The Past, Present, and Future of Enterprise Resource Planning

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Abstract – Enterprise Resource Planning **(**ERP) is a software system designed to facilitate the automation and management of essential business operations inside businesses, with the aim of achieving optimum performance. ERP software facilitates the integration and synchronization of data across various business processes inside an organization. This results in the establishment of a unified and reliable source of information, which in turn optimizes the efficiency and effectiveness of operations throughout the whole firm. The platform has the capability to integrate a company's human resource functions, financials, manufacturing, supply chain, operations, reporting and commerce into a unified system. The objective of this article is to provide a comprehensive examination of the historical progression and evolution of ERP systems, while also highlighting contemporary advancements facilitated by digital breakthroughs such as cloud computing. The research methodology used in this work included doing a comprehensive evaluation of scholarly literature sourced from academic publications as well as industry sources. The study revealed that ERP systems have undergone significant transformations compared to their predecessors, like MRP (material resource mapping) systems and IC (integrated control) packages. The ongoing transformations are seen in conjunction with the emergence of cloud computing and advancements in modern technologies such as artificial intelligence. Numerous scholarly publications have already examined the progression of Enterprise Resource Planning (ERPs). However, the distinctive value of this particular article lies in its comprehensive coverage of the latest advancements in the field, including debates on cloud-based ERPs and postmodern ERPs.

Keywords – Information System, Supply Chain Management, Enterprise Resource Planning, Concepts of Enterprise Resource Planning, Material Resource Mapping.

I. INTRODUCTION

Enterprise Resource Planning (ERP) systems are sophisticated software solutions that aim to seamlessly integrate and oversee all operational aspects of an organization. These systems encompass a wide range of applications, including quality management, human resources, SCM, financial and accounting, project management, sales and distribution, and material management. The centralization of information via a single database is a key concept in ERP systems. ERP systems are software modules within an Information System (IS) that utilize a centralized database to facilitate the flow of information between various functional areas. These functional areas include information services, sales and marketing, accounting, development and product design, finance, field service, HRM, production, manufacturing, inventory control, quality control, distribution, industrial facilities management, process design, procurement, and management.

Enterprise Resource Planning systems are specifically developed to enhance an organization's efficiency by improving its capacity to generate timely and accurate data across the whole supply chain and company. The deployment of ERP systems has been shown to have many positive impacts on organizations. These include the potential to decrease inventory levels, shorten product development cycles, enhance customer service, improve efficiency and productivity, boost profitability, and enhance overall effectiveness by means of improved client services. Business companies are increasingly investing in data systems to enhance their performance. In order to adapt to a dynamic business environment and overcome the constraints of outdated legacy systems, these organizations are turning to ERP systems. According to Kim [1], the introduction of an ERP system has resulted in developed performance. These systems implementation has resulted in important benefits for companies, including strengthened control, heightened productivity, knowledge sharing, improved accessibility to timely and precise data, decreased dependance on paper, and enhanced workflow. Additionally, these systems have automated business processes by effectively coordinating and integrating information across various departments. The

aforementioned advantages serve as compelling proof, which explains the appeal of these systems to bigger firms that own substantial amounts of data.

Despite the considerable benefits associated with ERP systems, companies often exhibit a tendency to resist their adoption. This reluctance may be attributed to the intricate nature of the elevated likelihood and the deployment process of failure. According to Chen, Law, and Yang [2], the ERP project had instances of both partial and total failure. The successful execution projects of IS and IT presents a significant obstacle as a result of the uncertainties associated with technical intricacies. In contrast to the observed ERP systems growth, has been argued that these systems implementation has experienced a relatively high failure rate, estimated to range from 60 to 90 percent. Moreover, there is a notable inability to comprehend the promised benefits of ERP systems, resulting in unmet expectations and disappointment in their implementation. The ongoing advancement of technology and its incorporation into the daily lives of individuals, both personally and professionally, raises a persistent concern about its level of acceptance or rejection. In previous years, substantial financial resources have been allocated towards information technology (IT), such as ERP systems, with the aim of enhancing employee performance, productivity, and gaining a competitive edge. Nevertheless, the realization of these advantages is contingent upon the proficient and suitable utilization of information technology by individual employees inside these organizations for the execution of their organizational duties.

The phenomena of ERP have been a prevalent and established reality for organizations spanning many decades. This article gives a definition of ERPs and presents a concise historical overview of the phenomena as documented by professionals from the 1940s to the present, including future scope. Here is the structure of the paper: Section II presents the definition, concepts and implementation process of ERP. Section III focusses on the ERP history and evolution process. In Section IV, a general discussion of the findings is presented. Section V reviews the future scope of ERP, while Section VI draws final remarks to the paper.

II. DEFINITION, CONCEPTS AND IMPLEMENTATION OF ERP

ERP Definition

The discourse around ERP systems or platforms has persisted for several decades, with notable growth seen throughout the 1990s. There have been occasions when debates around ERP have asserted the potential obsolescence of the system. The perception of ERP software as outdated has emerged due to the emergence of newer, more specialized cloud-based apps that are smaller in scale. According to Staehr [3], organizations that rely on integrated business processes to facilitate their operations consider ERP systems indispensable for achieving their desired outcomes. In [4] propose that enterprise resource planning (ERPs) may be conceptualized and operationalized as both a theoretical construct and a practical system. From a conceptual standpoint, ERP systems include the integration of various processes of business inside a company. This integration leads to SCM, control and enhanced order management, developed workflow, and provision of correct inventory data, as well as the establishment of standardized business standards and best practices. The ERP concept highlights the institutional modifications that occur throughout the implementation and sustenance of the phenomena.

ERP Concepts

Asgar and King [5] provided clarification that an ERP system encompasses more than simply software or a product. They further developed a conceptual framework that divides ERP into four distinct components. The first element comprises many software components such as Business Intelligence, Finance, CRM, Human Resources, Supplier Relationship management, and SCM. These components are the user-facing aspects of the ERP solution. The second component pertains to process flow, including the transmission of data across modules within the system of ERP. The third component to consider is the customer mindset, which delineates the impact of the ERP system on business, teams, and users. The last component to consider is change management, which pertains to the organization's capacity to effectively integrate an ERP system.

According to [17], ERP systems are often seen as a kind of technology infrastructure that is specifically built to give the necessary functional capabilities needed to transform the ERP idea into a tangible and operational entity. The ERP system is often understood as a software platform that spans across a whole organization, using an integrated database. According to [18], organizations have the flexibility to deploy several modules that are functional, like SCM, financial reporting, HRM, accounting, or sales, in a phased manner based on their specific operational needs. The subsequent sections of this essay will go into the evolution of ERPs as a whole system, rather than a just abstract idea. Irrespective of the classification of an ERP as a conceptual framework or a functional system, it encompasses more than a mere technical product. The integration inside the internal value chain of a business is often presented. The ERP system may be seen as the technical embodiment of the ERP idea, including its advantages, capabilities, aims, and strategic value.

ERP Implementation

ERP installation projects exhibit a diversity of sizes and configurations, necessitating meticulous and timely management choices throughout their lifespan stages. The successful adoption of ERP systems requires a high level of focus, commitment, substantial resource allocation, and organizational adjustments. There are several factors that influence the level of complexity and the schedule of implementation. For instance, these variables may pertain to the technical level and size of the adopting entity, structure of the organization, or they may be associated with external factors like the vendor's approach of implementation and market-specific contextual factors. Within the existing body of literature on ERP, there is a notable

variation in the terminology, number of stages, and degree of granularity used when discussing ERP deployment procedures and life-cycle phases. This component encompasses several factors such as user attitudes, project modifications, business process changes, and system changes. Likewise, a number of academics have expressed agreement with the notion of ERP systems, as shown in **Table 1.**

Table 1. Concepts in Enterprise Resource Planning

Definition/Concepts	Literature
The system of ERP is a kind of entrepreneurship management software that consists of a suite of programs designed to coordinate and control all company operations.	Mittner and Buchalcevova [6]
ERP systems are a sophisticated and interconnected invention.	Yılmaz and Ozcan [7]
ERP systems are all-encompassing databases that serve the real-time data requirements of departments including HR, Supply Chain, Finance, Customer Service, Marketing, Sales, and Operations.	Venkata Chalapathi [8]
Business decision-making is aided by ERP because of the system's ability to automate crucial business processes via integration.	Lee [9]
Using the internet as a communication channel, an ERP system integrates many departments within a company, like human resources, accounting, production, and finance.	Kishali, Sharma, and Gupta [10]
ERP systems are adaptable software suites used to streamline and unify operational procedures.	Thanh [11]
ERP systems are collections of programs that aim to unify all corporate processes inside a single entity.	Worster, Weirich, and Andera [12]
In an ERP system, all of the company's information is stored in a single location and is accessed in a unified manner.	Ba Karman, Darujati, and Wulandari [13]
An ERP system is a suite of software applications that can be tailored to any size business and used to coordinate all of an organization's operations from a central database.	Dewi [14]
ERP systems, or enterprise resource systems of planning, are packages of business software that combine all of a company`s necessary data and allow for more effective and efficient use of available resources (financial, human resources, material etc.)	Al-Mashari [15]
An enterprise system of resource planning is a set of entrepreneurship software used to integrate and automate business operations, administer a shared database throughout a company, and get access to data in real time.	Subba Rao [16]

In [19], it is common for ERP implementation models to consist of many stages that are equivalent to one another. These phases often include evolution, adoption, maintenance, selection, go-live, and implementation. Several scholars have expanded upon these models by including a retirement period. According to [20], the retirement phase denotes the stage at which an ERP system is replaced by any other data system. In practical application, it is observed that the majority of prominent ERP manufacturers have developed their own distinct implementation procedures. For instance, SAP adheres to the methodology of ASAP, AIM methodology is adopted by the Oracle ERP, and several ERP systems of open-source have established their own unique approaches.

While the terms "implementation methodology" and "implementation strategy" are sometimes used interchangeably, several scholars and practitioners make a distinction between them. Specifically, the latter term refers to the process of determining the timing and manner in which the system will be put into operation. The tactics for implementing ERP systems include many approaches, namely: a) immediate cutover or big bang b) Phased rollout, c) parallel adoption d) Pilot study. Each of these solutions has its own benefits, drawbacks, related expenses, and potential hazards. Certain firms may choose to integrate several methods while carrying out the implementation process. One of the primary obstacles that businesses have while implementing ERP systems pertains to the amount of BPR (business process re-engineering), customization, and change management necessary to align effectively with their chosen ERP system.

In contrast, several businesses choose for a vanilla implementation strategy, which is considered to be the option with the lowest level of risk. Typically, a vanilla installation prioritizes minimizing business process reengineering (BPR) and adheres to the fundamental functionality and process models of an ERP system, rather than adapting the ERP to align with the distinct processes of the organization. In order to effectively address business requirements and use core strengths, it is sometimes necessary to adopt a dual strategy that combines Business Process Reengineering (BPR) with system customization. This approach allows for the accommodation of specific business demands and unique competencies in certain areas, while adhering to standardized processes in other areas.

Regardless of the level of complexity or the size of the business, successful ERP installations need meticulous project management (PM) and a dedicated team. In addition, it is common for businesses to have a transitional phase known as a "shakedown" period, during which they encounter difficulties in adjusting to the recently reengineered procedures. This might potentially lead to interruptions in corporate operations or a temporary decrease in productivity.

III. ERP HISTORY AND EVOLUTION

Wu, Xu, and He [21] assert that the word "enterprise resource planning" was introduced by Gartner in 1990 to designate a new iteration of MRP systems. Nevertheless, the use of computers in corporate contexts served as the foundation for both MRPs and ERPs. The origins of ERPs (Enterprise Resource Planning) and MRPs (Material Requirements Planning) may be traced back to the mid-1950s and late 1940s. During this time, Lyons Teashop, a firm based in the United Kingdom, used early computer systems to effectively manage material requirements, process orders, and strategize products delivery. There may be a thin historical link between emergence of computer-supported companies and Lyons Teashop computers in subsequent decades. However, it is widely acknowledged by most experts that the systems of the 1960s might be seen as the apparent antecedents of ERPS. The aforementioned systems have the capability to automate the process of identifying inventory needs and monitoring the consumption of products, which are often referred to as IC packages. Integrated circuits were seen as legacy systems that relied on languages programming like FORTRAN and COBOL, which were executed on mainframe computers. The capabilities of these systems were restricted to the execution of batch and transaction processing tasks. However, it should be noted that these systems were characterized by their high cost and their restricted use inside large-scale mainframe computer settings.

In the 1970s, a series of comprehensive systems, often referred to as MRPs, were created. The primary emphasis of these activities is on the integration of products and the development of plans in accordance with a master production schedule. SAP, a prominent multinational corporation specializing in ERP solutions, started the development of its inaugural system during the 1970s. During the 1980s, there was significant progress in the advancement of manufacturing resources planning (MRP II) systems. These systems, formerly referred to as MRP, underwent a second generation of development. The primary objective of this new generation was to enhance manufacturing processes by effectively coordinating material and production needs. This optimization aimed to achieve greater efficiency and productivity in manufacturing operations.

During the aforementioned era, the development of People-Soft, a renowned worldwide ERP brand, took place, subsequently leading to its acquisition in 2005 by Oracle, a prominent global leader in the field of ERP. While a few ERP systems emerged in the late 1980s, the noteworthy advancements in enterprise-wide integration and coordination were mostly seen throughout the 1990s. ERP systems that were created and put into operation throughout the 1990s had the capability to operate on several platforms and facilitate the integration of diverse business processes. These activities included manufacturing planning, financial management, marketing, project management, transportation, and procurement. The surge in ERP was propelled by the emergence of client architecture and relational databases.

In the 1990s, suppliers of ERP systems expanded their offerings by including or enhancing capabilities like warehouse management, CRM, and SCM. The providers also provided analytics and business intelligence capabilities. The extended ERP system of the 2000s was characterized by a complex integration of components, organized into a three-tier design. This architecture consisted of a back database layer, a front display layer, and a middle application layer. During the 2000s, the field of computing saw the emergence of cloud computing. The model described in the text was officially defined by the United States NIST. According to Khatatneh, Nawafleh, and Al-Utaibi [22], this model facilitates widespread and convenient access to resources of configurable computing of a shared pool, like services, networks, storage, servers, and applications. These resources can be released with minimal effort and rapidly provisioned in terms of management or interaction with service providers. The NIST originally established three service models, as identified by Mell and Grance [23].

- SaaS (Software as a Service) refers to the delivery of software applications over a thin client interface, therefore relieving users of the need to maintain infrastructure.
- PaaS (Platform as a Service) refers to a model of cloud computing gives developers the middleware tools and services necessary for the development and configuration of Software as a Service (SaaS) application.
- IaaS (Infrastructure as a Service) refers to a model of cloud computing that gives essential resources of computer like storage, network capabilities, and processing power to enable the deployment and execution of software applications.

The ERP market has seen a significant technological transition influenced by the emergence of cloud computing, as stated Chen, Liang, and Hsu [24]. Cloud-based ERP systems gained prominence in the mid-2000s as organizations saw the advantages of transitioning from traditional on-premise ERPs. This shift was primarily driven by the need to streamline the management of updates and maintenance procedures associated with ERP systems. The majority of cloud-based ERP systems are often delivered to customers in the form of SaaS. However, it is worth noting that a significant number of Platform as Service (PaaS) options are also prevalent in this domain. According to a study conducted by Tenkorang and Helo [25], it is projected that by the year 2021, around 32% of big organizations that are in need of replacing their ERP systems would transition from an on-premise approach to a SaaS service model.

During the mid-2010s, the preceding versions of ERP systems were characterized by loosely connected solutions. Hence, Eampoonga and Leelasantitham [26] introduced the concept of postmodern ERPs, which were seen as being more adaptable and customer-oriented. According to the scholars, a postmodern ERP refers to a technological approach that encompasses the automation and integration of operational functions of business and administrative, including finance, human resources, manufacturing, procurement, and distribution. This strategy aims to strike a balance between the advantages of vendor-provided integration and the need for business adaptability and responsiveness. According to Pehlivanoglu, Duarte, and Verhaeghen [27], "Considerations for Midmarket It Leaders and Postmodern ERP Strategies"), a postmodern ERP refers to

an ERP environment that is characterized by a decentralized and loosely connected structure. In this context, the ERP system relies heavily on business process outsourcers or cloud services to provide the majority, if not all, of its functionality.

As stated by Zughoul, Al-Refai, and El-Omari [28], the evolution of ERP systems can be categorized into four distinct phases spanning from the 1980s to the present. These phases include: (1) the best-of-breed approach observed during the 1990s and 1980s, (2) the prevalence of monolithic ERPs in the 2000s and 1990s, (3) the emergence of postmodern ERPs in the 2010s, and (4) a forthcoming, as yet unnamed, fourth phase anticipated to transpire in the 2020s.

IV. DISCUSSION

ERP solutions aim to achieve the integration of processes and data inside businesses. The information is saved in a centralized manner inside a singular database. The database serves as a central repository for storing, disseminating, and exchanging data across many departments and operational units. ERP systems have been widely embraced as a prevalent information technology (IT) solution inside many enterprises. In addition to the possible financial benefits, the ERP system implementation is motivated by the need to achieve technological and operational integration of various company processes. This integration aims to synchronize the flow of information with the movement of products or services. This phenomenon may be achieved by internal value chain integration of the company and implementing a streamlined process of business, which has the ability to maintain the company`s market responsiveness and competitiveness.

Hsu [29] asserts that the use of business ERP systems may contribute to the attainment of business competitiveness. This is attributed to the systems' ability to provide management with comprehensive cost and operational data, hence facilitating informed strategic decision-making pertaining to the organization's competitive standing. However, in order to effectively harness the competitive capabilities of ERP systems, it is imperative that both management and staff possess a fundamental comprehension of ERP concepts. This knowledge is essential for maximizing the use of ERP systems. Furthermore, firms may be compelled to implement ERP systems as a result of acquisitions, mergers, and joint ventures. The primary objective behind this adoption is to consolidate, optimize, and effectively manage the vast amount of information and workflow among these entities.

For the last three decades, manufacturing firms have been using computers to enhance information, profitability, and productivity dissemination across their operations, including production, sales, and distribution activities. The origins of ERP systems may be traced back to the development of standard inventory management packages, which later evolved into MRP II (manufacturing resource planning) and MRP. The software developed was an inventory management system intended for managing conventional inventory procedures. This particular application was among the first business apps that were not categorized under the domain of accounting and finance. During the 1970s, the data systems that were focused on manufacturing were often referred to as MRP. The main concept of MRP is the implementation of a time-phased order release system. This system is responsible for the scheduling and release of purchase orders and manufacturing work orders. Its primary objective is to ensure that components and sub-assemblies are delivered to the station of assembly precisely when they are needed. According to Callerman and Heyl [30], the implementation of Material Requirements Planning (MRP) offers many advantages, including inventory reduction, greater customer service, and improved efficiency and effectiveness.

The evolutionary modifications seen in ERP systems are based on the underlying assumption that each successive iteration aimed to enhance the internal operations of the organizations that use these ERPs. According to Kerr and Houghton [31], it has been contended that ERP systems should not be regarded as just technology artifacts. However, they serve as a fundamental framework intended to facilitate and enhance the functionalities of the tools and procedures used inside an organization. Rouhani and Mehri [32] assert that in the 1980s and 1990s, several firms made substantial investments in ERP systems as a means of replacing their outdated legacy systems. The individuals were assigned the responsibility of executing certain business procedures in order to reduce expenses and enhance internal controls, efficiency, and operational performance. In the 1990s, ERP systems offered enterprise-wide integration and cross-functional to facilitate and include standardized business operations. In recent years, there has been a shift in focus from internal control systems to the use of real-time value creation. The process of evolution is seen in **Fig 1.**

The development led by values is motivated by at least two interconnected truths. One the one hand, it is common for many firms to encounter a simultaneous decrease in available resources and a rise in demands for high-quality and high-volume goods or services. This phenomenon is seen both in commercial enterprises and, to a potentially greater extent, in the public sector. In contrast, the advent of the 21st century brought forth technological advancements in the form of AI and RPA (robotic process automation). According to Figure 1, it can be seen that by the year 2017, the third phase of ERP transformation will be characterized by the use of cloud-based systems. Furthermore, the fourth phase is anticipated to include digital advancements like AI and RPA. The integration of Enterprise Resource Planning with RPA and AI might be seen as advantageous by some individuals. Nevertheless, firms that adopt a conservative stance and prioritize the maintenance of existing systems instead of embracing system modernization will see a decline in their attractiveness to both consumers and citizens. However, the implementation of change necessitates a verified approach that is in accordance with the particular requirements of an organization. This necessitates beyond the simple amalgamation of advanced technology. According to Makhmudov and Kholmirzaev [33], the influence of a certain factor should be considered in relation to an institution's operation and the implementation of its plan.

As a result of heightened competitive pressures and the growing sophistication of users, the concept of Material Requirements Planning (MRP) underwent a process of evolution and expansion. This evolution included the incorporation

of other business activities, like marketing and product costing, into the MRP framework. During the early 1980s, the scope of MRP (Material Requirements Planning) extended beyond its initial purpose as a system for material planning and control. It evolved into a comprehensive system that could effectively plan and manage all resources inside a corporation. The aforementioned technique was referred to as Manufacturing Resource Planning II (MRPII). One of the primary objectives of MRPII is to facilitate the integration of key functions, including finance, marketing, and production, as well as other functions like purchasing, engineering, and personnel, within the process of planning. This integration aims to enhance the overall manufacturing enterprise efficiency. MRPII, also known as Manufacturing Resource Planning II, has many extensions that enhance its functionality. These extensions include capacity needs planning and rough-cut capacity planning, which are specifically designed to facilitate scheduling production on the shop floor. Additionally, MRPII incorporates input from the shops of manufacturing about the status of fabrication, ensuring effective coordination and monitoring of the manufacturing process. The MRPII installations number has shown a consistent growth since the 1980s, owing to the availability of MRPII programs on small and microcomputers. Similar to MRP, production MRPII also has a primary emphasis on the production process.

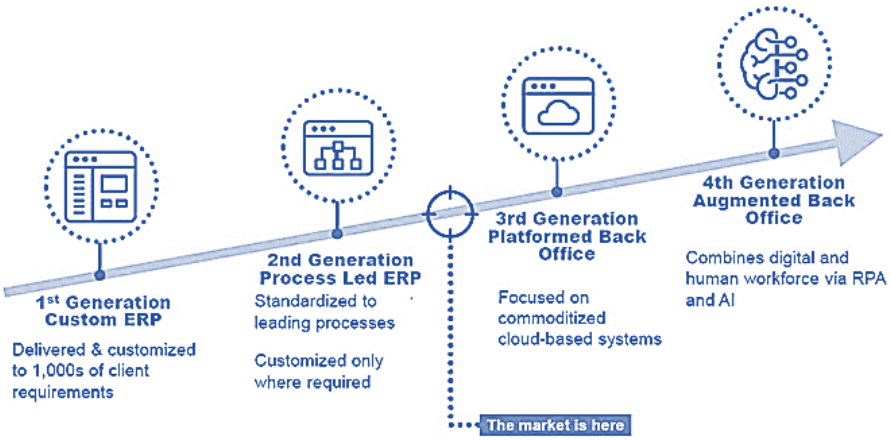

Fig 1. Evolution of ERPs

The subsequent phase in the growth of MRPII was the implementation of the just-in-time (JIT) approach, which, when paired with the decreasing cost of computers, led to the emergence of islands of automation in the late 1980s.The word ERP was first used by the Gartner Group, a renowned organization based in Stamford, CT, USA, during the early 1970s [34]. It was used to denote a system of business software that represents the most recent advancement of an MRPII system, which covers all modules of MRPII. One notable distinction between MRPII and ERP lies in their respective areas of concentration. MRPII has typically concentrated on scheduling and the planning of internal resources, while ERP aims to include the planning and scheduling of resources of supplier as well. This extension is driven by the dynamic nature of consumer needs and schedules. The mature stage of ERP was seen throughout the mid-1990s. The scope of ERP has been extended to include other "back-office" operations, including human resources management, order management, asset management, financial management, distribution, production, and warehousing. In recent years, there has been a notable expansion in the growth of extended-ERP systems, including a broader range of "front-office" functionalities. These functionalities now include supply chain management systems, electronic commerce, and marketing automation and sales force.

The scope of Enterprise Resource Planning (ERP) installation comprises the whole of the value chain inside a company. This includes various stages such as customer and prospect management, as well as order delivery and fulfillment. In order to maintain competitiveness, an organization must not only define its information requirements, but also ensure that its information infrastructure effectively supports the firm, its customers, and its suppliers. Failure to do so may result in the potential disconnection and exclusion from future chances. Hoffman [35] have provided a comprehensive analysis of the technical progression from Material Requirements Planning (MRP) to ERP. The field of information system technology has seen a progression from mainframe-based computing to the server era, and subsequently to the Internet age. In the past, ERP solutions were exclusively designed to operate in conjunction with large-scale mainframe computers. The majority of contemporary systems of ERP are founded around the client solution paradigm, as noted by Andrzej Partyka [36]. In a server context, the server is responsible for storing data, ensuring its consistency and integrity, and handling user requests from client PCs. According to Zhang, Fréchin, Guézé, and Jaulneau [37], the distribution of the burden of application logic and data processing is shared between the client and the server.

Currently, ERP suppliers, like other software manufacturers, are compelled to transition from a conventional server framework to a Web server architecture to effectively provide e-business functionalities [38]. These systems are constructed with a distinct segregation of components that are functional. The user interface, which is created using GUI (graphical user interface) approaches, is installed on client PCs. The databases and business logic are hosted on high-performance server computers, where they are implemented as procedures of server. The databases are constructed with technology of relational

database. Systems of relational database have facilitated the incorporation of essential flexibility in terms of data formats and business logic, hence supporting the deployment of parallel business practices. These technologies have provided users with the ability to design the system in a manner that allows for quicker installation, customization, and additions.

The trajectory of ERP is contingent upon the adoption and integration of Sustainable Enterprise Resource Planning (S-ERP) principles. Researchers have coined the term "Sustainable Enterprise Resource Planning (S-ERP) applications" to refer to the newly developed tools aimed at monitoring sustainable operations. The following part of business applications examines the potential influence of S-ERPs on the three dimensions of an organization's Triple Bottom Line (TBL) and global sustainability. In light of the increasing emphasis on innovation and social responsibility inside enterprises, executives are using technology to facilitate the integration of sustainable practices, operational processes, and information via the dissemination of knowledge throughout their company. Sustainable development and production may be defined as a kind of development that effectively meets the present needs of persons while ensuring the preservation of resources and opportunities for future generations.

The issue of sustainability and safety in supply chains and manufacturing facilities has prompted business partners of multinational corporations to raise concerns. In response, many companies have made a commitment to achieve environmental sustainability. In order to record and monitor their endeavors, these corporations are collaborating with ERP providers to adapt their existing programs and develop modules dedicated to the tracking of pertinent data. In their research, Scholars in [39] conducted an investigation on a global food firm. The company implemented a carbon information management (CIM) module inside its ERP system. This module was designed to monitor and record carbon emissions from their various operational facilities. Ershov and Sochilova [40] presented more examples of how firms might use their current business applications to make choices that are more environmentally sustainable, alongside the monitoring of carbon emissions. (i) Employing a product's bill of materials to monitor the consumption of polymers and solvents. (ii) Monitoring the temporal length of a chemical synthesis process. (iii) Conducting an analysis of the energy consumption shown by a manufacturing line.

Despite some progress in the development of S-ERP applications, the implementation of these applications may be even more challenging than traditional ERP systems, which have shown failure rates of approximately 60%. This complexity in implementing S-ERP applications has been acknowledged by Hawking [41]. Al-Mudimigh, Ullah, and Saleem [42] suggested that the introduction of new data types, data, and stakeholders, including environmentalists and scientists, who were not traditionally involved with the ERP application, would provide uncharted ground for enterprises when using S-ERP systems. Traditional ERP software are founded on the principle of streamlining operational and financial processes, hence leading to enhanced profitability. In the context of S-ERP, it is observed that organizations comprehensively address all dimensions of the Triple Bottom Line (TBL), hence influencing all stakeholders associated with the company. When comparing the two programs, it can be seen that the theory behind conventional ERP systems largely revolves around maximizing profit by consolidating all data and decision-making activities under a single application.

The fundamental emphasis of S-ERP is in the Triple Bottom Line (TBL), consisting of the dimensions of profit, people, and planet. According to Bohmholdt [43], profit under the Triple Bottom Line (TBL) framework pertains to the value-added activities conducted inside a firm. The people component pertains to the most valuable asset of a company, namely its workforce. Lastly, the term "planet" encompasses the environment and the Earth's natural resources. Despite the current lack of complete understanding of the environmental consequences associated with a gradual implementation of sustainable practices, entities have the opportunity to use technology as a means to effectively contribute to societal transformation.

V. THE FUTURE OF ERP

This section presents the anticipated scenario for future research in the field of ERP. The potential benefits of incorporating ERP systems into these constructions may be elucidated as follows:

Social Networks

With the pervasive use and integration of social networks, facilitated by the rapid acclimation of individuals to their usage. The aim is to see the integration of systems of ERP into social networks. This will just signify reduced durations of implementation, increased return on investment, and decreased capital outlays. The level of success attained by salesforce.com in the field of customer relationship management (CRM) necessitates its replication in ERP solutions as well.

Cloud Computing

Cloud computing has emerged as a significant trend in recent years. This technology has the ability to fundamentally transform the manner in which information technology services are used. Cloud computing may be described as a combination of software applications and physical infrastructure, namely the data centers, which facilitate the delivery of these services. The aforementioned services are often known as SaaS. Many individuals and organizations using the terminology IaaS and PaaS to categorize and delineate their respective offerings. In recent times, several ERP manufacturers have made the strategic decision to migrate a portion of their product offerings to cloud-based platforms. For instance, SAP By Design is an example of such a transition. Nevertheless, there remains a considerable amount of work that must be undertaken to ensure that clients see suites to the cloud and a greater services migration. Hence, more study efforts are required to enhance understanding about the integration of these two aspects.

Enterprise 2.0

Enterprise 2.0 (E2.0) refers to the use of Web 2.0 technology within an organizational context. Enterprise 2.0 technologies and apps provide the potential to enhance collaboration, facilitate content production, and improve average performance. Enterprise 2.0 (E2.0) may be conceptualized as a kind of social software that facilitates the interaction, engagement, and cooperation of its many stakeholders via computer-mediated communication. Additionally, it allows for the establishment of virtual communities in an online environment. E2.0, sometimes referred to as Enterprise 2.0, facilitates the provision of digital platforms whereby users may actively engage and contribute. These platforms ensure that all user-generated content and interactions remain visible and accessible to all members of the organization, until deliberately removed. While firms are now using ERP systems to address specific challenges, it is important to note that these technologies may not fully use an organization's staff capabilities and expertise. Although these systems provide cross-functional capabilities, their flexibility is limited. However, Enterprise 2.0 incorporates a distinct and supplementary strategy. Enterprise 2.0 places emphasis on the concept of "freeform," which refers to its lack of predefined procedures and its disregard for formal hierarchies. Hence, it is our contention that enhanced integration is necessary between E2.0 apps and tools and systems of ERP.

Historically, ERP systems have primarily concentrated on facilitating essential business operations and activities, leading to a uniform approach to managing the firm. They have achieved a significant level of success in accomplishing that objective. In contemporary times, it is important to prioritize the enhancement of decision-making processes, as well-versed choices possess the potential to have significant influence across all dimensions of corporate operations. There are several decision-making models, with one prominent example being Simon's model of decision-making. The sequential progression of the project may be delineated as follows: commencing with the phase of intelligence, followed by the phase of design, then transitioning to the decision phase, and culminating in the phase of implementation. The effectiveness of a decision implementation is contingent upon its ability to effectively address the intended issue and achieve the predetermined goals. Nevertheless, it is important to note that, according to Lindell [44], a significant proportion of judgments made by individual decision makers, over 50% on average, were deemed unsuccessful, even when the decision-making process was diligently adhered to. Hence, a contemporary phenomenon in the realm of decision-making involves the active participation of a large group of individuals, often referred to as crowd sourcing. This will augment the cognitive abilities and the evaluative stages of the process of decision-making. The incorporation of crowd integration into ERP systems to better the process of decision-making has been eagerly anticipated.

VI. CONCLUSION

This article provides a concise overview of the understanding of ERPs as a concept encompassing the business process integration and as a system consisting of multiple modules and an integrated database that address diverse functional domains. The origins of ERPs as both platforms and ideas may be traced back to the formative years of computers in the 1940s. The direct predecessors of modern integrated control (IC) packages may be traced back to the 1960s, but the advancement of MRP systems in the 1970s and 1980s also had a significant role in their evolution. During the period spanning from the 1990s to the 2000s, both ERP systems and extended ERPs were characterized by a monolithic architectural design. The use of several platforms became more prevalent in the postmodern ERP systems throughout the 2010s. The article emphasized the fast evolution of ERP systems in response to various internal and external factors inside the organizations that have adopted them. Numerous organizations encounter the predicament of escalating stakeholder and/or consumer demands while contending with limited resources to fulfill these demands. For ERPs to effectively facilitate integration and value generation, their implementation should occur within a technical environment that recognizes the comprehensive institutional processes and strategic objectives.

According to this paper, it is crucial for institutions that already possess ERP systems to contemplate adapting to digital advancements by transitioning from traditional monolithic systems to postmodern ERP and cloud-based systems that seamlessly include technology like AI and RPA. For many decades, the primary emphasis of mainstream research in the field of ERP has been on critical success factors (CSFs) related to deployment, upgrades, project management (PM), and other related areas. Further investigation is required to examine the potential of business resource planning systems to be integrated with social networks and other E 2.0 technologies. Inquiring specifically, what strategies may be used to extend the scope of systems of ERP beyond the integration of organizational processes and activities, including areas that have traditionally been considered outside their purview, such as decision 2.0, crowdsourcing, social networking, and other related domains? Lastly, it is essential for ERP suppliers and partners to adjust their strategies in response to these aforementioned developments, in order to effectively provide substantial benefits to their existing and prospective clientele.

Data Availability

No data was used to support this study.

Conflicts of Interests

The author(s) declare(s) that they have no conflicts of interest.

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