems, ERP solutions have evolved into integrated platforms that harmonize business processes, streamline information flows, and support enterprise-wide decision-making (Lecerf & Omrani, 2020; Metawa et al., 2021). Their modular and scalable architecture enables customized deployment across functional domains such as finance, human resources, supply chain management, procurement, and customer relationship management, while maintaining centralized control and coherence through standardized processes and a unified database (Siswanto & Maulida, 2016; Berić et al., 2018; Cieciora et al., 2020). One of the defining characteristics of modern ERP systems is their ability to provide real-time visibility into organizational performance, thereby facilitating data-driven strategies and enhancing responsiveness in rapidly changing markets (Amini & Abukari, 2020a). Their transformative potential lies not only in operational integration but also in their capacity to support enterprise innovation, regulatory compliance, and globalized operations (Gagnon, 2023). This capability becomes especially critical as organizations confront increasing market volatility and complexity in decision-making environments (Sebayang et al., 2021; Usmani et al., 2024). ERP systems are strategically positioned to optimize resource utilization, promote transparency, and improve decision-making effectiveness at all organizational levels (Siswanto & Maulida, 2016; Berić et al., 2018; Cieciora et al., 2020). Their modularity empowers organizations to implement ERP solutions in a phased or customized manner, aligning with unique operational needs and strategic goals, while ensuring interoperability and adaptability (Gagnon, 2023). However, despite their numerous advantages, ERP systems are also associated with considerable challenges, particularly in terms of system implementation, integration with legacy processes, user adoption, and organizational alignment (Bagheri & Meymandi, 2022). These complexities necessitate a comprehensive understanding of ERP systems as both technological and organizational constructs. From both academic and practical standpoints, ERP systems offer rich avenues for inquiry and innovation. For researchers, ERP serves as a platform for exploring intersections of system architecture, digital transformation, and organizational change. For practitioners and decision-makers, ERP functions as a critical enabler of performance optimization, strategic alignment, and enterprise-wide innovation (Berić et al., 2018; Kenge & Khan, 2020).

This paper presents a structured conceptual overview of ERP systems, synthesizing current academic literature to trace their historical evolution, definitional developments, architectural features, and core functional modules. By integrating empirical insights and scholarly perspectives, the study aims to establish a foundational reference for future research and practical implementation, particularly in the context of digital transformation and enterprise innovation.

ERP System

In the modern era of technological advancement, Enterprise Resource Planning (ERP) systems have become comprehensive IS/ICT-based solutions widely adopted across industries. These systems are now considered essential for enterprises regardless of size small, medium, or large and across both public and private sectors. ERP systems serve as strategic tools,

enabling organizations to enhance business processes, synchronize operations, and optimize resource utilization to gain competitive advantage (Attri & Panwar, 2018; Hodak, 2021). ERP systems are structured as multi-module software applications that integrate core business and management processes within and across organizational boundaries (Ali & Miller, 2017). They employ centralized databases that collect, manage, and disseminate organizational information across various modular applications, thereby supporting consistent and efficient enterprise-wide operations (Estefania et al., 2018). Built on a unified IT architecture, ERP systems support a broad spectrum of business functions including product planning, sales, marketing, distribution, inventory and project management, maintenance, shipping, e-commerce, production, payroll, supply chain management, logistics, financial and cost accounting, customer relationship management, scheduling, and human resource management (Al Mahrami & Hakro, 2018; Dziembek, 2021). This functionality allows organizations to automate workflows, streamline communication between departments, centralize administration, and reduce IT expenditures, thereby enhancing overall productivity (Rouhani & Mehri, 2018; Marsudi & Pambudi, 2021). The increasing importance of ERP systems stems from the growing need for timely and accurate business information to support strategic decision-making and maintain competitiveness (Ramli & Widayat, 2017; Alomari et al., 2018; Elgohary, 2019). As technology evolves and organizational requirements become more complex, global demand for ERP solutions continues to rise (Osnes et al., 2018; Alaskari et al., 2019; AboAbdo et al., 2019). The future of ERP systems appears promising, as they are expected to transcend conventional organizational boundaries and redefine ownership models (Almahamid, 2019; Szelągowski et al., 2022).

ERP System Concept

The concept of an ERP system is centred on the ability to utilize, store, retrieve, transmit, and manipulate data through a unified application. At its core, ERP is built around a singular, well-defined data structure linked to a centralized database, ensuring seamless information flow across the enterprise (Katuu, 2020; Semenoff, 2020). ERP can be conceptualized as a cross-functional platform that integrates and automates both internal and external business operations. These operations span functions such as finance, accounting, marketing, logistics, order processing, human resources, sales, production, and distribution. Through such integration, ERP systems help organizations achieve strategic objectives including operational efficiency, organizational agility, and responsiveness to market demands (Eker & Aytaç, 2017; Ravasan & Rouhani, 2018; Mahmood et al., 2019). The conceptual architecture of an ERP system is shown in Figure 1.

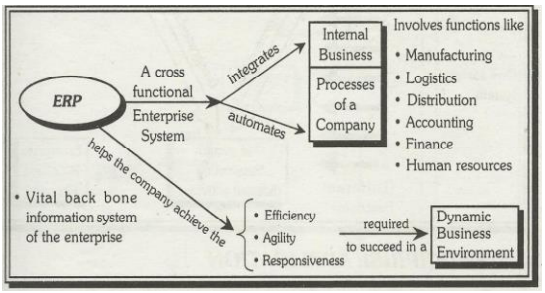

Figure 1: *ERP System Concept* (Murthy, 2008, p.3)

ERP System Outline

ERP is viewed as a comprehensive resource planning philosophy implemented through sophisticated software that integrates all major business functions within an organization into a single computing environment (Mastalerz, 2018; Bytniewski et al., 2020). Before ERP adoption, departments typically operate in isolation, each with its own application and separate database tailored to its needs. As shown in Figure 2, this fragmented structure may enhance individual departmental performance but often undermines overall enterprise efficiency due to data silos and lack of system interoperability (Tenhiälä et al., 2018).

Figure 2**:** *Standalone Systems within an Enterprise*

ERP systems overcome these inefficiencies by integrating diverse business functions into a unified software platform supported by a centralized database. This integration enables real-time communication, data sharing, and coordination among departments, thus improving organizational effectiveness (Ivanović et al., 2021). As illustrated in Figure 3, ERP replaces isolated systems with a modular architecture that delivers tailored functionality to each department while maintaining a unified data environment. This approach enhances cross-functional collaboration, streamlines business processes, and facilitates informed decision-making across the enterprise (Bender et al., 2021; Malik & Khan, 2021; Zaied & Mohmed, 2021).

Figure 3: *ERP System Deployed in an Enterprise*

ERP System Definition

Enterprise Resource Planning (ERP) systems have been defined and interpreted in various ways by scholars and practitioners, reflecting their evolution from basic inventory control tools in the 1960s to sophisticated enterprise-wide digital platforms (Badewi et al., 2018; Polivka & Dvorakova, 2021). Initially focused on production and material planning, ERP systems have grown to encompass cross-functional integration, real-time analytics, cloud

infrastructure, and strategic business process management (Goldston, 2020; Bagheri & Meymandi, 2022; Saxena & Verma, 2022). As organizations face increasingly dynamic environments, ERP systems have evolved to support data-driven decisions, interdepartmental collaboration, and agile operational capabilities (Zhao & Tu, 2021; Dumitru et al., 2023). Table 1 presents a curated selection of ERP system definitions that capture this transition, highlighting both technical sophistication and managerial value in today's digital enterprise landscape.

Table 1
Evolution of ERP Definitions (1960-2025)

Decade	Author(s) Year	Definition
1960s	Goldston (2020b)	Early computer applications in manufacturing emphasized aligning production systems with strategic objectives using technology.
	Katuu (2020b)	Introduced Materials Requirements Planning (MRP), a precursor to ERP, to calculate material needs based on production schedules.
1970s	Dziak (2019)	Developed MRP systems to automate inventory control and scheduling, improving manufacturing efficiency.
	Saxena & Verma (2022b)	IBM's mainframe solutions integrated inventory, payroll, and manufacturing data, an early form of ERP thinking.
1980s	Selamoğlu (2023)	MRP II as an extension of MRP, integrating capacity planning and shop floor control.
	Novinskyi & Popenko (2024)	Described ERP as a merger of financial, production, and inventory systems into a single software solution.
1990s	Davenport (1998), Mathar & Gaur (2020)	ERP integrates all departments and functions within a company through a unified software system.
	Slater (1999), Harwood (2017)	ERP is a packaged business software system that automates and integrates business processes across functions.
2000s	Markus et al. (2000), Telukdarie & Sishi (2018)	ERP is both a software solution and an organizational change enabler for cross-departmental coordination.
	Kumar et al. (2003), Hajghasem et al. (2022)	ERP systems are configurable packages designed to support business integration across enterprise functions.
2010s	Abu-Shanab et al. (2015), Mladenova (2020)	ERP systems use IT tools to streamline business processes and promote integration.
	Mkokweza & Phiri (2016), AboAbdo et al. (2019b)	ERP is a collective application managing end-to-end business activities including planning and marketing.
2020s	Polivka & Dvorakova (2021)	ERP systems act as critical digital infrastructure enabling real-time integration of internal and external processes.

Li (2021)	Modern ERP systems incorporate AI, IoT, and advanced analytics to deliver intelligent automation.
Sikder (2022)	ERP unifies customer experience, operations, and data across ecosystems for transformation.
Shibly et al. (2022)	Composable ERP offers modular, cloud-based architectures for agile service delivery.
Szelągowski et al. (2023)	ERP integrates real-time analytics, flexible deployment, and industry-specific extensions.

Continue Table 1
Evolution of ERP Definitions (1960–2025)

Gašpar et al. (2023)	AI-driven ERP systems automate processes for strategic planning and business adaptation.
MANDAVA (2024)	ERP systems embed ESG tools to align data with sustainability goals.
Usmani et al. (2024)	Next-gen ERP supports decentralized environments and scalable systems.
Dziembek & Ture (2025)	ERP is a composable platform using AI for real-time planning and visibility.
Chen (2025)	ERP systems enable predictive enterprise services via modular ecosystems.

Building on this historical progression, it is evident that the definition of ERP systems has evolved in tandem with advancements in technology and changing organizational needs. Over time, ERP systems have gradually shifted from being purely internal management tools to becoming comprehensive platforms that facilitate inter-firm collaboration by integrating front-office and back-office functions. This ongoing transformation underscores the increasing emphasis on enterprise-wide connectivity, operational transparency, and strategic alignment, enabling businesses to respond more effectively to external market pressures and internal performance demands.

Characteristics of ERP Systems

A review of various definitions proposed by scholars and researchers reveals a consensus that Enterprise Resource Planning (ERP) systems are integrated platforms implemented within organizations, operating in real-time environments. ERP systems utilize a centralized database, which supports all applications and facilitates organizational functions, activities, business operations, and services within the enterprise (Alomari & Aldammagh, 2021). Furthermore, ERP systems are equipped with analytical planning capabilities and effectively bridge informational gaps across different units of an organization (Amani & Fadlalla, 2016; Feng, 2019). Fundamentally, ERP systems exhibit several essential characteristics. They are typically packaged software solutions either traditional or web-based designed to support enterprises by integrating business processes, handling the majority of enterprise transactions, and providing real-time access to enterprise-wide data through a unified database (Abeyratne, 2018; Latała, 2018). According to Zughoul et al. (2016), the core characteristics of ERP systems can be grouped into three main categories:

- "Technical" including flexibility, complexity, and openness.
- "Organizational" encompassing integration, best practices, completeness, and the change process.
- "Informational" referring to the system's functionality as a software package.
  These categories and their corresponding features are depicted in Figure 4, adapted from Zughoul et al. (2016).

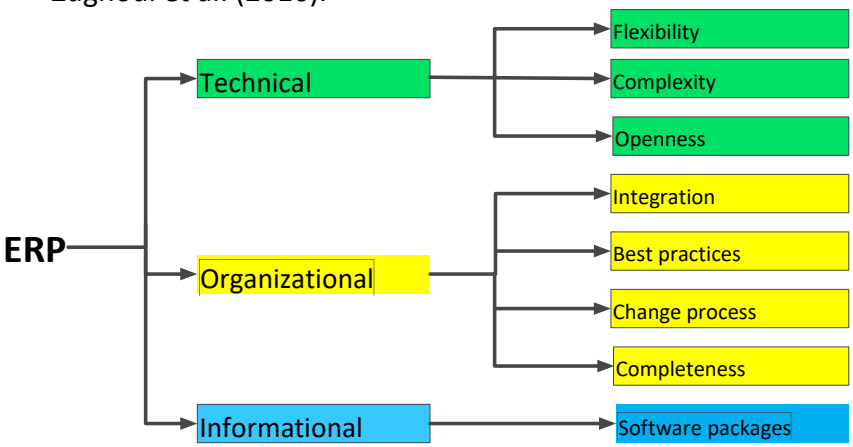

Figure 4*: ERP System Characteristics*, Source: Zughoul et al. (2016).

Flexibility

Flexibility is considered one of the most critical characteristics that distinguish ERP systems from other IT applications (Sarferaz, 2022). This feature is particularly relevant to strategic business decision-making (Stancu & Drăguţ, 2018). Enterprises often customize and configure ERP systems according to their specific needs and operational requirements to enhance competitiveness (Khadrouf et al., 2018; Alomari & Mohd, 2020).

Complexity

ERP systems are among the most complex types of information systems within the IT domain (Schlichter et al., 2021). They are designed as standalone applications with user-friendly interfaces, yet they often operate independently from other organizational applications (Wibowo & Sari, 2018). Their complexity arises from the integration of multiple modules, each managing various business functions and resources. This intermodular interaction contributes to the system's complexity and necessitates significant effort for both development and user interaction (Freeze & Schmidt, 2015; Roekel & Steen, 2019).

Openness

ERP systems have undergone continuous evolution, often requiring organizations to upgrade or replace legacy infrastructures (Abd Elmonem et al., 2016). This development has generally occurred gradually, supporting flexibility and adaptability (Harwood, 2017). ERP systems feature an open architecture that allows for modular configuration, enabling the addition or removal of individual modules without affecting the overall system (Amini & Abukari, 2020a). Moreover, ERP systems are compatible with multiple hardware platforms and support integration with third-party applications (Ali & Miller, 2017; Haddara, 2018; Patalas-Maliszewska et al., 2022).

Integration

A defining characteristic of ERP systems is their integrative nature, which allows for the coordination of tasks, activities, and information sharing across various departments within an organization (Tarigan et al., 2020). This tightly coupled integration differentiates ERP systems from other IT applications (Estefania et al., 2018). Integration enables the connection of ERP software with other applications to facilitate efficient information flow and improved productivity (Samara, 2015). It often involves conventional methods such as Enterprise Service Bus (ESB), Integration Platform as a Service (iPaaS), and point-to-point integrations (Bridwell et al., 2018). However, the integration process can be complex, given that each connected software may have distinct data management protocols. ERP integration ensures accurate and useful synchronization of information (Andročec et al., 2018).

Best Practices

ERP systems are designed to embed and enforce best business practices (Amini & Abukari, 2020b). Their adoption supports diverse business processes across various enterprise types, ultimately enhancing productivity and competitive advantage (Gronwald, 2017). Through their modular capabilities, ERP systems connect all parts of an organization, promoting improved workflows and more effective business operations (Tarigan & Basana, 2019). The ability to implement industry-standard processes without significant customization is a key factor in ERP system adoption (Latała, 2018).

Change Process

The implementation of ERP systems typically results in structural changes within an organization, affecting business processes, job roles, and workflow dynamics (Simatupang et al., 2016; Raja et al., 2020). ERP systems also influence decision-making and operational procedures (Comuzzi & Parhizkar, 2017). Their impact extends to various organizational dimensions, including technology, structure, strategy, people, tasks, and culture. Hence, ERP systems serve not only as technological solutions but also as catalysts for organizational transformation, enhancing both operational and dynamic capabilities (Gunjal, 2019; Alsharari, 2020).

Completeness

Completeness is another critical feature of ERP systems, referring to their generic yet comprehensive functionalities suitable for diverse organizational needs. Enterprises with distinct workflows can benefit from ERP systems that offer modular and customizable functionalities (Liere-Netheler et al., 2017). ERP systems encompass multiple components and interrelations among software, hardware, and human resources, collectively influencing enterprise-wide operations (Sun et al., 2015; Abeyratne, 2018). This broader scope enables ERP systems to impact the entire enterprise structure, in contrast to the limited functionality of earlier software packages (Soliman & Karia, 2015; Mekadmi & Louati, 2018).

Software Package

Perhaps the most distinguishing feature of an ERP system is its form as a software package developed specifically for enterprise use (Raj, 2016; Kiran & Reddy, 2019). ERP software packages are designed to be configurable, allowing enterprises to add, remove, or adjust modules according to their operational requirements (Li, 2021). These packages support the full spectrum of enterprise business processes, including finance, human resources,

procurement, manufacturing, logistics, sales, distribution, and warehouse management (Ruivo et al., 2015; Venkatraman & Fahd, 2016; Berić et al., 2018; Lutfi et al., 2022).

Modules of ERP Systems

Enterprise Resource Planning (ERP) systems consist of various modules, each tailored to meet distinct business needs within an organization. The primary function of each module is to capture data across all business domains and store it in a centralized database (Siswanto & Maulida, 2016; Chaushi et al., 2018; Jadawala & Patel, 2020). This centralized data repository empowers decision-makers to assess and compare performance across different business units (Lecerf & Omrani, 2020; Metawa et al., 2021). One of the most defining characteristics of ERP systems is their modularity, which enables organizations to adapt to evolving business demands and gain a competitive edge (Siswanto & Maulida, 2016; Jadawala & Patel, 2020). Companies typically implement modules aligned with their business models, operational capacities, and specific challenges, with the flexibility to add further modules as new requirements emerge (Zadeh et al., 2020; Rahul et al., 2022). Common ERP modules essential to business operations include Financial and Accounting (FA), Manufacturing (MM), Human Resources (HRM), Procurement (PR), Inventory Management (IMM), Order Management (OM), Warehouse Management (WM), Supply Chain Management (SCM), Customer Relationship Management (CRM), Project Management (PM), Workforce Management (WFM), E-commerce (ECOM), and Marketing Automation (MA) (Al Hayek & Odeh, 2020; Surjit, 2021). These modules are elaborated in the following figure 5 and subsections.

Figure 5: *ERP System Modules*

Financial and Accounting Module (FA)

The Financial and Accounting module is a cornerstone of ERP systems, offering tools to assess current financial health and forecast future performance (Hassan & Mouakket, 2016; Bazhair & Sandhu, 2020; Nasution et al., 2020). It supports financial operations such as managing accounts payable and receivable, maintaining general ledgers, and generating key documents including balance sheets, tax filings, and payment receipts (Singh & Best, 2016; Putri et al., 2018). Additionally, it automates processes like billing, reconciliation, cash management, and vendor payments, enabling timely book closures and compliance with accounting standards

(Mira et al., 2020). This module also aids financial planning and analysis by producing critical reports such as profit and loss statements, board reports, and scenario analyses (UNGUREANU, 2022; Zhang et al., 2022).

Procurement Module (PR)

Often referred to as the purchasing module, the Procurement module handles the sourcing of goods and materials necessary for production or resale (Siswanto & Maulida, 2016; Faccia & Petratos, 2021). It maintains a list of approved vendors and suppliers to facilitate supplier relationship management (Karlina et al., 2019; Utomo et al., 2021). The module streamlines quote requests and monitors their lifecycle, assists the purchasing department with preparing purchase orders, and tracks order statuses until delivery (Naveed et al., 2016; Njualem & Smith, 2018; Kirana et al., 2021). It also updates inventory levels automatically upon order receipt (Reid-Regier & Snage, 2022).

Manufacturing Module (MM)

The Manufacturing module is essential for production-centric enterprises, building on traditional MRP (Material Requirements Planning) systems (C. D. Singh et al., 2017; Mogrovejo et al., 2020; Pratama et al., 2021). Modern ERP platforms integrate MES (Manufacturing Execution System) and PMS (Production Management System) functionalities (Rezaeian & Wynn, 2016; Ho et al., 2018; Kabir, 2020). This module supports production planning, resource allocation, real-time progress monitoring, and forecasting accuracy (ElMadany et al., 2022; Chopra et al., 2022). It also provides visibility into work-in-progress and finished goods, enabling efficient supply planning and meeting production goals (Nafianto et al., 2019; Ikhsan et al., 2020; SIKA et al., 2022).

Inventory Management Module (IMM)

The Inventory Management module offers comprehensive control over inventory by tracking stock locations and Stock Keeping Units (SKU) (Wei et al., 2017; Nugra et al., 2018; Lubis et al., 2021). Integrated with procurement, it ensures real-time insights into current and incoming stock (Zhao & Tu, 2021; Rahul et al., 2022). It also optimizes inventory costs by balancing stock levels, minimizing capital tied up in excess inventory (Coronado-Hernandez et al., 2019). By analysing sales trends, it aids decision-making to boost profit margins and inventory turnover, while preventing stockouts and delays (Jituri et al., 2018; Jenab et al., 2019; Surung et al., 2020).

Order Management Module (OM)

The Order Management module monitors customer orders from initiation to delivery (Shaltayev & Hasbrouck, 2019). It synchronizes order data across warehouses, retail outlets, and distribution Centers, ensuring timely order fulfilment and shipping (Kunath & Winkler, 2019; H. Zhang, 2022). By reducing lost orders and minimizing expedited shipping costs, it enhances customer satisfaction and operational efficiency (Shaltayev & Hasbrouck, 2019; Grobler-Dębska et al., 2022).

Warehouse Management Module (WM)

The Warehouse Management module delivers rapid ROI, especially for enterprises operating in-house warehouses (Woźniakowski et al., 2018; Utami et al., 2020). It optimizes storage, picking, and shipment workflows, while planning labour needs (Vilenne, 2020; Putra et al.,

2020). It supports advanced picking methods batch, wave, and zone tailored to business needs, and ensures seamless integration with inventory and order management for timely deliveries (Titova, 2016; Hanifah & Al Ghofari, 2017; Hanum et al., 2020; Shibly et al., 2022; .Grobler-Dębska et al., 2022).

Supply Chain Management Module (SCM)

This module tracks the end-to-end movement of goods—from suppliers to manufacturers, distributors, and customers (Acar et al., 2017; Surung et al., 2020; Rahul et al., 2022). It also handles returns, replacements, and refunds (Oghazi et al., 2018; Surung et al., 2020). While integrating with procurement, inventory, manufacturing, order, and warehouse modules, its broader scope significantly enhances enterprise productivity (Tarigan & Siagian, 2020; Essila, 2020; Linda et al., 2022).

Customer Relationship Management Module (CRM)

The CRM module stores detailed customer and prospect data including communication and purchase histories (Mukutu, 2022; Rinaldy & Juarna, 2022). It supports customer service by providing access to relevant client information and is vital for sales lead management (Zucco Monti et al., 2017; Krizanic et al., 2019; Issa & Qutaishat, 2020). The module also identifies cross-sell opportunities and manages targeted promotions, enabling segmentation and advanced reporting (Aljawarneh & Al-Omari, 2018; Gebreyes, 2018; PATEL, 2018; Cieciora et al., 2020; Ragulan, 2021).

Professional Services Automation Module (PSA)

Also known as the Service Resource Management module, PSA facilitates project planning and execution for service-based organizations (Kakkar, 2021; Suutarinen, 2021). It manages human and capital resources, tracks project status, and streamlines timesheet approvals (Amini & Abukari, 2020a; Kivinen, 2020). It also centralizes documentation for team collaboration and automates client billing (Huttunen, 2017; Edge, 2018; McLean, 2020; Salmela, 2021; Viitanen, 2021).

Workforce Management Module (WFM)

The WFM module addresses time tracking, scheduling, and labour optimization, aligning workforce efforts with business strategy (R. Freeze & Bristow, 2018; Senn, 2020). It integrates planning functions such as forecasting, risk analysis, and headcount planning (Mahar et al., 2020; Igna, 2021; AL Nawaiseh et al., 2022). The module oversees attendance, payroll distribution, and generates reports on labour costs and performance metrics (Braglia et al., 2019; Lawton-Thesing, 2020; Lobkov, 2020; Shibly et al., 2022).

Human Resource Management Module (HRM)

The HRM module manages comprehensive employee data, streamlining daily administrative tasks (Vaideeswaran & Kulandai, 2019; Zhao & Tu, 2021). It features payroll automation, biometric tracking, leave management, and benefits administration (Alhalboosi et al., 2021; Atries et al., 2021; Bouhazzama & Mssassi, 2022). Centralized employee records reduce redundancy and improve data accuracy (Maria, 2018; Tung et al., 2020; Lee & Seo, 2021).

E-Commerce Module (E-COM)

In today's digital economy, the E-commerce module enables businesses to operate B2B and B2C platforms (Krithika et al., 2020; Santos & Martinho, 2021). It allows for easy product updates, site customization, and integration with payment, inventory, and order management systems (Font Escribano et al., 2017; Terminanto & Hidayanto, 2018; Qi et al., 2021). This integration ensures seamless order fulfilment and accurate accounting (Carvalho, 2018; .(Güvenc, 2020; Arisandy et al., 2022).

Marketing Automation Module (MA)

The Marketing Automation module supports the execution of digital campaigns, lead nurturing, and customer retention strategies (Tao et al., 2021; Suero Martínez, 2022). It manages multichannel marketing across email, SMS, web, and social platforms (Mu'id et al., 2018; Dar et al., 2021). With advanced segmentation and reporting tools, this module enables campaign personalization and tracks ROI (Gaharwar et al., 2017; DENDIR, 2019; Komansilan & Iriani, 2019; Sagegg & Alfnes, 2020; Aqmarina et al., 2021; Romero-Palma, 2021).

Conclusion

Enterprise Resource Planning (ERP) systems have emerged as vital technological frameworks that enable organizations to integrate, automate, and optimize core business functions within a unified digital environment. This paper has presented a comprehensive conceptual overview of ERP systems by examining their evolving definitions, key characteristics, and modular architecture. The historical progression of ERP from its origins in inventory control and MRP systems to today's AI-enabled, cloud-based, and composable platforms highlights the system's dynamic adaptability in response to technological innovation and organizational complexity. The review underscores that ERP systems are not merely software solutions, but strategic enablers of enterprise-wide transformation. Core characteristics such as integration, flexibility, openness, and completeness position ERP systems as foundational tools for enhancing organizational efficiency, decision-making, and competitive responsiveness. Moreover, the modular nature of ERP systems allows enterprises to tailor implementations based on operational needs, promoting scalability and functional alignment across departments. By dissecting the various ERP modules ranging from financial accounting and procurement to supply chain, human resources, and customer relationship management—this study illuminates the functional depth and strategic breadth that ERP systems offer. These modules collectively support real-time data flow, process automation, and strategic visibility, which are critical for thriving in increasingly complex and data-driven business environments. This conceptual synthesis provides a valuable reference for academics, system designers, and enterprise decision-makers seeking to understand ERP systems from a holistic perspective. Future research could explore the implications of emerging technologies such as machine learning, Internet of Things (IoT), and blockchain—on the next generation of ERP systems, particularly within SMEs and digitally transforming economies.

References

Abd Elmonem, M. A., Nasr, E. S., & Geith, M. H. (2016). Benefits and challenges of cloud ERP systems–a systematic literature review. *Future Computing and Informatics Journal*, *1*(1–2), 1–9.

Abeyratne, D. (2018). *Impact of ERP System Characteristics for the Business Performance of Manufacturing Companies in Sri Lanka*.

AboAbdo, S., Aldhoiena, A., & Al-Amrib, H. (2019a). Implementing enterprise resource planning ERP system in a large construction company in KSA. *Procedia Computer Science*, *164*, 463–470.

AboAbdo, S., Aldhoiena, A., & Al-Amrib, H. (2019b). Implementing Enterprise Resource Planning ERP system in a large construction company in KSA. *Procedia Computer Science*, *164*, 463–470.

Abu-Shanab, E., Abu-Shehab, R., & Khairallah, M. (2015). Critical Success Factors for ERP Implementation: The Case of Jordan. *Int. Arab. J. e Technol.*, *4*(1), 1–7.

Acar, M. F., Zaim, S., Isik, M., & Calisir, F. (2017). Relationships among ERP, supply chain orientation and operational performance: An analysis of structural equation modeling. *Benchmarking: An International Journal*.

Al Hayek, W. Y., & Odeh, R. A. A. (2020). Cloud ERP VS On-Premise ERP. *International Journal of Applied*, *10*(4), 55–60.

Al Mahrami, E. H. K., & Hakro, A. N. (2018). Effectiveness of ERP system in selected organizations in Sultanate of Oman. *2018 Majan International Conference (MIC)*, 1–6.

AL Nawaiseh, K., Alawamleh, H., Al Shibly, M., & Almari, M. (2022). The Relationship Between the Enterprise Resource Planning System and Maintenance Planning System: An Empirical Study. *Information Sciences Letters*, *11*(5), 2.

Alaskari, O., Pinedo-Cuenca, R., & Ahmad, M. M. (2019). Framework for Selection of ERP System: Case Study. *Procedia Manufacturing*, *38*, 69–75.

Alhalboosi, F. H. A., Mawlood, S. J., & Al-halboosi, I. A. M. (2021). Role of ERP Systems in Improving Human Resources Management Processes. *Review of International Geographical Education Online*, *11*(4), 1667–1681.

Ali, M., & Miller, L. (2017). ERP system implementation in large enterprises–a systematic literature review. *Journal of Enterprise Information Management*.

Aljawarneh, N., & Al-Omari, Z. (2018). The role of enterprise resource planning systems ERP in improving customer relationship management CRM: An empirical study of safeway company of Jordan. *International Journal of Business and Management*, *13*(8), 86–100.

Almahamid, S. (2019). The influence of ERP system usage on agile capabilities. *Information Technology & People*.

Alomari, I. A., & Aldammagh, Z. J. (2021). ERP Business Process Attributes to Create Competitive Advantage. *International Journal of Business and Economics Research*, *10*(1), 40.

Alomari, I. A., Amir, A. M., Aziz, K. A., & Auzair, S. M. (2018). Effect of Enterprise Resource Planning Systems and Forms of Management Control on Firm's Competitive Advantage. *Asian Journal of Accounting and Governance*, *9*.

Alomari, I. A., & Mohd, A. (2020). ERP business process attributes and management control to create competitive advantage. [illegible])1(*28*, [illegible].

Alsharari, N. M. (2020). Institutional change of cloud ERP implementation in the public sector: A transformation of strategy. *International Journal of Disruptive Innovation in Government*.

Amani, F., & Fadlalla, A. (2016). Organizing ERP research: a knowledge-centric approach. *Journal of Enterprise Information Management*.

Amini, M., & Abukari, A. M. (2020a). ERP Systems Architecture For The Modern Age: A Review of The State of The Art Technologies. *Journal of Applied Intelligent Systems and Information Sciences*, *1*(2), 70–90.

Amini, M., & Abukari, A. M. (2020b). ERP systems architecture for the modern age: A review of the state of the art technologies. *Journal of Applied Intelligent Systems and Information Sciences*, *1*(2), 70–90.

Andročec, D., Picek, R., & Mijač, M. (2018). The ontologically based model for the integration of the IoT and Cloud ERP services. *Proceedings of the 8th International Conference on Cloud Computing and Services Science*, 481–488.

Aqmarina, I., Suroso, A. I., & Ratono, J. (n.d.). *Analysis of Marketing Strategy of PT. ERP as a Modern Smartphone Retailer*.

Arisandy, E., Qoriah, R., Nova, S. H., Sediyono, E., & Widodo, A. P. (2022). Implementation of B2B E-Commerce in the Enterprise Market. *Sistemasi: Jurnal Sistem Informasi*, *11*(1), 46–54.

Atries, A., Ragab, A. A., Ragheb, M. A., & Wahba, M. (2021). The effect of enterprise resource planning on the organizational performance of organizations through HRM practices: An Applied Study on the Reinforcing Steel Sector Companies in Egypt. *The Business & Management Review*, *12*(1), 41–56.

Attri, R., & Panwar, N. (2018). A literature review on the implementation of Enterprise Resource Planning (ERP) system. *International Journal of Metallurgy and Alloys*, *4*(2), 21–24.

Badewi, A., Shehab, E., Zeng, J., & Mohamad, M. (2018). ERP benefits capability framework: orchestration theory perspective. *Business Process Management Journal*, *24*(1), 266–294.

Bagheri, I., & Meymandi, M. S. (2022). *ASSESSING THE LEVELS OF BENEFITS OF ENTERPRISE RESOURCE PLANNING SYSTEM BY BALANCED SCORECARD METHOD*. https://doi.org/10.22034/JAISIS.2022.371328.1055

Bazhair, A. H., & Sandhu, K. (2020). A study of digital acceptance of ERP systems for improved financial performance. In *Digital Innovations for Customer Engagement, Management, and Organizational Improvement* (pp. 66–82). IGI Global.

Bender, B., Bertheau, C., & Gronau, N. (2021). *Future ERP Systems: A Research Agenda*. https://doi.org/10.5220/0010477307760783

Berić, D., Sekulić, D., Lolić, T., & Stefanović, D. (2018). Evolution of ERP Systems in SMEs–Past Research, Present Findings and Future Directions. *International Scientific and Expert Conference-TEAM, Novi Sad, Serbia*.

Bouhazzama, M., & Mssassi, S. (2022). The Implementation of ERP Systems for Developing Human Resources in Moroccan Public Sector Organizations. In *Distributed Sensing and Intelligent Systems* (pp. 569–575). Springer.

Braglia, M., Castellano, D., Gallo, M., & Romagnoli, G. (2019). A visual planning solution to streamline the processes of hybrid cross-dockings. *Production Planning & Control*, *30*(1), 33–47.

Bridwell, D. A., Cavanagh, J. F., Collins, A. G. E., Nunez, M. D., Srinivasan, R., Stober, S., & Calhoun, V. D. (2018). Moving beyond ERP components: a selective review of approaches to integrate EEG and behavior. *Frontiers in Human Neuroscience*, *12*, 106.

Bytniewski, A., Matouk, K., Rot, A., Hernes, M., & Kozina, A. (2020). Towards Industry 4.0: Functional and Technological Basis for ERP 4.0 Systems. *Studies in Computational Intelligence*, *887*, 3–19.

Carvalho, A. F. M. (2018). *An interface between WebShops for eCommerce and ERP Systems at MM Software Consulting GmbH*.

Chaushi, B. A., Chaushi, A., & Ismaili, F. (2018). ERP systems in higher education institutions: Review of the information systems and ERP modules. *2018 41st International Convention on Information and Communication Technology, Electronics and Microelectronics (MIPRO)*, 1487–1494.

Chen, B. (2025). *The Comprehensive Evolution of ERP Systems: Classification, Financial Integration, and Future AI Integration*.

Chopra, R., Sawant, L., Kodi, D., & Terkar, R. (2022). Utilization of ERP systems in manufacturing industry for productivity improvement. *Materials Today: Proceedings*.

Cieciora, M., Bołkunow, W., Pietrzak, P., & Gago, P. (2020). Key criteria of ERP/CRM systems selection in SMEs in Poland. *Online Journal of Applied Knowledge Management (OJAKM)*, *8*(1), 85–98.

Comuzzi, M., & Parhizkar, M. (2017). A methodology for enterprise systems post-implementation change management. *Industrial Management & Data Systems*.

Coronado-Hernandez, J. R., Ospina-Mateus, H., Canabal-Gónzalez, D., Peña-Ballestas, D., Baron-Villamizar, J., Mercado-Carusso, N., Romero-Conrado, A. R., Paternina-Arboleda, C., & Silva, J. (2019). Implementation of an erp Inventory module in a small colombian metalworking company. *International Conference on Inventive Computation Technologies*, 905–911.

Dar, I. B., Bashir Khan, P. D., Shafiq, D., & Ali, M. (2021). Marketing analytics capability and ERP systems implementation: Theoretical framework and case study. *Journal of Contemporary Issues in Business and Government*, *27*(1), 4137–4150.

Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review*, *76*(4).

DENDIR, M. (2019). *Assessment of Enterprise Resource Planning (ERP) Implementation: In the Case of IE Network Solutions Plc, Ethiopia*. St. Mary's University.

Dumitru, V., Ionescu, B., Rîndașu, S., Electronics, L. B.-, & 2023, undefined. (2023). Implications for sustainability accounting and reporting in the context of the automation-driven evolution of ERP systems. *Mdpi.Com*. https://doi.org/10.3390/electronics12081819

Dziak, M. (2019). *Material requirements planning (MRP)*. Salem Press Encyclopedia. Retrieved from EBSCOHost Research Starters.

Dziembek, D. (2021). Integrated ERP-Class Management Information Systems–Evolution, Current State and Development Directions. *Problemy Zarządzania*, *19*(3/2021 (93), 187–210.

Dziembek, D., & Turek, T. (2025). Evolution of ERP Systems in the Perspective of Process Maturity. In *Recent Trends In Engineering and Science for Resource Optimization and Sustainable Development* (pp. 464–470). CRC Press.

Edge, C. (2018). Buy Software to Automate the Business. In *Build, Run, and Sell Your Apple Consulting Practice* (pp. 135–185). Springer.

Eker, M., & Aytaç, A. (2017). The Role of ERP in advanced managerial accounting techniques: A conceptual framework 1. *Business and Economics Research Journal*, *8*(1), 83.

Elgohary, E. (2019). The Role of ERP Capabilities in Achieving Competitive Advantage: An Empirical Study on Dakahlia Governorate Companies, Egypt. *The Electronic Journal of Information Systems in Developing Countries*, *85*(4), e12085.

ElMadany, H., Alfonse, M., & Aref, M. (2022). Forecasting in Enterprise Resource Planning (ERP) Systems: A Survey. *Digital Transformation Technology*, 395–406.

Essila, J. C. (2020). The Dynamics of Electronic Supply Chains and Enterprise Resource Planning Systems: The New Business Challenge. In *Supply Chain and Logistics Management: Concepts, Methodologies, Tools, and Applications* (pp. 1766–1782). IGI Global.

Estefania, T. V., Samir, L., Robert, P., Patrice, D., & Alexandre, M. (2018). The integration of ERP and inter-intra organizational information systems: A Literature Review. *IFAC-PapersOnLine*, *51*(11), 1212–1217.

Faccia, A., & Petratos, P. (2021). Blockchain, enterprise resource planning (ERP) and accounting information systems (AIS): Research on e-procurement and system integration. *Applied Sciences*, *11*(15), 6792.

Feng, L. (2019). Design and Implementation of ERP Management System for Manufacturing Enterprise. *Journal of Physics: Conference Series*, *1345*(6), 62018.

Font Escribano, J., & Reynoso Vasquez, V. K. (2017). *ERP implementation for an administrative agency as a corporative frontend and an e-commerce smartphone app*. Universitat Politècnica de Catalunya.

Freeze, R., & Bristow, S. (2018). ERP knowledge: enhancing program growth for workforce impact. *Proceedings of the 51st Hawaii International Conference on System Sciences*.

Freeze, R. D., & Schmidt, P. J. (2015). To use or not to Use—ERP resistance is the question: The roles of tacit knowledge and complexity. *Decision Sciences Journal of Innovative Education*, *13*(2), 247–272.

Gagnon, E. (2023). Reconceptualizing ERP Integration: A module level perspective. *Procedia Computer Science*, *219*, 596–605.

Gaharwar, G., Jacob, S., & Shringarpure, A. (2017). *Successful erp sme implementation: himak pvt. Ltd., vadodara*.

Gašpar, D., Ćorić, I., & Mabić, M. (2023). Composable ERP–New Generation of Intelligent ERP. *International Symposium on Innovative and Interdisciplinary Applications of Advanced Technologies*, 359–375.

Gebreyes, M. M. (2018). Integration of enterprise resource planning (ERP) and customer relationship management (CRM) for quality service delivery. The case of Ethiopian airlines. *Integration*, *8*(5), 12–17.

Goldston, J. (2020a). The evolution of ERP systems: A literature review. *The Evolution of ERP Systems: A Literature Review*, *50*(1), 14.

Goldston, J. (2020b). The evolution of ERP systems: A literature review. *The Evolution of ERP Systems: A Literature Review*, *50*(1), 17.

Grobler-Dębska, K., Żak, B., Fijas, M., Kowalski, M., Kopa, M., Kucharska, E., & Baranowski, J. (2022). Logistics processes optimization in ERP systems. *2022 26th International Conference on Methods and Models in Automation and Robotics (MMAR)*, 176–180.

Gronwald, K.-D. (2017). *Integrated business information systems: A holistic view of the linked business process chain ERP-SCM-CRM-BI-Big Data*. Springer.

Gunjal, S. (2019). Enterprise resource planning (erp) as a change management tool. *Journal of Management*, *6*(2).

Güvenc, F. (2020). *Selection of an Integrated ERP and Ecommerce System: Research and Analysis of Common Best-practices for Integration of ERP and Ecommerce Systems in SMEs for the Company Montenapoleone*. Berne University of Applied Sciences. Business.

Haddara, M. (2018). ERP systems selection in multinational enterprises: a practical guide. *Determinants of Analytics-Based Managerial Decision-Making*.

Hajghasem, M., Abtahi, A. R., Khalili-Damghani, K., & Yousefi-Zenouz, R. (2022). A Definition of the Level of Automation Considering ERP Systems and New Technologies to Confront the Spread of COVID-19 in Medical Centers. *J Clin Res Paramed Sci*, *11*(1), e128005.

Hanifah, E., & Al Ghofari, A. K. (2017). *Implementasi Sistem Informasi Warehouse Management Berbasis Enterprise Resource Planning (ERP) Dengan Menggunakan Aplikasi Odoo*. Universitas Muhammadiyah Surakarta.

Hanum, B., Haekal, J., & Adi Prasetio, D. E. (2020). The Analysis of Implementation of Enterprise Resource Planning in the Warehouse Division of Trading and Service Companies, Indonesia. *International Journal of Engineering Research and Advanced Technology-IJERAT (ISSN: 2454-6135)*, *6*(7), 37–50.

Harwood, S. (2017). ERP: The implementation cycle. *ERP: The Implementation Cycle*, 1–183. https://doi.org/10.4324/9781315094373/ERP-IMPLEMENTATION-CYCLE-STEPHEN-HARWOOD

Hassan, M. K., & Mouakket, S. (2016). ERP and organizational change: A case study examining the implementation of accounting modules. *International Journal of Organizational Analysis*.

Ho, T. P. D., Kumar, A., & Shiwakoti, N. (2018). Using system dynamics approach to examine the impact of ERP and Lean on manufacturing performance. *Proceedings of the 2nd European International Conference on Industrial Engineering and Operations Management (IEOM 2018)*, 350–357.

Hodak, K. (2021). DETERMINING THE BENEFITS OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS: A LITERATURE REVIEW. *Economic and Social Development: Book of Proceedings*, 105–114.

Huttunen, E. (2017). *Benchmark study to enhance business processes through ERP: case: Company X*.

Igna, R. D. (2021). The influence of the implementation of ERP systems on the performance of an organization. *Proceedings of the International Conference on Business Excellence*, *15*(1), 268–279.

Ikhsan, I., Ridwan, A. Y., & Saputra, M. (2020). Green Production Using ERP: Case Study in The Leather Tanning Industry. *2020 8th International Conference on Information and Communication Technology (ICoICT)*, 1–6.

Issa, W. B., & Qutaishat, F. (2020). *The Moderating Effect of Integration between ERP and CRM Systems on Organizational Performance*.

Ivanović, T., … M. M.-M. and D. S. S. in, & 2021, undefined. (2021). Application of modern Enterprise Resource Planning (ERP) systems in the era of digital transformation. *Smjournal.Rs*, *26*(4), 28–036. https://doi.org/10.5937/StraMan2104028I

Jadawala, R., & Patel, S. (2020). *Proposed ICT based ERP modules for milk cooperatives*.

Jenab, K., Staub, S., Moslehpour, S., & Wu, C. (2019). *Company performance improvement by quality based intelligent-ERP*.

Jituri, S., Fleck, B., & Ahmad, R. (2018). A methodology to satisfy key performance indicators for successful ERP implementation in small and medium enterprises. *International Journal of Innovation, Management and Technology*, *9*(2), 79–84.

Kabir, M. R. (2020). Impact of ERP Implementation on Productivity and Profitability: An Empirical Study on the Largest Bangladeshi Steels Manufacturer. *International Journal of Entrepreneurial Research*, *3*(4), 88–94.

Kakkar, P. (2021). Business transfomation with cloud ERP. *International Journal of Management IT and Engineering*, *11*(3), 27–31.

Karlina, O., Ridwan, A. Y., & Fajrillah, A. A. N. (2019). Designing green procurement system based on enterprise resources planning for the rubber processing industry. *2019 International Conference on Electrical Engineering and Informatics (ICEEI)*, 608–613.

Katuu, S. (2020a). Enterprise resource planning: past, present, and future. *New Review of Information Networking*, *25*(1), 37–46.

Katuu, S. (2020b). Enterprise resource planning: past, present, and future. *New Review of Information Networking*, *25*(1), 37–46.

Kenge, R., & Khan, Z. (2020). A Research Study on the ERP System Implementation and Current Trends in ERP. *Shanlax International Journal of Management*, *8*(2), 34–39.

Khadrouf, O., Chouki, M., Talea, M., & Bakali, A. (2018). ERP System Customization in Moroccan SMEs. *2018 IEEE International Conference on Technology Management, Operations and Decisions (ICTMOD)*, 55–60.

Kiran, T., & Reddy, A. (2019). Critical success factors of ERP implementation in SMEs. *Journal of Project Management*, *4*(4), 267–280.

Kirana, D. A., Saputra, M., & Puspitasari, W. (2021). Enterprise Resource Planning of Procurement Process with SAP MM Module. *International Journal of Innovation in Enterprise System*, *5*(01), 55–64.

Kivinen, S. (2020). *Enhancing Operations Management Efficiency and Employee Experience Through Data*.

Komansilan, R., & Iriani, A. (2019). Design and Analysis of ERP Integration for Pari Fish Leather Smes in Yogyakarta Using Web Service Technology. *International Journal Of Engineering And Computer Science*, *8*(6).

Krithika, L. B., Prabadevi, B., Deepa, N., & Bhavanasi, S. (2020). Integration of E-Commerce System with Various ERP Tools. *2020 International Conference on Emerging Trends in Information Technology and Engineering (Ic-ETITE)*, 1–8.

Krizanic, S., Sestanj-Peric, T., & Tomicic-Pupek, K. (2019). The changing role of ERP and CRM in Digital Transformation. *Economic and Social Development: Book of Proceedings*, 248–256.

Kumar, V., Maheshwari, B., & Kumar, U. (2003). An investigation of critical management issues in ERP implementation: emperical evidence from Canadian organizations. *Technovation*, *23*(10), 793–807.

Kunath, M., & Winkler, H. (2019). Usability of information systems to support decision making in the order management process. *Procedia Cirp*, *81*, 322–327.

Latała, D. (2018). Characteristics of ERP class system. *AUTOBUSY–Technika, Eksploatacja, Systemy Transportowe*, *19*(6), 1221–1224.

Lawton-Thesing, A. R. (2020). *Employee Experiences with an ERP Implementation*.

Lecerf, M., & Omrani, N. (2020). SME internationalization: The impact of information technology and innovation. *Journal of the Knowledge Economy*, *11*(2), 805–824.

Lee, J.-W., & Seo, H.-S. (2021). A Study on the API Gateway for human resources management modules extensions in ERP. *Journal of the Korea Society of Computer and Information*, *26*(2), 79–88.

Li, C. (2021). ERP packages: what's next? In *Data Management* (pp. 903–910). Auerbach Publications.

Liere-Netheler, K., Vogelsang, K., Hoppe, U., & Steinhüser, M. (2017). *Towards the User: Extending the Job Characteristics Model to Measure Job Satisfaction for ERP Based Workplaces–A Qualitative Approach*.

Linda, M. R., Thabrani, G., Suhery, S., Yonita, R., Ravelby, T. A., Pujani, V., & Hasan, A. (2022). Organizational Performance: The Role of Enterprise Resource Planning and Supply Chain Management. *AFEBI Management and Business Review*, *7*(1), 47–56.

Lobkov, K. (2020). Acceptance Testing for Software as a Service (SaaS). *Software Quality Professional*, *23*(1).

Lubis, M., Tasia, S., Ridho Lubis, A., & Al-Khowarizmi, A.-K. (2021). Enterprise Resource Planning (ERP) System Customization with the Inventory Management Module: Case Study of Rumah Yatim. *The 4th International Conference on Electronics, Communications and Control Engineering*, 7–12.

Lutfi, A., Alshira'h, A. F., Alshirah, M. H., Al-Okaily, M., Alqudah, H., Saad, M., Ibrahim, N., & Abdelmaksoud, O. (2022). Antecedents and Impacts of Enterprise Resource Planning System Adoption among Jordanian SMEs. *Sustainability*, *14*(6), 3508.

Mahar, F., Ali, S. I., Jumani, A. K., & Khan, M. O. (2020). ERP system implementation: planning, management, and administrative issues. *Indian J. Sci. Technol*, *13*(01), 1–22.

Mahmood, F., Khan, A. Z., & Bokhari, R. H. (2019). ERP issues and challenges: a research synthesis. *Kybernetes*.

Malik, M. O., & Khan, N. (2021). Analysis of ERP implementation to develop a strategy for its success in developing countries. *Production Planning & Control*, *32*(12), 1020–1035.

MANDAVA, H. (2024). The Advantages of Cloud ERP in the Global Business Landscape. *World Journal of Electrical and Electronic Engineering*, 1–5.

Maria, M. B. (2018). *Human resource practices under enterprise resource planning: a study on Bangladesh venture capital limited*. Daffodil International University.

Markus, M. L., Tanis, C., & Van Fenema, P. C. (2000). Multisite ERP implementations. *Communications of the ACM*, *43*(4), 42–46. https://doi.org/10.1145/332051.332068

Marsudi, A. S., & Pambudi, R. (2021). The Effect of Enterprise Resource Planning (ERP) on Performance with Information Technology Capability as Moderating Variable. *Journal of Economics, Business, & Accountancy Ventura*, *24*(1), 1–11.

Mastalerz, M. (2018). *Project of implementation ERP software (Microsoft Dynamics AX 2012) in production and logistic areas for a cosmetic company*. Instytut Organizacji Systemów Produkcyjnych.

Mathar, D., & Gaur, M. (2020). *Change management: Identifying change agents using social network analysis in an ERP implementation*. SSRN.

McLean, R. A. (2020). *Forecasting Clinical Revenue Services of a Large Medical Device Company When There Is Dependency on Other Departments*. Utica College.

Mekadmi, S., & Louati, R. (2018). An evaluation model of user satisfaction with enterprise resource planning systems. *Electronic Journal of Information Systems Evaluation*, *21*(2), pp143-157.

Metawa, N., Elhoseny, M., & Mutawea, M. (2021). The role of information systems for digital transformation in the private sector: a review of Egyptian SMEs. *African Journal of Economic and Management Studies*.

Mira, I. G., Lubis, M., Puspitasari, W., & Lubis, A. R. (2020). ERP system implementation with accounting modules in national amil zakat institutions. *IOP Conference Series: Materials Science and Engineering*, *801*(1), 12117.

Mkokweza, M., & Phiri, J. (2016). An Investigation on the Challenges of Enterprise Resource Planning Systems Implementation in Zambia (a comparative study of three organisations). *International Journal of Advanced Studies in Computers, Science and Engineering*, *5*(6), 1.

Mladenova, T. (2020). Open-source ERP systems: an overview. *2020 International Conference Automatics and Informatics (ICAI)*, 1–6.

Mogrovejo, P., Maldonado-Maldonado, J. M., Crespo-Martínez, E., & Astudillo, C. (2020). Procedure for the Implementation of the Manufacturing Module of an ERP System in MSME. Applied Case: Textile "Tendencias" Enterprise, UDA ERP. *International Conference on Intelligent Human Systems Integration*, 392–397.

Mu'id, D., Laksito, H., & Nugraheni, R. (2018). The role of ERP in increasing marketing performance of SMEs in Central Java, Indonesia. *Advanced Science Letters*, *24*(12), 9706–9709.

Mukutu, I. (2022). *Evaluating the effectiveness of customer relationship management applications on customer satisfaction: a case study of Zambia National Broadcasting Corporation.* The University of Zambia.

Murthy, C. S. V. (2008). *Enterprise Resource Planning and Management Information Systems*. Himalaya Publishing House.

Nafianto, C., Puspitasari, W., & Saputra, M. (2019). Development of Flexible Production Scheduling by Applying Gantt Charts in Manufacturing Module Open Source ERP (Case Study CV. XYZ). *2019 International Conference on Sustainable Engineering and Creative Computing (ICSECC)*, 182–185.

Nasution, F., Puspitasari, W., & Saputra, M. (2020). Automation financial processing in account receivable for integrated hospital system using ERP and quickstart approach. *Proceedings of the 2020 The 6th International Conference on Frontiers of Educational Technologies*, 204–211.

Naveed, R. T., Ahmad, N., & Ahmad, S. (2016). Attainment of Competitive Advantage through ERP and Procurement. *Arabian Journal of Business and Management Review (Oman Chapter)*, *6*(3), 37. https://doi.org/10.12816/0033241

Njualem, L., & Smith, M. (2018). Exploring the Effects of Enterprise Resource Planning Systems on Direct Procurement: An Upstream Asset-intensive Industry Perspective. *International Journal of Supply and Operations Management*, *5*(4), 396–402.

Novinskyi, V., & Popenko, V. (2024). Formalization of the master production shedule formation task in the MRP II planning system. *Radio Electronics, Computer Science, Control*, 167–179.

Nugra, J., Wiyarta, M., & Kurniawan, Y. (2018). The Evaluation of Inventory Management Module of Enterprise Resource Planning System (A Case Study Approach). *Proceedings of the 2018 International Conference on Internet and E-Business*, 79–83.

Oghazi, P., Rad, F. F., Karlsson, S., & Haftor, D. (2018). RFID and ERP systems in supply chain management. *European Journal of Management and Business Economics*.

Osnes, K. B., Olsen, J. R., Vassilakopoulou, P., & Hustad, E. (2018). ERP systems in multinational enterprises: A literature review of post-implementation challenges. *Procedia Computer Science*, *138*, 541–548.

Patalas-Maliszewska, J., Kłos, S., & Dostatni, E. (2022). Integrating the Assessment of Sustainability and an ERP System in Small and Medium Manufacturing Enterprise-A Case Study. *International Scientific-Technical Conference MANUFACTURING*, 50–60.

PATEL, D. R. M. (2018). *CRM integrates with ERP*. RED'SHINE Publication. Pvt. Ltd.

Polivka, M., & Dvorakova, L. (2021). Selection of the ERP System with Regard to the Global 4th Industrial Revolution. *SHS Web of Conferences*, *92*.

Pratama, I. P. A. H., Sukarsa, I. M., & Putri, G. A. A. (2021). Reengineering of Manufacturing Business Process Utilising the Manufacturing Module of an ERP Application. *Jurnal Ilmiah Merpati (Menara Penelitian Akademika Teknologi Informasi)*, *9*(3), 263–275.

Putra, M. N., Nurhakim, M., Rifni, M., & Himawan, D. (2020). Optimization Enterprise Resource Planning (ERP) system on the control flow of material in Kalijapat Warehouse. *Journal of Physics: Conference Series*, *1573*(1), 12026.

Putri, D. C. G., Witjaksono, R. W., & Idawicaksakti, M. D. (2018). Information System Design Based On Enterprise Resource Planning Using Account Payable Module Sap With ASAP Method In PT. Len Industri (Persero). *International Journal of Innovation in Enterprise System*, *2*(01), 34–44.

Qi, X., Joghee, S., & Mohammed, A. S. (2021). *E-commerce combined with enterprise management using Cloud Computing for business sector*.

Ragulan, B. (2021). Analysis of ERP, BPR and CRM. *International Journal Of*.

Rahul, K., Banyal, R. K., & Sati, H. (2022). ERP Module Functionalities for the Food Supply Chain Industries. In *Intelligent Sustainable Systems* (pp. 595–606). Springer.

Raj, A. (2016). Role of ERP software in an organization. *Retrieved September*, *6*.

Raja, S. L. N., Joseph, N., & Totawar, A. (2020). Analysing ERP Implementations from Organizational Change Perspective: An Exploratory Study. *International Working Conference on Transfer and Diffusion of IT*, 674–678.

Ramli, I., & Widayat, U. (2017). ERP Usage Model towards Competitive Advantage. *International Journal of Economic Perspectives*, *11*(1), 1580–1597.

Ravasan, A. Z., & Rouhani, S. (2018). An Expert System for Predicting ERP Post-Implementation Benefits Using Artificial Neural Network. In *Operations and Service Management: Concepts, Methodologies, Tools, and Applications* (pp. 760–784). IGI Global.

Reid-Regier, A., & Snage, B. (2022). Procurement Information Systems. *Procurement in the Supply Chain World*.

Rezaeian, M., & Wynn, M. (2016). The implementation of ERP systems in Iranian manufacturing SMEs. *International Journal on Advances in Intelligent Systems*, *9*(3 & 4), 600–614.

Rinaldy, R. A., & Juarna, A. (2022). Implementation of Enterprise Resource Planning (ERP), and Customer Relationship Management (CRM) Systems to Support Business Operations in PT. Wira Pratama. *Science*, *7*(1), 208–211.

Romero-Palma, M. (2021). Choosing the Right Marketing Automation Platform: A SME Success Story. In *B2B Marketing* (pp. 559–578). Springer.

Rouhani, S., & Mehri, M. (2018). Empowering benefits of ERP systems implementation: empirical study of industrial firms. *Journal of Systems and Information Technology*, *20*(1), 54–72.

Ruivo, P., Oliveira, T., & Neto, M. (2015). Using resource-based view theory to assess the value of ERP commercial-packages in SMEs. *Computers in Industry*, *73*, 105–116.

Sagegg, O. J., & Alfnes, E. (2020). *ERP systems for manufacturing supply chains: applications, configuration, and performance*. CRC Press.

Salmela, K. (2021). *Projektikohtaisen kustannusseurannan kehittäminen: case X Oy*.

Samara, T. (2015). *ERP and information systems: Integration or disintegration*. John Wiley & Sons.

Santos, F., & Martinho, R. (2021). Architectural Challenges on the Integration of e-Commerce and ERP Systems: A Case Study. *ICEIS (1)*, 313–319.

Sarferaz, S. (2022). Challenges and Characteristics of ERP Systems. In *Compendium on Enterprise Resource Planning* (pp. 3–15). Springer.

Saxena, D., & Verma, J. K. (2022a). ERP on the Cloud: Evolution, Benefits, and Critical Success Factors. In *Cloud IoT* (pp. 35–44). Chapman and Hall/CRC.

Saxena, D., & Verma, J. K. (2022b). ERP on the cloud: evolution, benefits, and critical success factors. In *Cloud IoT* (pp. 35–44). Chapman and Hall/CRC.

Schlichter, J., Klyver, K., & Haug, A. (2021). The moderating effect of ERP system complexity on the growth–profitability relationship in young SMEs. *Journal of Small Business Management*, *59*(4), 601–626.

Sebayang, P., Tarigan, Z. J. H., & Panjaitan, T. W. S. (2021). ERP compatibility on business performance through the inventory system and internal integration. *IOP Conference Series: Materials Science and Engineering*, *1010*(1), 12008.

Selamoğlu, B. I. (2023). MRP and ERP. In *Smart and Sustainable Operations and Supply Chain Management in Industry 4.0* (pp. 203–221). CRC Press.

Semenoff, J. (2020). *How and why?: explaining the factors that influence ERP system usage from the end-users perspective: a literature review*.

Senn, F. (2020). Digitales Workforce Management in der Wasserkraft. In *Realisierung Utility 4.0 Band 1* (pp. 457–469). Springer.

Shaltayev, D. S., & Hasbrouck, R. B. (2019). From order-to-cash to wall-to-wall: Four SAP implementations at Smithfield Foods. *Journal of Information Technology Teaching Cases*, *9*(1), 13–25.

Shibly, H. R., Abdullah, A. B. M., & Murad, M. W. (2022). Enterprise Resource Planning: An Innovative Technology. In *ERP Adoption in Organizations* (pp. 15–36). Springer.

SIKA, R., WOJTALA, O., & HAJKOWSKI, J. (2022). Comparison of Selected ERP Systems Supporting the Production Planning and Control on the Example of Automotive Industry-PROOF READING. *Management and Production Engineering Review*.

Sikder, T. (2022). *The Dynamic History and Evolution of ERP Systems (2022)*. Pridobljeno iz WPERP: https://wperp. com/89774/history-and-evolution-of ….

Simatupang, T., Govindaraju, R., & Amaranti, R. (2016). Change management perspectives in an ERP module implementation: A case study in a telecommunication company. *Jurnal Teknik Industri*, *18*(1), 51–62.

Singh, C. D., Singh, R., & Kaur, H. (2017). *Critical appraisal for implementation of ERP in manufacturing industry*. Citeseer.

Singh, K., & Best, P. (2016). Interactive visual analysis of anomalous accounts payable transactions in SAP enterprise systems. *Managerial Auditing Journal*, *31*(1), 35–63.

Siswanto, J., & Maulida, A. (2016). Validated ERP modules requirement for micro, small and medium enterprise fashion industry. *2016 International Conference on Information Technology Systems and Innovation (ICITSI)*, 1–6.

Slater, D. (1999). What is ERP. *CIO*, *12*(15), 86–91.

Soliman, M., & Karia, N. (2015). Enterprise resource planning systems in higher education context: Functionalities and characteristics. *International Journal of Innovative Research in Science, Engineering and Technology*, *4*(11), 10408–10413.

Stancu, A.-M. R., & Drăguţ, B. M. (2018). ERP SYSTEMS-PAST, PRESENT AND FUTURE. *Knowledge Horizons. Economics*, *10*(4), 33–44.

Suero Martínez, H. G. (2022). *Design & Development of a Full-stack ERP Marketing Web App*.

Sun, H., Ni, W., & Lam, R. (2015). A step-by-step performance assessment and improvement method for ERP implementation: Action case studies in Chinese companies. *Computers in Industry*, *68*, 40–52.

Surjit, R. (2021). *An overview of ERP software used in apparel industry*.

Surung, J. S., Bayupati, I., & Ayu Putri, G. A. (2020). The Implementation Of ERP In Supply Chain Management On Conventional Woven Fabric Business. *International Journal of Information Engineering & Electronic Business*, *12*(3).

Suutarinen, P. (2021). *Autotask PSA-Netbaron ERP-integraatio*.

Szelągowski, M., Berniak-Woźny, J., & Lupeikiene, A. (2022). The Future Development of ERP: Towards Process ERP Systems? *International Conference on Business Process Management*, 326–341.

Szelągowski, M., Berniak-Woźny, J., Lupeikiene, A., & Senkus, P. (2023). PAVING THE WAY FOR TOMORROW: THE EVOLUTION OF ERP AND BPMS SYSTEMS. *Scientific Papers of Silesian University of Technology. Organization & Management/Zeszyty Naukowe Politechniki Slaskiej. Seria Organizacji i Zarzadzanie*, *185*.

Tao, Z., Si Jun, B., & Xi Bai, R. (2021). Research on marketing management system based on independent ERP and business BI using fuzzy TOPSIS. *Journal of Intelligent & Fuzzy Systems*, *40*(4), 8247–8255.

Tarigan, Z. J. H., & Basana, S. R. (2019). The impact of organizational commitment on upgrading ERP for maintaining the quality of information and the ERP performance. *IOP Conference Series: Materials Science and Engineering*, *473*(1), 12051.

Tarigan, Z. J. H., & Siagian, H. (2020). The Effect of Enterprise Resource Planning Sustainability on Operational Performance through Planning and Control. *International Journal of E-Education, e-Business, e-Management and e-Learning (IJEEEE)*, *10*(1), 86–94.

Tarigan, Z. J. H., Siagian, H., & Jie, F. (2020). The role of top management commitment to enhancing the competitive advantage through ERP integration and purchasing strategy. *International Journal of Enterprise Information Systems (IJEIS)*, *16*(1), 53–68.

Telukdarie, A., & Sishi, M. N. (2018). Enterprise definition for Industry 4.0. *2018 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)*, 849–853.

Tenhiälä, A., Rungtusanatham, M. J., & Miller, J. W. (2018). ERP System versus Stand-Alone Enterprise Applications in the Mitigation of Operational Glitches. *Decision Sciences*, *49*(3), 407–444.

Terminanto, A., & Hidayanto, A. N. (2018). Implementation and configurations open source ERP in ecommerce module (A case study on SME). *8th International Conference on Industrial Engineering and Operations Management, IEOM 2018*, 1224–1233.

Titova, V. (2016). *Implementation of Enterprise Resource Planning service: 1C Logistics system in the warehouse processes in construction companies.*

Tung, P. H., Tho, N. G., Van Tri, N., Duc, B. H., & Dat, P. M. (2020). Placement of Shared Leadership in Between ERP and HRM Implementation. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *17*(2), 78–89.

UNGUREANU, I. (2022). ERP AND FINANCIAL PERFORMANCE–CASE STUDY ON ROMANIAN COMPANIES. *REVIEW OF ECONOMIC AND BUSINESS STUDIES*.

Usmani, U. A., Happonen, A., & Watada, J. (2024). ERP integration: Enhancing collaboration in virtual and extended enterprises. *Springer*, *828*, 161–178. https://doi.org/10.1007/978-981-99-8111-3_16

Utami, F. D., Puspitasari, W., & Saputra, M. (2020). Design of planning model for ERP system in warehouse management: an empirical study of public hospital in Indonesia. *IOP Conference Series: Materials Science and Engineering*, *909*(1), 12061.

Utomo, S. B., Yuliani, E. W., & Wulandari, N. (2021). Business process improvement (BPI) with enterprise resource planning (ERP) financial & control (FICO) and procurement modules using SAP S/4 HANA to handle non-banking processes in case study: PT bank mantap. *Journal of Physics: Conference Series*, *1807*(1), 12004.

Vaideeswaran, R., & Kulandai, A. (2019). Impacts of ERP in HRM. *Journal of Emerging Technologies and Innovative Research*.

van Roekel, H.-J., & van der Steen, M. (2019). Integration as unrealised ideal of ERP systems: An exploration of complexity resulting from multiple variations of integration. *Qualitative Research in Accounting & Management*.

Venkatraman, S., & Fahd, K. (2016). Challenges and success factors of ERP systems in Australian SMEs. *Systems*, *4*(2), 20.

Viitanen, L. (2021). *Tilitoimiston kannattavuuden mittarien kehittäminen*.

Vilenne, B. (2020). *Integration and implementation of monitoring tools for the warehouse management and sales module in an ERP*.

Wei, O. C., Idrus, R., & Abdullah, N. L. (2017). Extended ERP for inventory management: The case of a multi-national manufacturing company. *2017 International Conference on Research and Innovation in Information Systems (ICRIIS)*, 1–5.

Wibowo, A., & Sari, M. W. (2018). Measuring enterprise resource planning (ERP) systems effectiveness in Indonesia. *Telkomnika (Telecommunication Computing Electronics and Control)*, *16*(1), 343–351. https://doi.org/10.12928/TELKOMNIKA.v16i1.5895

Woźniakowski, T., Jałowiecki, P., & Zmarzłowski, K. (2018). ERP systems and warehouse management by WMS. *Information Systems in Management*, *7*.

Zadeh, A. H., Zolbanin, H. M., Sengupta, A., & Schultz, T. (2020). Enhancing ERP learning outcomes through microsoft dynamics. *Journal of Information Systems Education*, *31*(2), 83–95.

Zaied, A. N. H., & Mohmed, S. (2021). ERP Implementation Road Map for Small and Medium Size Enterprises (SMEs). *Journal of Intelligent Systems and Internet of Things*, *2*(1), 14.

Zhang, H. (2022). A deep learning model for ERP enterprise financial management system. *Advances in Multimedia*, *2022*.

Zhang, L., Miao, C., & Zhang, C. (2022). Cost-oriented Information Construction for Enterprise Based on ERP System. *2022 IEEE Asia-Pacific Conference on Image Processing, Electronics and Computers (IPEC)*, 294–298.

Zhao, B., & Tu, C. (2021). Research and development of inventory management and human resource management in ERP. *Wireless Communications and Mobile Computing*, *2021*.

Zucco Monti, M., Gómez Samaniego, F., Carrera González, R., Alveo Lorenzo, C., & Vargas-Lombardo, M. (2017). *The four axes 'WMS, SCM, CRM and ERP'for e-logistics*.

Zughoul, B., Al-Refai, M., & El-Omari, N. (2016). Evolution characteristics of ERP systems that distinct from traditional SDLCs. *Evolution*, *5*(7), 87–91.