

Article

The Relationship between the Implementation of ERP Systems and the Financial and Non-Financial Reporting of Organizations

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Abstract: Numerous studies have shown that ERP systems can improve organizational performance and efficiency. Thus, the main concepts addressed in the paper are ERP systems, their performance and the manner in which they improve financial and non-financial reporting. The purpose of this paper is to observe the relationship between ERP systems and financial reporting. The role of these systems is to ensure transparency over the financial and non-financial reporting process of an organization. The research method is represented by an archival analysis (organization's annual reports) to highlight the relationship between ERP systems and financial and non-financial reporting, given the impact of ERP systems on the information used to prepare financial and non-financial reports and how the organization changes after implementing these systems. The results highlight the significant role of ERP systems within an organization, in terms of performance and improvements in financial and non-financial reporting.

Keywords: financial reporting; ERP systems; performance; accounting; organization



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1. Introduction

Any organization tries to find ways to report reliable information, in order to “obtain financial benefits” [1]. ERP systems are an integrated system solution that “can cover all operations throughout the organization” [2–4]. ERP systems are organized modularly, containing such basic modules as procurement, sales, finance, accounting, human resources and other modules specific to each organization, depending on the specifics of the activity. These integrated systems are able to manage most activities within an organization. Data processed using ERP systems are stored in a common database, which facilitates the flow of information [4] between the departments of any organization.

Various studies conducted by [5] found that the implementation of ERP systems has a positive impact on organizational performance. Positive differences in financial and non-financial reporting were identified between organizations that implemented or did not implement ERP systems. ERP systems focus on information quality, strategy, control, decision making, performance and reporting [6], in order to provide real-time operational or financial information, creating strong relationships and efficient communication between departments [7]. Thus, ERP systems offer a superior quality of accounting information, helping managers to make the most efficient decisions regarding the organization.

Ref. [8] they observed that the main objectives of an organization are to ensure the continuity of its activity and to considerably reduce costs. Additionally, various studies found that organizations that implement ERP systems report a significant improvement in financial information (indicators such as return on assets (ROA)) compared to those

that do not implement these systems. The implementation of ERP systems improves non-financial performance, highlighting a positive relationship between return on assets and stock return [9].

The successful implementation of ERP systems has a positive impact on establishing business strategy, but also on organizational efficiency. However, there are situations in which the implementation of ERP systems fails, and the main reasons for these are changes in the activities carried out and other factors of vulnerability not considered at the right time.

The purpose of this paper is to observe the relationship between ERP systems and financial and non-financial reporting processes, and to determine their impact on the quality of information used in this process and the ways in which the organization changes after implementing these systems.

The paper is divided into four parts. The following section introduces the literature review, in order to demonstrate the contribution this article makes to the literature, and explains the research methodology, presenting the sample and data collection processes. The third section discusses the results, followed by several interpretations and conclusions.

2. Materials and Methods

2.1. Theoretical Background

Technological and scientific progress has emerged from research conducted by humans to streamline their work [10]. Many organizations aim to improve their work to provide a quick response to business managers [11].

The need of the organizations to carry out their activity as efficiently as possible has led to them showing greater interest in the information systems market. According with [12], the main reason why organizations feel the need to implement ERP systems is “a way of streamlining business operations, enhancing job performance and generating value by improving the integration of best practice job processes, management functions, real-time reporting and knowledge analysis capabilities”. An IT system that allows the integration of all activities within the organization is the integrated ERP system. An ERP system is an information system used to integrate all the activities of the organization. These ERP systems are based on a unique IT platform, ensuring an optimal transfer of information between people and departments [13]. They ensure the management and automation of a very large amount of information. A feature of these ERP systems is that they can be focused on different activities, helping to monitor and control the processes and activities within the organization. ERP systems standardize, streamline and integrate business processes in the departments of finance, human resources, procurement, sales and distribution, accounting, and more [14]. Additionally, they store all the information in a single database with the role of facilitating the correct flow of information between departments, through a simple query of the database.

The main objectives regarding the adoption of ERP systems are [15]:

- the replacement of the in-house legacy system;
- to increase business process efficiency;
- to decrease operating cost;
- to redesign some business processes.

The main purpose of accounting is to provide financial information about transactions occurring within the organization, in different financial periods. ERP systems play the role of integrating all the information within the organization and generating real-time financial and non-financial data that are useful in the decision-making process. Without data, the decision-making process would not be possible and would be very vague. The main purpose of accounting is to provide financial information about transactions that change the financial status of the organization from one period to another.

The role of ERP systems is to help “an organization to stay competitive in today’s business climate” [12]. Additionally, ERP systems ensure that the information collected is correct and complete and is useful to stakeholders, so that the financial and non-financial reports of an organization can be prepared. Financial reporting provides accurate and real-

time information to stakeholders and managers so that the most important decisions for the organization can be made (improving efficiency and financial statements, making the best decisions related to investors or creditors). Additionally, stakeholder theory involves describing and examining the relationship between the legitimate interests of stakeholders, the management practices of stakeholders and the achievement of an organization's objectives. In other words, it represents organizational management and a business ethic. Stakeholder theory is the basis of corporate governance intended to minimize financial, legal and reputational risks, but also to reduce potential conflicts of interest between owners, managers and the wider stakeholder community, while promoting integrity within organizations. The purpose of this theory is to better understand the needs of stakeholders, mainly by establishing the limits of operation and formulating recommendations for increasing the efficiency of governance.

The agents interested in financial and non-financial information, but who are also involved in the organization of the activity, are owners, investors, employees, suppliers, customers and competitors. Their role within organizations is to ensure the functioning and survival of the organization, so that its activity takes place within normal parameters. The results presented in the monthly or annual reports influence the decisions of the interested parties regarding the settlement and continuity of the activity, as well as the avoidance of conflicts of interest between the interested parties.

The purpose of ERP systems is to ensure that the monitoring, control and integration of all activities and processes is carried out by an organization. Additionally, ERP systems can be "seen as a tool to support management activities that involve making decisions about the complexity of organizational problems" [16]. Thus, all information processed with these systems has either a direct or indirect impact on financial and non-financial performance. ERP systems are used in generating reports and performing various accounting analyses, providing an overview of financial and non-financial operations. Financial and non-financial reporting is important for stakeholders because it aims to improve the process of setting objectives and developing strategies, but also to improve the allocation of resources and decision-making.

Creating value within an organization by implementing ERP systems depends on the fact that any information processed using them is qualitative and provides support for the strategy and control of the organization, as well as on the decision-making process.

According to IFRS 8, the manager is required to report on the internal structure and evaluate the performance and allocation of resources in order to provide a more accurate picture of the company's situation at a given time [6] (p. 7).

Moreover, ERP systems ensure the accurate and complete reporting of the information processed with these information systems, because the architecture of these systems has four characteristics:

- integration—interconnecting the functions of the organization in a database;
- standardization—the rules of the organization are based on good practices;
- centralization and real-time data generation;
- automation of daily tasks.

Assessing the characteristics of ERP systems, it was found that organizations consider ERP systems as a powerful tool that provides support in automating the organization's activities [17]. According to [18], an ERP system is "an application used to plan and handle the capital efficiently, productively, and profitability". So, the purpose of these systems is to "reduce costs, enhancement of productivity, enhancing service quality and better decision-making".

It was found that ERP systems have the ability to integrate all activities within the organization due to the fact that the system is the means of providing functions for each department and offering competitive advantages to an organization (for example, improving productivity and the financial cycle, providing a detailed analysis of financial and non-financial information, making a better inventory, generating high-quality information) [7]. The other benefits include reduced time spent in information processing for financial and

non-financial reports, data sharing, visible data, reduced redundancies, improved supply chain efficiency, and reduced costs.

Financial benefits refer to the ability to obtain profit and improve other indicators (such as return on assets (ROA), return on investments (ROI), total stockholder return (TSR)), and non-financial benefits refer to customer satisfaction, productivity, and the satisfaction of users of financial accounting information [1]. The benefits can be seen only 2 years after the implementation of ERP systems.

The main role of ERP systems is to ensure an improvement in operational efficiency and business strategy.

The existence of an internal control framework within an organization is intended to ensure the credibility of financial and non-financial reporting, and to mitigate fraud risks [19].

The ERP system implemented within the organization has an impact on performance, management accounting techniques and activities, and non-financial information [20] (p. 401).

The measurement of the performance of an organization depends first of all on the size of the organization and secondly on the activity carried out by the organization. ERP systems can provide faster access to operational data [21] (p. 307) and improve transaction processing and information quality.

The process of implementing an ERP system within the organization is complex, consisting of a multitude of phases (presented in Figure 1) requiring a time interval of between 6 months and 2 years depending on the different requirements of the organization.

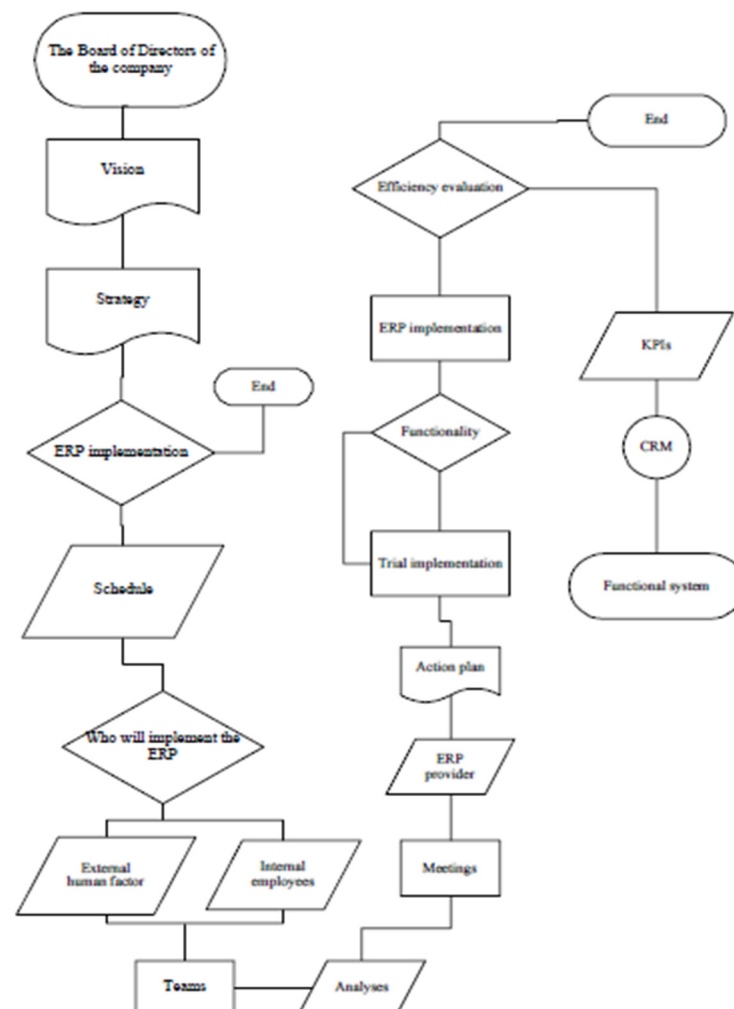


Figure 1. Process of implementing an ERP system. Source: [22].

Management accounting techniques do not change significantly after the implementation of ERP systems. These systems only influence the way in which the analysis of information is performed after data processing with the systems, because the information is much more consistent.

Management accounting activities have been improved after the implementation of ERP systems because many tasks were then automated and redundancies were decreased.

The quality of financial accounting information depends very closely on the perspective from which it is viewed. For example, from the macroeconomic point of view, the quality of information is influenced by various factors including the characteristics of the organization, corporate governance systems, and the audit method. There are also external factors (legal, political) that may influence the organization's activity [23].

Non-financial reporting provides information with respect to the sustainable development of an organization [24]. Non-financial reports must contain accurate, verifiable and comparable data and information over time, as well as the series of policies and procedures applied and applicable by the company within the value chain [24].

IT systems and changes in the structure of the organization significantly influence employee behavior, according to the results obtained by [25]. An outdated IT system determines a reduction in employees' productivity, as they become stressed because they cannot complete their work and must stay overtime to complete their task on time.

Organizations invest in ERP systems to integrate the functionalities of the two separate systems used by the organization into one [26], so as to store information in a single database, facilitating easier access to information.

The main parameters underlying a decision to implement an ERP system are turnover, number of employees, and quantity of manufactured products (if it is an organization with production activity), if the organization has branches in other countries [22].

Another important factor underlying the choice of the ERP system is the organization's dimensions, which all depend on the costs generated by the implementation of the new system. Another factor is the time required to implement the ERP system.

The benefits of implementing these integrated ERP systems include a series of activities within the organization, taking into account both strategic and operational benefits and tangible and intangible results (internal integration, improving information and services to the customer, productivity, reducing costs) [27]. The role of these systems is to add value to the organization by significantly improving the results and efficiency of the organization [28]. Additionally, the transparency of the information used for financial reporting after the implementation of ERP systems was observed by [22]. The quality of information is very important in the decision-making process of the organization [29].

2.2. Research Methodology

In this article, the research method used by the authors to identify the relationship between the implementation of ERP systems and the financial and non-financial reporting of organizations was archive analysis (annual reports and other public information), through which we tracked the impact of using ERP systems when preparing financial and non-financial reports before and after implementing these systems.

We accessed the official pages of ERP systems [30–34] in order to identify a sample of organizations that have implemented the selected ERP systems. The sample includes 37 organizations operating in various fields such as the pharmaceutical industry, food industry, chemical industry, providers of high-tech products, suppliers of IT systems and components, as well as utilities, retail, aviation, financial and accounting services.

In order to identify the year of implementation of the ERP systems within the organizations, the authors consulted the annual reports published on the organizations' websites or specialized websites where the managers of the organizations offered interviews about the effects of ERP system implementation within the organization. In total, 15 organizations were not considered in the final sample due to data limitations.

In order to observe the impact of the implementation of ERP systems, we processed data from the annual reports published on the organizations' websites, taking information from before and after the implementation of these systems, through which we selected various indicators specific to financial reporting (liquidity, solvency, risk, debt, efficiency indicators and rates of return), as well as elements specific to non-financial reporting (operational indicators, corporate governance).

The objective was to investigate whether there is a relationship between the implementation of ERP systems and the financial and non-financial reporting of the organization, considering also any change that occurred after the implementation.

The reason the authors chose these indicators was that all the data processed with ERP systems are presented in annual reports, thus having a massive impact on the financial and non-financial indicators of the organization, but also on the strategy to continue the activity next year.

In Table 1, we present the variables used in this article.

The role of financial and non-financial indicators is to provide information as to whether an organization is successful or not. Managers, suppliers and investors are interested in financial indicators, but also in establishing the business plan for the next year. Financial indicators enable the signaling of critical moments for the organization.

The most followed indicator by investors in the management of the organization is the rate of return on equity, because this can indicate to what extent their investment is profitable or not.

Non-financial indicators highlight the long-term viability of the organization, as well as the way in which the activity of the organization is perceived. The most important non-financial indicator can be represented by the analysis of corporate governance, through which the organizations are internally controlled and supervised by the board of directors, who watch over the interests of the involved parties (shareholders, associates).

Table 1. Financial and non-financial indicators selected for our study.

Variables	Formula	Short Description
Financial indicators		
Current liquidity rate	Current assets/Short-term debts	Liquidity indicators reflect the organization's ability to pay its short-term obligations at maturity based on current assets represented by stocks, receivables, investments.
Intermediate liquidity rate (Quick ratio)	Current assets and inventories/Short-term debts	
Liquidity rate at sight	Cash and cash equivalents + Short-term investments/Current debts	
Global solvency rate	Total assets/Total debts	Solvency indicators provide information on the ability to cover total debts.
Patrimony solvency rate	Own capital/Own capital + Bank credits	
Return on assets (ROA)	Operating result/Operating assets × 100 OR Gross profit/Total assets × 100	Profitability indicators show whether the organization uses all resources to generate profit. Rates of return provide information about the efficiency of the business activity of the organization, mainly reflecting the relationship between turnover and profit or total costs related to the sale. The rate of return on assets highlights the performance when using the total asset, with respect to the invested capital to obtain the performance in the developed activity. These indicators measure the speed and turnover of current assets. The speed of rotation assets highlights the intensity of exploitation of the organization's assets, thus showing how much capital has been invested to obtain annual turnover. However, from the duration of the rotation we can observe the number of days necessary for the recovery of the assets.
Return on equity (ROE)	Net profit/Own capital × 100	
Return on sales (ROS)	Profit/Turnover × 100	
Return on consumed resources (RRC)	Operating result/Operating expenses × 100	
Speed of rotation of the assets	Turnover/Average of current assets, where average of current assets = (Initial sold + Final sold)/2	
Duration of rotation of the assets	Average of current assets/Turnover × T, where T = 365 days	
Non-financial indicators		
Number of directors Executive members Non-executive members	The information provided in the annual reports	These indicators are needed to observe how many members are needed in the decision-making process and whether the set objectives are met.
The corporate governance model		The reason we chose this indicator was to see if the selected organizations want to maximize their financial results (shareholders model) or if they incorporate corporate responsibility to protect the interests of all stakeholders (stakeholders model).
One-tier board vs. two-tier board		The purpose of this indicator is to highlight the structure of the organizations selected for the sample.
Sustainability		This indicator represents all the forms and methods of socio-economic development that ensure a balance between social, economic and ecological aspects and elements of natural capital. If an organization decides to be sustainable, it can obtain financial and non-financial benefits.
Audit		This indicator shows the degree of credibility presented in the reports.

Source: Author's creation adapted after sources [35,36].

According to [37], there is a close correlation between corporate governance and transparency (the way information is disseminated) because a high degree of transparency is associated with the use of high-quality governance practices. Thus, transparency is considered a mirror of good governance practices, and an efficient system of governance involves attracting investment, transparency increases the degree of trust in the organization's activity. Thus, investors can take the risk of placing capital within the organization.

The operational indicator chosen by the authors for analysis was the time spent working on a certain task to observe whether the labor productivity was improved or not after the implementation of the ERP system.

3. Results and Discussion

The organizations were chosen based on the lists of organizations that have implemented ERP systems, which is presented on the websites of ERP system providers [30–34]. The organizations subject to analysis carried out their activity in different fields, these being presented in Figure 2.

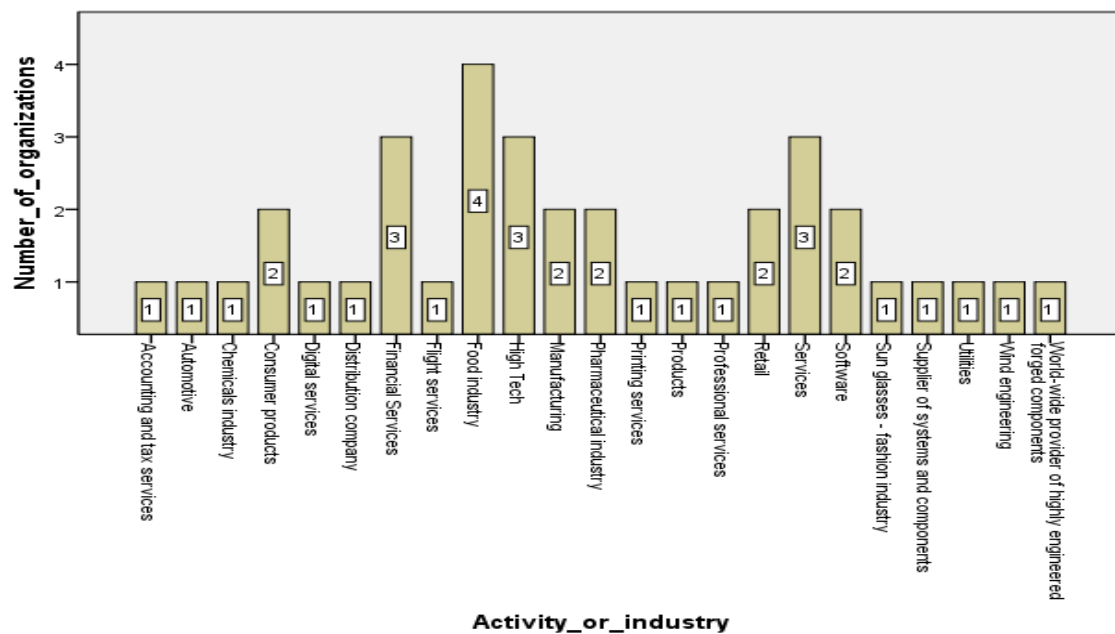


Figure 2. Selected organizations operating in various fields, initial sample. Source: Author's creation based on sources [38–66].

The sample of organizations allowed the authors to form an opinion on how ERP systems influence the activity of different organizations depending on the field of activity.

The analysis of the results in this article is divided into two parts: a section where the main financial indicators will be analyzed (based on the processing of data collected from annual reports) and a section where non-financial indicators are analyzed (following the analysis of annual reports presented by organizations).

Analyzing the current liquidity rates for a period of three years (considering the year before implementation, the year of actual implementation and the year after the implementation of ERP systems), we identified the following situations, presented in Figure 3: approximately 18.18% of the selected organizations have difficulty in honoring their short-term obligations (highlighted with red), while 81.82% have a level of current liquidity above 1.5, providing assurance that those organizations have the capacity to honor short-term obligations (highlighted with green).

No.	Organization	Year of implementation of the ERP system	Type of ERP system implemented	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	2004	SAP ERP	1.710	1.962	2.485
2	Curtiss Wright	2015	Oracle ERP	2.747	3.365	3.313
3	SIFCO Industries	2015	MS DAX	2.762	2.158	1.144
4	Robert Bosch Power Tools	2016	SAP ERP	1.691	1.673	1.723
5	Avant	2016	Oracle Netsuite ERP	1.330	1.294	1.753
6	Tikkurila Sverige AB	2016	MS DAX	1.834	1.707	1.398
7	HP Inc.	2017	SAP ERP	0.982	0.996	0.851
8	Siemens Gamesa Renewable Energy S.A	2017	SAP ERP	1.279	N/A	N/A
9	Central Garden & Pet	2005	SAP ERP	2.704	3.059	3.062
10	Inc	2008	SAP ERP	1.460	1.381	1.826
11	Sopharma	2017	MS DAX	1.409	1.289	1.224
12	Toyota	2018	SAP ERP	1.030	1.485	1.696
13	Engie	2018	SAP ERP	1.061	1.071	1.045
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services Corporation	2018	Oracle Netsuite ERP	1.717	1.776	1.758
15	Chatham Financial	2018	Microsoft Dynamics GP	0.948	0.505	0.422
16	Tyson Foods, Inc	2019	SAP ERP	1.131	1.300	1.862
17	Hewlett Packard Enterprise	2019	SAP ERP	1.004	0.790	0.884
18	Accenture	2019	SAP ERP	1.338	1.397	1.402
19	Colgate-Palmolive	2020	SAP ERP	1.035	0.985	N/A
20	Gartner	2010	MS DAX	0.621	0.766	0.766
21	Valora	2020	SAP ERP	1.028	1.027	N/A
22	Landbay	2020	Oracle Netsuite ERP	4.585	5.621	N/A

Figure 3. Current liquidity rate. Source: Author's creation based on information collected from annual reports.

After analyzing in detail, it was noticed that in the year of implementation, some organizations had a lower level than in the year before implementation; this is because their short-term debts were high compared to their current assets, as these were represented by the cost of implementing these systems.

According to Figure 4, 45.45% had a full capacity to honor their payments at maturity (exceeding the level of 0.8–1), and these cells are colored green. In approximately 22.72%, there is a possibility of problems arising when payments are due, and these are highlighted with yellow and red.

	Organization	Year of implementation of the ERP system	Type of ERP system implemented	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	2004	SAP ERP	1.4431	1.6928	2.1713
2	Curtiss Wright	2015	Oracle ERP	2.0672	2.6934	2.3324
3	SIFCO Industries	2015	MS DAX	1.7741	1.3150	0.5827
4	Robert Bosch Power Tools Gm	2016	SAP ERP	1.1514	1.1801	1.21303
5	Avant	2016	Oracle Netsuite ERP	1.3297	1.2943	1.75275
6	Tikkurila Sverige AB	2016	MS DAX	1.0737	1.0344	0.81741
7	HP Inc.	2017	SAP ERP	0.74351	0.73764	0.6098
8	Siemens Gamesa Renewable	2017	SAP ERP	0.96439	N/A	N/A
9	Central Garden & Pet Company	2005	SAP ERP	2.6122	2.9039	2.8933
10	Cooper Standard Automotive I	2008	SAP ERP	1.1662	1.1216	1.6104
11	Sopharma	2017	MS DAX	0.8621	0.7401	0.6795
12	Toyota	2018	SAP ERP	0.8918	1.2627	1.4400
13	Engie	2018	SAP ERP	0.9856	0.9989	0.9828
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services Corporation	2018	Oracle Netsuite ERP	0.483710592	0.3729	0.4577
15	Chatham Financial	2018	Microsoft Dynamics GP	0.947635313	0.5052	0.4222
16	Tyson Foods, Inc	2019	SAP ERP	0.4323	0.5552	0.8831
17	Hewlett Packard Enterprise	2019	SAP ERP	0.8620	0.6658	0.7408
18	Accenture	2019	SAP ERP	1.3382	1.3967	1.4017
19	Colgate-Palmolive	2020	SAP ERP	0.6882	0.6051	N/A
20	Gartner	2010	MS DAX	0.6211	0.7657	0.7662
21	Valora	2020	SAP ERP	0.6870	0.7531	N/A
22	Landbay	2020	Oracle Netsuite ERP	4.5849	5.6212	N/A

Figure 4. Intermediate liquidity rate (Quick ratio). Source: Author's creation based on information collected from annual reports.

The intermediate liquidity rate (Quick ratio) provides information about an organization's ability to pay its short-term debt, using mostly the liquid assets on its balance sheet.

The liquidity rate provides information on the state of short-term cash and investments. Following the implementation of ERP systems, in approximately 50% of the organizations, an improvement in these rates was observed (see values on Figure 5).

	Organization	Year of implementation of the ERP system	Type of ERP system implemented	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	2004	SAP ERP	0.3998	0.6608	1.2707
2	Curtiss Wright	2015	Oracle ERP	0.8659	0.7632	0.7837
3	SIFCO Industries	2015	MS DAX	0.2399	2.0121	0.9278
4	Robert Bosch Power Tools GmbH	2016	SAP ERP	0.2915	0.3257	0.3306
5	Avant	2016	Oracle Netsuite ERP	0.3086	0.3938	0.8352
6	Tikkurila Sverige AB	2016	MS DAX	0.1628	0.1551	0.1028
7	HP Inc.	2017	SAP ERP	0.5248	0.5407	0.4064
8	Siemens Gamesa Renewable	2017	SAP ERP	0.3941	N/A	N/A
9	Central Garden & Pet Company	2005	SAP ERP	1.4551	1.7955	1.7396
10	Cooper Standard Automotive Inc	2008	SAP ERP	0.0956	0.3404	0.8814
11	Sopharma	2017	MS DAX	0.0717	0.0838	0.0591
12	Toyota	2018	SAP ERP	0.1982	0.4331	0.4829
13	Engie	2018	SAP ERP	0.1630	0.1503	0.1818
14	Titan Shops, a Division of CSU	2018	Oracle Netsuite ERP	0.2686	0.1138	0.1397
15	Chatham Financial	2018	Microsoft Dynamics GP	0.4430	0.2202	0.1463
16	Tyson Foods, Inc	2019	SAP ERP	0.0898	0.1611	0.4221
17	Hewlett Packard Enterprise	2019	SAP ERP	0.4745	0.3226	0.3536
18	Accenture	2019	SAP ERP	0.4989	0.5542	0.6720
19	Colgate-Palmolive	2020	SAP ERP	0.331599802	0.3181	N/A
20	Gartner	2010	MS DAX	0.1298	0.1482	0.1550
21	Valora	2020	SAP ERP	0.4475	0.5938	N/A
22	Landbay	2020	Oracle Netsuite ERP	3.6231	0.4442	N/A

Figure 5. Liquidity rate at first sight. Source: Author's creation based on information collected from annual reports.

Regarding the global solvency rate presented in Figure 6, approximately 72% of the analyzed organizations were solvent (because they exceeded a level of 1.4, as highlighted with green), and 22.72% were close to insolvency. Only one organization in the sample became insolvent due to the implementation of the ERP system.

	Organization	Year of implementation of the ERP system	Type of ERP system implemented	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	2004	SAP ERP	2.2559	2.4794	2.8791
2	Curtiss Wright	2015	Oracle ERP	1.7696	1.8678	2.0978
3	SIFCO Industries	2015	MS DAX	3.3164	1.8738	1.8614
4	Robert Bosch Power Tools GmbH	2016	SAP ERP	1.8035	1.7880	1.8473
5	Avant	2016	Oracle Netsuite ERP	2.0167	2.0390	29.6978
6	Tikkurila Sverige AB	2016	MS DAX	2.0456	2.0342	1.7232
7	HP Inc.	2017	SAP ERP	0.8818	0.9062	0.9819
8	Siemens Gamesa Renewable Energy S.A	2017	SAP ERP	1.4274	N/A	N/A
9	Central Garden & Pet Company	2005	SAP ERP	1.9863	2.0746	1.9019
10	Cooper Standard Automotive Inc	2008	SAP ERP	1.1418	1.0109	0.8500
11	Sopharma	2017	MS DAX	2.3349	2.0534	2.0129
12	Toyota	2018	SAP ERP	1.5949	2.0035	1.9491
13	Engie	2018	SAP ERP	1.3951	1.3631	1.3124
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services Corporation	2018	Oracle Netsuite ERP	2.0765	2.2360	2.1690
15	Chatham Financial	2018	Microsoft Dynamics GP	2.3903	2.2770	2.1680
16	Tyson Foods, Inc	2019	SAP ERP	1.7860	1.7539	1.8147
17	Hewlett Packard Enterprise	2019	SAP ERP	1.6217	1.4949	1.4245
18	Accenture	2019	SAP ERP	1.7814	1.9910	1.8938
19	Colgate-Palmolive	2020	SAP ERP	1.0385	1.0743	N/A
20	Gartner	2010	MS DAX	1.1020	1.1703	1.1517
21	Valora	2020	SAP ERP	1.3544	1.3890	N/A
22	Landbay	2020	Oracle Netsuite ERP	8.3467	5.8881	N/A

Figure 6. Global solvency rate. Source: Author's creation based on information collected from annual reports.

The overall solvency ratio reflects the degree to which the total debt of the organization can be covered by its total assets.

In Figure 7, we calculate the patrimony solvency rate, and it can be noticed that 72% of the analyzed organizations have a good level of patrimony, managing to use their own capital without resorting to bank loans. The rest of the organizations contracted bank loans to finance and continue their activities.

	Organization	Year of implementation of the ERP system	Type of ERP system implemented	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	2004	SAP ERP	1	1	1
2	Curtiss Wright	2015	Oracle ERP	1	1	1
3	SIFCO Industries	2015	MS DAX	1	1	1
4	Robert Bosch Power Tools GmbH	2016	SAP ERP	1	1	1
5	Avant	2016	Oracle Netsuite ERP	1	1	1
6	Tikkurila Sverige AB	2016	MS DAX	1	1	1
7	HP Inc.	2017	SAP ERP	1	1	1
8	Siemens Gamesa Renewable Energy S.A	2017	SAP ERP	0.8061	N/A	N/A
9	Central Garden & Pet Company	2005	SAP ERP	1	1	1
10	Cooper Standard Automotive Inc	2008	SAP ERP	1	1	1
11	Sopharma	2017	MS DAX	0.9499	0.9087	0.9252
12	Toyota	2018	SAP ERP	0.9721	1	1
13	Engie	2018	SAP ERP	0.6273	0.6077	0.5590
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services Corporation	2018	Oracle Netsuite ERP	1	1	0.7299
15	Chatham Financial	2018	Microsoft Dynamics GP	1	1	1
16	Tyson Foods, Inc	2019	SAP ERP	1	1	1
17	Hewlett Packard Enterprise	2019	SAP ERP	1	1	1
18	Accenture	2019	SAP ERP	1	1	1
19	Colgate-Palmolive	2020	SAP ERP	0.6822	0.8102	N/A
20	Gartner	2010	MS DAX	1	1	1
21	Valora	2020	SAP ERP	1	1	N/A
22	Landbay	2020	Oracle Netsuite ERP	1	1	N/A

Figure 7. Patrimony solvency rate. Source: Author's creation based on information collected from annual reports.

The purpose of rates of return is to measure the efficient use of the organization's resources to finance its activity. According to [67], rates of return are defined as "a ratio between an indicator of results (profit or loss) and an indicator that reflects an activity flow (net turnover, resources consumed) or a stock (equity, total assets)". In Figures 8 and 9, we calculate the rates of return based on the data collected from the annual reports of the selected organizations in the sample. Some information is not available in the annual reports (for example, Siemens Gamesa Renewable Energy S.A.), and in some cases, the most up-to-date annual report after the implementation year is not available (for example, Colgate-Palmolive, Valora, Landbay); thus, such information is replaced by "N/A".

Return on assets (ROA) measures the efficiency of the capital allocated to the fixed and current assets of the organization. In most of the cases presented in Figure 8, it can be seen that the ROA increased significantly after the implementation of the ERP system, but there was also a decrease in certain organizations in the year after the implementation of the ERP system. Return on equity (ROE) shows the efficiency of using equity, highlighting the organization's ability to make a profit using equity.

Return on sales (ROS) highlights the elasticity of net profit in relation to turnover, and return on consumed resources (RRC) shows the degree to which the organization's resources are capitalized in order to make a profit. Some organizations showed an increasing trend, others a decreasing one, with all depending on the impact of the implementation of the ERP system on the operating expenses.

	Organization	ROA			ROE		
		Before implementation	Year of implementation	After implementation	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	21,358	24,079	23,535	26,786	26,747	27,491
2	Curtiss Wright	7,264	5,658	5,276	7,666	3,712	2,970
3	SIFCO Industries	7,617	(3,845)	(10,220)	6,556	(3,931)	(18,776)
4	Robert Bosch Power Tools GmbH	5,810	4,112	5,824	10,275	6,579	8,719
5	Avant	1,228	1,399	2,054	2,193	2,535	1,972
6	Tikkurila Sverige AB	13,845	13,990	3,881	21,282	21,333	5,961
7	HP Inc.	12,964	9,954	8,703	(64,181)	(74,120)	(833,646)
8	Siemens Gamesa Renewable Energy S.A	7,388	N/A	N/A	17,628	N/A	N/A
9	Central Garden & Pet Company	6,708	5,458	6,204	8,672	9,830	9,010
10	Cooper Standard Automotive Inc	(0,005)	(0,005)	(0,024)	(0,056)	(0,618)	0,116
11	Sopharma	7,229	5,338	3,497	11,177	9,098	6,025
12	Toyota	4,500	3,990	3,844	10,598	6,599	6,237
13	Engie	2,184	1,711	1,577	5,256	4,028	4,283
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services Corporation	12,425	16,716	16,804	17,668	22,389	22,233
15	Chatham Financial	2,160	2,142	1,312	3,665	3,823	2,436
16	Tyson Foods, Inc	17,507	15,174	15,498	23,628	14,305	13,785
17	Hewlett Packard Enterprise	5,341	7,716	4,147	8,969	6,117	(2,000)
18	Accenture	23,756	20,986	18,270	37,856	32,684	38,712
19	Colgate-Palmolive	20,839	23,361	N/A	424,194	244,777	N/A
20	Gartner	9,506	10,429	14,652	73,723	51,474	75,310
21	Valora	2,932	(0,421)	N/A	11,771	(0,905)	N/A
22	Landbay	1,508	(17,308)	N/A	1,193	(20,849)	N/A

Figure 8. Return on assets (ROA) and return on equity (ROE) (expressed in %). Source: Author's creation based on information collected from annual reports.

	Organization	ROS			RRC		
		Before implementation	Year of implementation	After implementation	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	17,192	17,971	20,610	243,807	252,764	262,004
2	Curtiss Wright	5,053	2,656	2,646	52,946	9,546	9,867
3	SIFCO Industries	4,198	(2,628)	(9,516)	27,660	16,813	11,287
4	Robert Bosch Power Tools GmbH	5,009	3,246	4,194	51,274	53,275	55,646
5	Avant	0,018	0,019	66,452	0,020	0,021	252,273
6	Tikkurila Sverige AB	7,104	7,780	1,837	11,807	10,233	3,427
7	HP Inc.	5,174	4,852	9,110	7,942	7,250	7,469
8	Siemens Gamesa Renewable Energy S.A	6,746	N/A	N/A	11,546	N/A	N/A
9	Central Garden & Pet Company	3,265	3,896	4,041	43,560	47,192	49,282
10	Cooper Standard Automotive Inc	(6,013)	(4,683)	(18,311)	18,783	14,800	15,861
11	Sopharma	6,260	4,500	2,598	5,402	5,809	3,434
12	Toyota	7,465	8,674	7,214	8,373	30,619	30,092
13	Engie	13,434	2,895	2,712	20,368	4,869	6,520
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services Corporation	5,832	7,387	7,140	9,467	11,807	11,578
15	Chatham Financial	9,833	9,521	5,750	469,109	457,556	479,399
16	Tyson Foods, Inc	7,558	4,799	4,979	7,989	6,300	9,855
17	Hewlett Packard Enterprise	6,184	3,600	(1,193)	42,695	48,330	45,746
18	Accenture	9,759	11,214	15,283	16,333	17,082	17,226
19	Colgate-Palmolive	15,083	16,362	N/A	146,435	155,206	N/A
20	Gartner	7,279	7,473	9,322	13,376	13,103	17,063
21	Valora	25,382	(2,571)	N/A	45,980	6,184	N/A
22	Landbay	2,545	(89,599)	N/A	3,791	327,587	N/A

Figure 9. Return on sales (ROS) and return on resources consumed (RRC) (expressed in %). Source: Author's creation based on information collected from annual reports.

Regarding financial indicators, we can also analyze the speed and duration of the rotation of the assets. According to [35], the speed of rotation of assets highlights the intensity of exploitation of the organization's assets, thus showing how much capital has been invested to obtain annual turnover. However, via the duration of the rotation we can observe the number of days necessary for the recovery of the assets. In Figure 10, we present and analyze the speed and duration of the rotation of the assets.

	Organization	Speed of rotation assets			Duration of rotation assets (expressed in days)		
		Before implementation	Year of implementation	After implementation	Before implementation	Year of implementation	After implementation
1	Johnson & Johnson	1.98	1.88	1.72	184	194	212
2	Curtiss Wright	1.54	1.24	1.06	237	294	344
3	SIFCO Industries	2.27	1.76	1.84	161	208	199
4	Robert Bosch Power Tools GmbH	2.54	2.29	2.31	144	159	158
5	Avant	245.50	259.10	0.06	1	1	6487
6	Tikkurila Sverige AB	3.06	2.91	2.68	119	125	136
7	HP Inc.	0.77	2.55	2.68	474	143	136
8	Siemens Gamesa Renewable Energy	1.27	N/A	N/A	286	N/A	N/A
9	Central Garden & Pet Company	2.75	2.83	2.83	133	129	129
10	Cooper Standard Automotive Inc	0.00	0.00	0.00	98449	98180	147247
11	Sopharma	2.00	2.13	2.26	182	171	161
12	Toyota	1.43	0.21	1.42	255	1760	257
13	Engie	0.28	0.95	0.98	1290	385	372
14	Titan Shops, a Division of CSU Fullerton Auxiliary Services	2.20	2.25	2.35	166	162	155
15	Chatham Financial	4.25	4.70	4.80	86	78	76
16	Tyson Foods, Inc	6.71	6.60	5.74	54	55	64
17	Hewlett Packard Enterprise	1.59	1.80	1.70	229	203	214
18	Accenture	3.24	2.98	2.67	113	123	137
19	Colgate-Palmolive	3.94	3.87	N/A	93	94	N/A
20	Gartner	2.05	2.19	2.21	178	167	165
21	Valora	0.71	0.50	N/A	516	734	N/A
22	Landbay	0.86	0.33	N/A	426	1117	N/A

Figure 10. Speed and duration of rotation of the assets. Source: Author's creation based on information collected from annual reports.

According to the data presented in Figure 10, we noticed a higher speed of rotation of assets and a lower duration of rotation of assets (for example, the Avant organization before the implementation of ERP systems had a very fast speed of rotation of assets of 245.50 rotations, so the assets can be rotated in a single day; on the other hand, a very low rotation speed of 0.004 rotations was displayed by the organization Cooper Standard Automotive Inc., in which the duration of the rotation of assets was 98,449 days). The acceleration of the rotation speed determines a favorable improvement in the performance of the organization, and its slowing down has a negative effect.

In the year of implementation of the ERP system, there was a decrease in the speed of rotation of assets, which determines an increase in the number of days required for asset rotation for approximately 50% of the analyzed organizations, depending on their turnover and current assets.

In the second part, we analyzed some representative non-financial indicators related to corporate governance, these being presented in Figure 11. Corporate governance includes the principles based on which an organization is governed and controlled.

In this analysis, we chose as criteria the number of directors, the number of executive and non-executive members, the corporate governance model, a unitary or dual system (one-tier or two-tier board), whether or not sustainability is ensured, and which organization ensures the audit of financial statements.

Approximately 68% of the analyzed organizations consider sustainability in their development. Additionally, 68% of them have a two-tier board. The corporate governance model used by the analyzed organizations is mostly the stakeholders model, which allows the incorporation of corporate responsibility to protect the interests of all stakeholders (for example, shareholders, potential investors, employees, customers, suppliers, business partners, government, local government, media) that have an impact on the activity of an organization or are influenced by them.

The two-tier board aims to protect shareholders and ensure the transparency of the information published in the annual reports. To ensure the high credibility of this information, regular, independent and efficient audits must be performed. The analyzed organizations benefit from audit services from external auditors (Ernst & Young, PwC, KPMG, Grant Thornton and others) which communicate with internal auditors.

	Organization	Year of implementation of the ERP system	Number of directors	Executive members	Non-executive members	The corporate governance model	One-tier board vs. Two-tier board	Sustainability	Audit
1	Johnson & Johnson	2004	2	9	0	Stakeholders model	Two-tier board	Yes	PwC LLP
2	Curtiss Wright	2015	7	6	1	Stakeholders model	Two-tier board	Yes	N/A
3	SIFCO Industries	2015	5	4	1	Shareholders model	Two-tier board	No	Grant Thornton LLP
4	Robert Bosch Power Tools GmbH	2016	6	9	2	Shareholders model	Two-tier board	Yes	PwC GmbH
5	Avant	2016	7	2	0	Stakeholders model	Two-tier board	No	PwC GmbH
6	Tikkurila Sverige AB	2016	7	1		Stakeholders model	Two-tier board	Yes	KPMG
7	HP Inc.	2017	3	2	1	Stakeholders model	One-tier board	No	Ernst & Young LLP
8	Siemens Gamesa Renewable Energy	2017	2	1	7	Stakeholders model	Two-tier board	Yes	N/A
9	Central Garden & Pet Company	2005	1	6	0	Stakeholders model	Two-tier board	Yes	Deloitte & Touche LLP
10	Cooper Standard Automotive Inc	2008	8	3	2	Stakeholders model	Two-tier board	No	Ernst & Young LLP
11	Sopharma	2017	1	4	0	Shareholders model	One-tier board	Yes	Baker Tilly Klitou and Partners OOD
12	Toyota	2018	1	6	1	Stakeholders model	Two-tier board	Yes	N/A
13	Engie	2018	2	11	0	Shareholders model	Two-tier board	Yes	Deloitte & EY
14	Fullerton Auxiliary Services Corporation	2018	N/A	N/A	N/A	N/A	N/A	N/A	N/A
15	Chatham Financial	2018	1	3	2	Shareholders model	One-tier board	No	PwC LLP
16	Tyson Foods, Inc	2019	1	6	7	Shareholders model	Two-tier board	Yes	N/A
17	Hewlett Packard Enterprise	2019	1	2	0	Stakeholders model	One-tier board	Yes	Ernst & Young LLP
18	Accenture	2019	2	8	3	Shareholders model	Two-tier board	Yes	KPMG LLP
19	Colgate-Palmolive	2020	5	11	0	Stakeholders model	Two-tier board	Yes	PwC LLP
20	Gartner	2010	1	10	0	Shareholders model	Two-tier board	Yes	KPMG LLP
21	Valora	2020	1	6	1	Shareholders model	One-tier board	Yes	Ernst & Young AC
22	Landbay	2020	1	0	0	Shareholders model	One-tier board	No	BF Borgers CPA PC

Figure 11. Corporate governance. Source: Author's creation based on information collected from annual reports.

Analyzing in detail the annual reports of the selected organizations in the sample, we identified the benefits offered by the implementation of ERP systems. According to [38] from 2019, using these technologies enables a high-quality service for customers. In their 2020 report, [38] showed that the organization's strategy is focused on customer needs, using ERP systems to redesign certain activities. The flexibility and cost reduction benefits offered by ERP systems were observed mainly by [43], this being presented in the 2019 annual report (post-implementation of ERP systems).

In the report presented in 2020 by [44], they noted that the ERP system used (SAP) improves efficiency in the process of supply and production, and can deal with significant increases in consumer demand for their products. Thus, they noticed a significant reduction in production costs.

After the implementation of an ERP system, [47] presented a strong financial performance, because the data processed with ERP systems are much more accurate, giving the organization the opportunity to develop sustainably. The same benefits have been observed by other organizations, such as [50,53,56,65].

4. Conclusions

The technological development over the period in question has significantly influenced the perception of the organizations regarding the development and continuation of activity, and the degree of implementation of ERP systems has increased significantly. ERP systems play the role of replacing a multitude of systems used in the past in the financial and accounting reporting process, because these systems are based on a modular structure capable of adaptation to the needs of the organization.

Even if the implementation of ERP systems is more difficult, more expensive or more time-consuming (the implementation process can take between six months and one or three years), its success has a positive impact on financial and non-financial indicators. In the annual reports of selected organizations, we have identified that the implementation of ERP systems does not affect internal control in terms of financial reporting ([65], 2020), enabling the significant progress made in validating and accurately reporting with these systems.

According to the annual report published on the Valora website in 2020, we can see how the ERP system's modules can be combined with customized ones, depending on the activity carried out by an organization. The purpose of combining these modules is to

create an open environment that increases the visibility of information for many employees in the organization, given that all information processed is stored in the common database of the ERP system.

After analyzing the financial and non-financial data, which were collected from the annual reports published by organizations on their websites, we conclude that for the most part these indicators have improved significantly, and only in a few cases did we encounter negative situations as a result of implementing these systems. The results obtained refer to the theoretical context, as the purpose of ERP systems is to allow users of financial information to monitor and control the information within the organization, so as to improve the quality of the activity and the decisions made in organizations. As we mentioned in the theoretical background section, the information derived from ERP systems is useful to the interested parties, as it helps to establish the strategy of the organization.

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Implications and Limitations: The initial population was represented by a sample of 37 organizations, out of which 15 organizations were removed, because their annual reports were not available. For the remaining organizations, where the year of implementation of the ERP systems was 2020, the annual reports for 2021 were not available, thus data were not collected.

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