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Evolution of Integrated Management Information Systems on the ERP Process System

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ABSTRACT

This research aims to forecast the trajectory of ERP class information systems. There has been constant development and change in these systems from the start. Solution versions ERP II and ERP III were developed in tandem with evolving requirements and market trends. There is a process approach in use by these systems at the moment. One can classify ERP systems into three main categories: process-oriented ERP systems, process ERP systems that support processes, and process ERP systems that are not process-oriented. Macrologic Merit ERP, which is the basis for the article's concerns, provides complete service of processes within the system, has an in-built modeler, and supports processes. Successful process management, analysis, and enhancement are possible thanks to the implemented method. Understanding the moderating influence of ERP on Business Model (BM) innovation is the goal of this study, which compares two groups of SMEs: one that is considering ERP adoption and another that has already made the decision. More specifically, we want to know if ERP helps or hinders the connection between BM innovation (i.e., BM experimentation) and BM performance.

Keywords: ERP, process oriented ERP, management information systems.

INTRODUCTION

Using ERP (Enterprise Resource Planning) Integration When it comes to information technology (IT) tools and measures that can aid in enterprise management and simplify business processes, IT management systems are at the top of the list. There is a wide range of businesses nowadays that employ ERP-class IT systems. These businesses vary in size, industry, type of operation, and ownership structure. Given ERP systems' extensive feature sets, IT may provide assistance in nearly every area of a business's operations. Many companies' plans rely heavily on the ERP system due to the digital transformation that many of these companies are undergoing [1-5].

Larger organizations with a production profile were initially the target audience for enterprise resource planning (ERP) systems in the 1960s, mostly because of the functionality, technological innovation, and high cost of these systems. Due to advancements in science and technology, ERP systems were further developed. Additionally, competition in the IT market helped spread the word about ERP systems, which made them more accessible to smaller organizations that run commercial or service operations, in addition to production organizations. The current development of enterprise resource planning (ERP) technologies is very dynamic. New challenges for enterprise resource planning (ERP) systems have arisen as a result of the COVID-19 pandemic. These challenges mostly pertain to the ability of distant workers to interact and collaborate with one another, as well as with other employees and business partners. Enterprise resource planning (ERP) solutions are core to digital transformation because they improve process, data, and document integration, which in turn leads to real-time decision-making, quicker communication and collaboration, more staff productivity, and less resource consumption [6-10].

Providing a historical overview of ERP systems and outlining their most significant development paths are the primary goals of this essay. The purpose of this article was to accomplish just that by providing a concise overview of ERP system features and a global and Polish market picture for ERP systems.

According to Bytniewski and colleagues, the integrated IT management system covers every facet of managing the organization and its external environment. Information technology (IT) process optimization is characterized by a shared database, computational algorithms, and info-control actions [11-15]. Enterprise resource planning (ERP)

systems are described by C. Brown and others as "a collection of interconnected business applications, or modules," that help with common business tasks such as general ledger accounting, accounts payable, accounts receivable, material requirements planning, order management, inventory control, and human resources management [16-22]. H. Beheshti and others claim that enterprise resource planning (ERP) systems integrate a service provider's financials, inventory, orders, HR, and distribution of goods to clients and outside vendors into a streamlined, user-friendly platform that provides relevant data in real-time [23-32]. So, ERP systems are better understood as an IT architecture based on components that enables management procedures across many different areas of an organization's activities. With the help of Table 1, we can identify the primary characteristics of ERP systems.

Tab.1. The most important features of ERP systems.

Mainfeatures of ERP systems	
Feature	**Featuredescription**
Functional complexity	It entails attending to the technical and commercial aspects of the business in every way possible.
Modular/component construction	It makes it possible to roll out the ERP system in stages, focusing on the areas that are really essential for the company's unique operations.
Substantive advancement	In ERP systems, it shows up as the ability to use management methods like Total Quality Management (TQM) or JiT (Just In Time) and the inclusion of free data extraction mechanisms, variants, optimization, and forecasting. It also helps with information and decision-making processes.
Technological advancement	It allows for additional development of the ERP system and ensures that it complies with current software and hardware requirements. It allows for the system's future evolution while also ensuring that the ERP system complies with present-day software and hardware requirements.
High degree of integration	Strong data and procedure integration within modules and between modules through inter-module links (e.g., EDI).
Process orientation	Rather than focusing on certain parts of the company's structure, this approach gets the system ready for complete information service of specific economic operations.
Functional and structural flexibility	The potential for IT solutions to be tailored to the enterprise's needs, with the added flexibility to expand their functional scope and operating parameters in tandem with the user's evolving demands and requirements.
Openness	It shows up as an extensible design that can take on more modules and integrate with other systems.
Considerable in dependence from the hardware platform	Enterprise resource planning (ERP) system portability means it can be used on many servers and PCs running different operating systems.
Safety	Protecting the company's information technology investments while ensuring the high reliability and security of resources and user work is achieved through the use of proven and safe software and hardware solutions, such as database systems.
Compliance with regulations	The ERP system follows the regulations and statutes that are in effect in a specific nation, such as the Accounting Act.

CLASSIFICATIONOFERPSYSTEMS

Table 2 shows the ERP system classification based on a number of parameters. To sum up, an ERP-class system allows managers to define any statements or reports from the ERP system, giving them quick access to entire business information. Various areas of enterprise activity can be controlled with the use of highly complex analytical tools that allow for extensive examinations of corporate processes. Users are able to use the system remotely, including through mobile device connections, thanks to the ERP class's integrated IT system. In addition to providing the possibility of integrating more modules and new capabilities, the ERP system provider also provides updated versions of the system that contain legal changes, new patches to remove noticed faults and increase security, etc.

Tab.2. Classification of ERPsystems

Classification of ERP systems	
Type of classification	**Type of classification and their description**

By the way Of installing/using the ERP system	Stationarysystem–onto the chosen server. The system's design determines whether a web browser or a specialized client app (loaded on the user's computer, phone, tablet, or other device) is required for access. ERPasaservice–ahighly favored and practical approach wherein the ERP system is utilized in the same way as any website. After the producer pays the subscription price, they make the account for the system available.
By the construction of the ERP system	Monolithicsystems–Their structure is consistent, and all of their functionalities actually originate from a single application. Modularsystems–from an architectural standpoint, they do not form a single entity; this is true even when the programs in question share data, have a similar structure, and use a common graphic layer. Enterprise resource planning (ERP) solutions often allow for the development of individual modules that can be enabled only when needed. The software modules we utilize determine how much money the manufacturers of modular ERP systems make.
By the functionality of the ERP system	Universal ERP systems–created in a manner that benefits the business irrespective of the sector in which it works. Typically, the core functionality is wide-ranging and quite generic. It is typically feasible, with the right setup, to adapt to the particulars of a certain industry or business. Industry-specificERPsystems–specialized to a certain industry, containing features common to that sector (such as energy generation, banking, telecommunications, etc.). Completely customized enterprise resource planning (ERP) systems for individual businesses.
By the way the ERP system is implemented	Boxsystems–instantly ready to go once installed and logged in. Since their application is dependent on the features offered by the maker, setting them up does not need much effort. Systemsadaptedtoindividualneeds–necessitate diligent research and planning before to launch, as well as execution, tailoring the foundational tool to organization needs.

DIRECTIONS OF ERP SYSTEMS DEVELOPMENT

An example of an IT solution that has evolved and transformed over the last several decades with the aim of providing more thorough support for and integration across all areas of a corporation is enterprise resource planning (ERP) systems. The present demands of a dynamic market dictate the direction of ERP system development, which in turn is influenced by the accessibility of relevant technology solutions. ERP systems are undergoing continuous change as a result of environmental factors such as rising levels of competition, shifting consumer preferences, and the proliferation of interdependencies and electronic economy processes. The most prominent areas of change can be identified in the following:

system integration – ERP systems in the organization gather information from a wide variety of sources, both internal and external. Once processed, this data should supply all the essential details needed for effective corporate administration. Under these conditions, enterprise resource planning (ERP) system developers should prioritize enhanced system integration to better connect with current IT infrastructure, B2B (Business to Business) networks, and next-gen data-reading devices;

customization – ERP recipients from a wide range of industries are on the rise. This is why businesses need systems with industry-specific functionalities to drive processes;

migration to the cloud – The business sector is witnessing a growing trend of firms migrating their enterprise resource planning (ERP) systems to the cloud. Low starting and maintenance costs, ease of use, speed of deployment, and security all contribute to this solution's attractiveness to businesses seeking a versatile means of amassing massive amounts of data.

mobile devices – Many entrepreneurs believe that in the near future, gadget mobility will be crucial. Utilizing mobile solutions, you have constant access to the company's data regardless of your location or the time of day. Such upgrades will allow ERP systems to facilitate two-way communication, both inside and externally (with distributors);

the fourth industrial revolution – There is an intrinsic connection between ERP systems and Industry 4.0 and the IoT. According to the new ideas, businesses may optimize their operations by integrating machines, systems, processes, and goods into "intelligent" networks that can optimize themselves with the help of data provided to them. But enterprises can't participate in projects without enterprise resource planning (ERP) software that gathers data from every angle.

Among the intriguing trends listed by E. Abramek et al. in their suggestion for the development of ERP systems are:

● extensively utilizing cloud computing technologies.

enabling the widespread use of mobility and the associated BYOD trend, which in turn boosts staff efficiency.

● process modeling and improvement tools should be put into use.
expanding the capabilities of data analytics to incorporate social network data and facilitating the efficient utilization of Big Data assets.
● making the system accessible through a web browser on any device.
improving the user-friendliness of enterprise resource planning (ERP) systems, for instance, by developing role-specific graphical user interfaces or so-called "dashboards" (accessible interfaces that highlight key data points).
As a proposal for the future of ERP-class systems, we have the ERP IV system. Starting in 2020, this system is expected to become more popular. Its goals include achieving globalization mechanisms for economic activity and strengthening connections between social networks, other organizations (like banks and administration), and market partners. As shown in Table 3, the ERP IV system is an expansion of the ERP III system that incorporates solutions in the domain of applying AI (cognitive programming), ML, IoT, Big Data, Industry 4.0, and fog computing.

Tab.3. Differences between successive generations of ERPsystems

Feature	ERP	ERPII	ERPIII	ERPIV
Role	business efficiency	business improvement, involvement in a wider supply chain, online sales	business improvement, involvement in a wider supply chain, online sales	Just like ERP III, but with the added benefit of automatically generating and executing choices, particularly at the tactical and operational levels
Domain	manufacturing and delivery	every sector and customer base	environmental organization, all market divisions and industries	across all sectors and customer bases, environmental management
Computerized areas	manufacturing, marketing, and funding	linking several sectors, sub-sectors, and/or individual manufacturing and/or service procedures	the company's operations in tandem with a multicultural setting	across the board, with relation to a varied setting (e.g., offices, banks, and insurance firms)
Processes	internal, hidden	involving both internal and exterior factors that are interdependent	reengineering of business processes, integration of internal and external resources	Just like in ERP III, with the added bonus of potentially allowing remote process management.
Architecture	isolated, not linked, one-dimensional	open, web-based, component	utilizing a variety of networks, including both wireless and wired internet	With all the features of ERP III plus the ability to self-adjust to changes in the operational environment
Data	produced in-house and employed	made accessible at wired internet locations both internally and outside	sent instantly, both within and outside the company,	distributed globally and has the potential to be transformed into information
Information technologies used	regional computer systems	web-based system (the wired system is more common)	access to the web using wireless and wired mobile devices	Internet of Things (IoT), ERP III, and fog computing
Technologies in software	company databases, information repositories	database management systems (DBMSs), data warehouses, and external sources	machine learning, large datasets, processing inside memory	AI, in-memory computing, big data, and big management
Mode Of operation	at its own core	within one's own core	within its own core and metamorphosed in the cloud	on their own, but the dominance of cloud and fog computing is

EVOLUTION OF ERP SYSTEMS

The effort to automate company operations and improve the internal and external flows of information resources, together with the complexity, unpredictability, and dynamics of today's business environment, mandate that firms utilize multiple IT solutions. There are few IT solutions as impactful as integrated ERP systems when it comes to bettering management procedures and the company's results. Almost every part of a company's operations

(including trade, logistics, production, personnel and payroll, accounting and finance, customer service, etc.) can be aided and integrated by this class of information systems, which offer substantial support for reporting, monitoring, and analysis of business processes. In order to help management better understand the current state of the firm and make educated decisions, enterprise resource planning (ERP) systems include a number of reports.

Simply put, enterprise resource planning (ERP) systems are highly developed and modular information technology systems that have seen significant technological developments. These systems are designed to support the management activities of organizations and are applicable to most or all economic sectors.

These areas are essential for the enterprise's nature and operations, and integrated management information systems' module-component structure makes it possible to incorporate them in stages. In enterprise resource planning (ERP) class systems, a central database serves as the backbone, guaranteeing that all modules work together as intended (with accurate and up-to-date data) and that all data is compatible with one another. To put it simply, ERP class systems allow businesses to effectively plan and manage their operations by collecting and analyzing information resources using various analytical approaches.

Large corporations engaged in production were the original users of ERP class systems. Enterprise resource planning (ERP) systems can trace their roots back to IC (Inventory Control) software. As personal computers became more widely used in businesses in the 1960s, IC applications were developed to aid in decision-making within the realm of warehouse management. The evolution of enterprise resource planning (ERP) systems essentially began with material requirement planning (MRP) systems, continued with manufacturing resources planning II (MRP II) for distribution and production planning, and finally culminated in enterprise resource planning (ERP) resource planning, followed by ERP II and ERP III (concept). Figure 1 depicts the development of ERP class systems. Problems with material preparation for manufacturing were the original motivation for the MRP idea. Optimal production levels were guaranteed by integrated corporate information systems built on the MRP concept, which planned the size of material supplies. In the meanwhile, this system checked the material stockpiles and set the quantity such that the storage time was minimal, all while keeping production running smoothly.

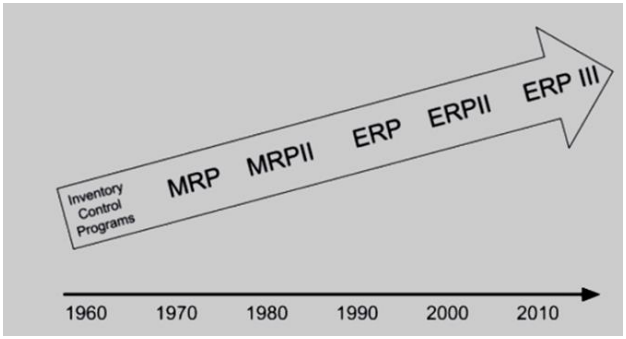

Fig. 1. *Product lifecycle management (ERP) database architecture*

Enterprise Resource Planning (ERP) was the development of a single system for company information that followed. This standard built upon previous ones and integrated nearly every facet of a company's operations, including production, distribution, accounting, finance, controlling, human resources, quality, document flow, project, and strategic management tools. The outcome is a simplification of information flows, improved process coordination, and a heightened capacity to react swiftly to opportunities and dangers both inside and beyond the organization. Nowadays, ERP systems come with a plethora of extra features that can be customized to fit any type of business. These features include customer relationship management (CRM), project management, business intelligence (BI), and supply chain management, among many more.

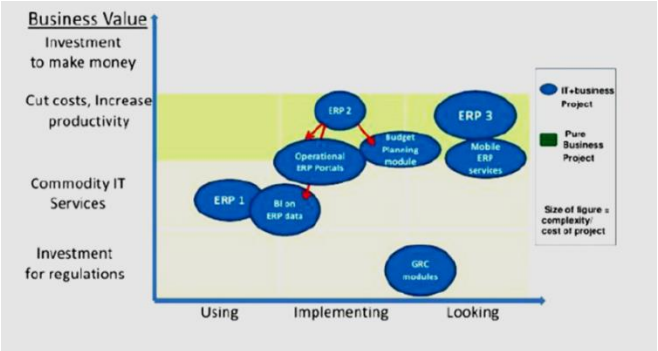

Fig. 2. *ERP maturity model*

Internet technologies (such as analytical search engines), social media, and other online communication tools are all a part of the ERP II compliant system, which is a solution that allows the organization to work according to the virtual model. With the use of teamwork, one-on-one communication, online platforms, and ERP III marketplace integration. Companies using ERP and ERPII systems. Assuming Grid and Cloud Computing technologies are used by ERP III (e.g., ERP as a Service), databases can be shared and stored on several servers, leading to greater application performance for users. Suppliers of information technology systems currently only offer ERP II systems with further features (Figure 2) and do not provide any information systems referred to as ERP III.

The ERP system model based on the Open Source formula has been evolving in the past few years. In this model, users pay for implementation services and support but can download the software for free or a modest price. Here, enterprise resource planning (ERP) solutions are sold in a manner analogous to that of server operating systems or web servers. Offering an enterprise resource planning (ERP) system in return for ad space is another possibility.

CONCLUSIONS

Changes in the environment and shifts in management philosophy (such as the elimination of process organizations in favor of more traditional ones) are two main drivers of ERP system advancement. Among the many trends in the evolution of IM systems, one noteworthy development is the process ERP. The capacity to build, model, and optimize processes directly within the ERP system, without the need for additional BPMS software, is the core feature of process ERP systems. Users can choose from a library of pre-defined processes or build and refine their own unique business procedures by directly mapping them in the process modeller and then importing them into the ERP system. Defining, describing, and modeling all enterprise-wide business processes—including those that are carried out in conjunction with collaborating and receiving processes—is the primary activity of the ERP process system. Remember, though, that the once-arranged procedure is subject to alter. It is important to keep an eye on, simplify, and optimize business processes. In addition to the ever-shifting demands of the market, they must also accommodate internal organizational changes, such as team rotation, the introduction of new competencies, or changes in the age structure of the company.

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