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## Cloud Computing Technologies and the Economic Impact of Digitalization

Gabriela Ignat<sup>1</sup>, Lilia Şargu<sup>2</sup>, Ioan Prigoreanu<sup>3</sup>

**Abstract:** Nowadays, the use of the Internet and new technologies, for business and people, is part of everyday life. Thanks to the Internet, any information is available anywhere in the world at any time, and this was not available a few years ago. The term Cloud Computing describes a variety of concepts that involve a large number of computers connected through a network in real time, this being possible with the help of the Internet. Cloud computing is the most popular and widely used technology today. Big data, storage capacity and inadequate analysis are challenging many organizations today and require perfect data management techniques and analytical models to implement an integrated business intelligence solution.

**Keywords:** cloud computing; Oracle; SaaS; integrated platforms; business intelligence

**JEL Classification:** M15; L86; P50

### 1. Introduction

The emergence of Cloud Computing has led to an evolution of a variety of technologies that have emerged to change the approach of an organization, to build the most sustainable infrastructure (Al-Aqrabi, Liu, Hill, & Antonopoulos, 2015, pp. 85-96). Organizations use cloud-based data management solutions and business intelligence solutions to manage and analyze data quickly and efficiently (Alsufyani & Chang, 2015). Cloud integration enables fast and reliable data synchronization, which also eliminates redundant data and improves operational efficiency. By integrating data and services, the business will have the systems in place to automatically implement various similar tasks that can be performed and edited anytime, anywhere. Cloud integration leads to better business performance, but only if done correctly.

The ultimate goal of cloud integration is to connect different elements of different resources - both cloud-based and local - into a single environment. Once this is done, people can access and manage data, applications and services from that ubiquitous environment.

Cloud computing has been a mainstay of the IT world for several years, but many organizations are just beginning to explore how it can be incorporated into their broader technology strategy. Given the pace

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of recent innovation, the impact of cloud computing on business will continue to grow in the future (Arora, Arora, Kumar, & Pant, 2020, pp. 495–505).

When planning an IT strategy, an organization must consider the strategic importance of cloud computing, it presents many opportunities for companies that want to think beyond the traditional model of local IT infrastructure (Bahl, et al., 2020a). The industry is changing rapidly, empowering companies across a wide range of industries to undertake unprecedented digital transformations that enable them to enter new markets and better serve their existing customers (Banda & Ngassam, 2017).

**2. Results and Discussions**

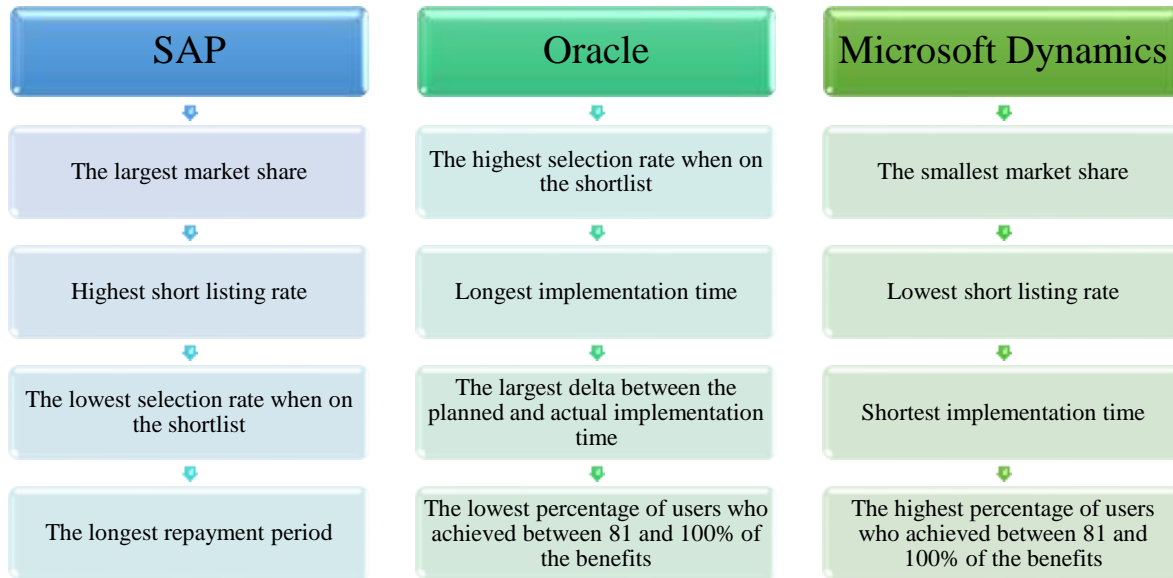
Cloud computing is gaining momentum because it allows for a distributed system infrastructure that offers more benefits than traditional ones. Provides a hosted virtualized hardware environment, effective unlimited storage, and software services that can help with system development and deployment (Basilaia, Dgebuadze, Kantaria, & Chokhonelidze, 2020, pp. 101-108; Bauer, 2018, pp. 26-32). This session is the fourth in a series of special events at the WSE, focusing on selected aspects of research directions in the evolution of web systems, and the second session focused on issues related to the migration of web applications to the cloud. Figure 1 highlights the types of cloud computing services.



**Figure 1. Types of Cloud Services**

Another distinctive feature of cloud computing is accessibility (and security): private clouds that are operated by a single organization for its own needs, community clouds are shared between multiple organizations, and public clouds are open. all.

Cloud computing has changed significantly in the last decade. Not only have multiple vendors and service providers crowded the space, but also cloud infrastructure, which has traditionally been limited to single-vendor data centers (Bellini, Cenni, & Nesi, 2015). These trends have led to the need for a variety of new computing architectures that will be offered by the future cloud infrastructure. These architectures are expected to have an impact on areas such as connecting people and devices, data-intensive computing, service space, and self-learning systems (Chang, Kuo, & Ramachandran, 2016, pp. 24-41; Iyengar, Vaishya, Bahl, & Vaish, 2020b, pp. 1–4).



**Figure 2. The Main Aspects of Cloud Computing Platforms**

The applications now aim to leverage the cloud infrastructure by using heterogeneous resources from multiple providers. This is in contrast to how resources from a single cloud or data center provider have traditionally been used. As a result, new computing architectures are emerging. This change affects a number of societal and scientific fields (Figure 2).

Cloud computing has been around for about two decades, and despite data showing business efficiency, cost-effectiveness, and competitive advantage, much of the business community continues to operate without it.

Factors that should affect purchasing decisions include functional requirements, risk tolerance, budget, complexity, resource availability, and project scope, to name a few. In addition to weighing all vendors, companies must also examine the variety of specific packages, modules, and deployment options offered by each vendor to determine the “most appropriate” solution (Jasmine, 2019, pp. 67–70).

**Table 1. The Advantages of Cloud Computing**

Nr. crt.	Advantage	Impact
1	Reduced costs	For many organizations, the main benefit of cloud computing is its ability to significantly reduce capital expenditures. By using virtualized computing resources, companies do not have to invest in hardware, such as servers, routers, and cables.
2	Fast capacity	The ability to grow fast is incredibly important for most start-ups and smaller companies. As their IT requirements change, they need to have the infrastructure to quickly expand their ability to meet their new requirements.
3	Flexibility	Data availability and mobility are extremely important for today's organizations. As customers access services in more ways than ever before, thanks to smartphones and IT devices, companies need to be able to adapt quickly to these access requests. More importantly, the modern workplace is becoming more and more virtual, with employees accessing IT networks remotely and non-stop.
4	Redundancy	Every organization needs to have a plan in place when a disaster strikes. The cost of losing data and services for any length of time is significant, potentially high enough to mark the end of a business. Whether it is a natural disaster, an infrastructure failure or a cyber attack, any event that causes periods of system downtime must be considered when implementing layoffs to protect critical mission data and applications.
5	Better infrastructure	Maintaining an up-to-date IT infrastructure is a challenge for many organizations, especially those who cannot afford to invest in new equipment every time the next generation of servers enters the market. Cloud providers, on the other hand, are providing the best possible computing resources to their customers, which means they are constantly working to make their infrastructure more efficient, flexible and powerful.
6	Security updates	The world of cybersecurity is constantly evolving and it can be difficult for IT departments to keep up with all the latest threats. While enterprise-level organizations typically have cybersecurity staff, smaller companies are usually forced to rely on third-party services or rely on software updates.
7	Control	When an organization moves workload and data to the cloud, it has a variety of options in how it builds and manages that environment. By establishing a private cloud deployment for the exclusive use of a single organization, companies can maintain the control and visibility they expect from their local deployments.

*Source: elaborate by the authors*

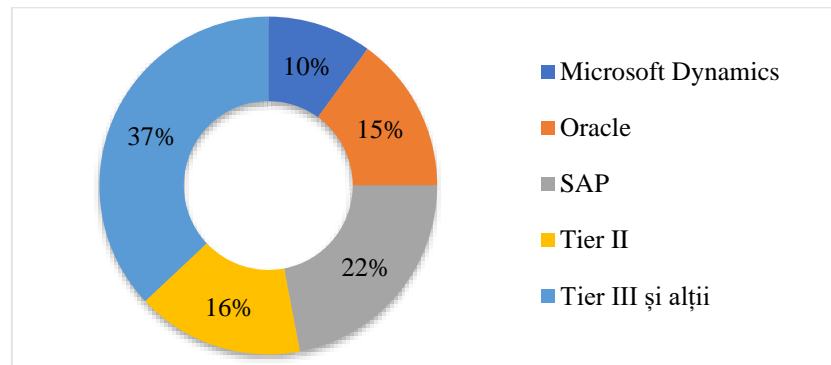
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Figure 3 shows the total distribution of market share for the period from February 2016 to May 2021, when the survey was opened on the Panorama website.



**Figure 3. Market Share**

The data collected conclusively show that SAP is the highest of the three suppliers, with more than a fifth (22%) of the total market share. It is followed by Oracle with 15% of the total market share and Microsoft with 10% of the total market share. Tier II solutions (including Infor and Epicor) account for only 16% of the market, while Tier III and others account for 37% of the market (Larson & Chang, 2016, pp. 700-710).

Key data points in the report include the rates that SAP, Oracle, and / or Microsoft Dynamics have to shortlist and the selection rates of the three shortlisted vendors. Survey data reveals that SAP is the most common shortlist ERP system (Jasmine, 2019; Arora, Arora, Kumar, & Pant, 2020, pp. 495–505; Bauer, 2018, pp. 26-32).

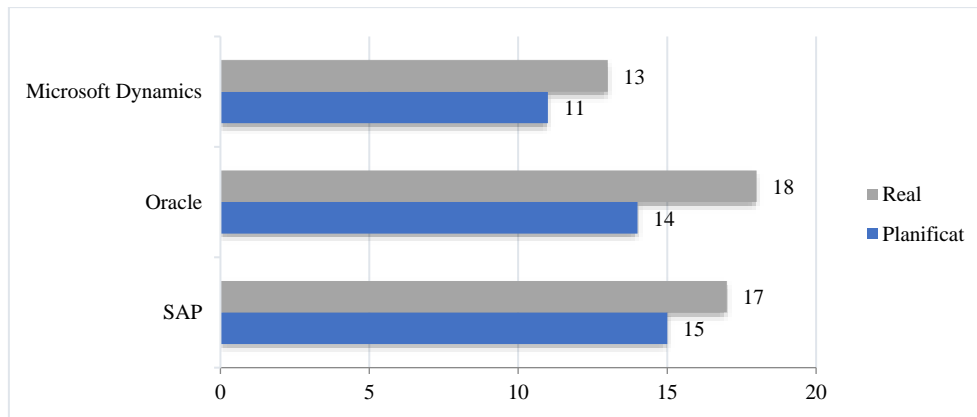
Although Microsoft and Oracle are not on the short list as often as SAP, their selection rates are higher when they are. This suggests that those providers are likely to offer products that are better suited to the needs of the organizations represented in the study.

From the Panorama experience, many organizations simply do not have the proper methodologies or knowledge to effectively evaluate ERP software packages. Therefore, while selection rates are high for Microsoft Dynamics and Oracle, there is no evidence that organizations made the “right” decision by choosing them. Instead of considering these data as indicative of the adequacy of product offerings, it is useful to consider them as a broader data point on the sales cycle trends experienced by the three suppliers (Liang & Liu, 2018, pp. 2-10).

Panorama usually finds that the duration of an implementation project is directly related to the purpose of implementing a company, the resources provided, the suitability and functionality of the chosen software and the type of solution purchased.

All vendors represented in this study offer a variety of solutions for different organizations and industries. The level of customization that an organization wants or needs to make the ERP solution work “best” also affects the duration of the implementation (Sahmim & Gharsellaoui, 2017, pp. 1516-1522).

As can be easily concluded from the graph, the actual implementation times rarely matched the planned periods. The biggest discrepancy was found in Oracle implementations, which have an average of 18 months - four months longer than expected. Both SAP and Microsoft Dynamics run on average for two months during the planned implementation time. Microsoft Dynamics has the shortest total implementation time (13 months), followed by SAP (17 months) and Oracle (18 months) (Figure 4).



**Figure 4. Average Time to Implementation (Months)**

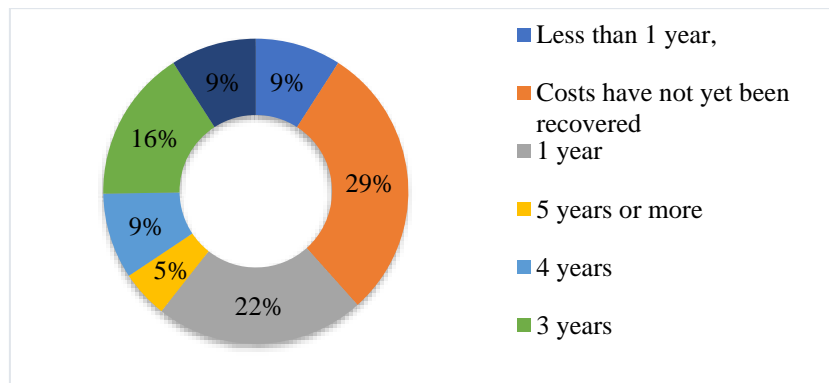
Although it is terribly common for ERP implementation to go beyond the program, this is not a forgotten conclusion. While almost two-thirds (61%) of respondents indicated that their implementations exceeded the program, 28% completed the project according to the program and 11% completed the implementation earlier than scheduled. This is a positive finding and shows that organizations' increased realism about implementation times is beginning to be reflected in their planning strategies (Singh, et al., 2020c, pp. 661–664).

The key reason for the delayed implementation noted in this analysis is the extension of the initial scope of the project (29%). This is a common problem faced by organizations that are in a hurry to implement without taking the time to properly plan or fully understand the impact and / or organizational change management tactics needed to achieve a successful implementation. As follows, organizational problems are a component that one-fifth of respondents (20%) indicate that they have extended their duration. Data issues and resource constraints each garnered 17% of the “vote”, while training and technical issues affected 15% and 14% of respondents, respectively (Iyengar, Vaishya, Bahl, & Vaish, 2020b).

Regardless of the size or needs of an individual company, strong organizational risk reduction and change management can address many of the issues mentioned above. Project planning, resource implementation, segmented communications, targeted training, strong data conversion plans, and so on serve to minimize the negative effects of change, reduce durations, and increase the success of implementations (Stergiou, Psannis, Gupta, & Ishibashi, 2018, pp. 174-184; Subramanian & Jeyaraj, 2018, pp. 28-42). Due to the resource and staffing constraints faced by most small and medium-sized enterprises, it is essential that they recognize the high impact that organizational change efforts - both in the executive suite and among end-users - have on successful implementation. Regardless of the software package chosen, a company that does not devote time and effort to ensure that its staff is aligned and trained and that its leaders are clear about project priority, timing, staffing needs and so on necessary

for success. ERP, is able to see an ERP project that extends well beyond the originally designed time frame (Jasmine, 2019; Al-Aqrabi, Liu, Hill, & Antonopoulos, 2015, pp. 85-96).

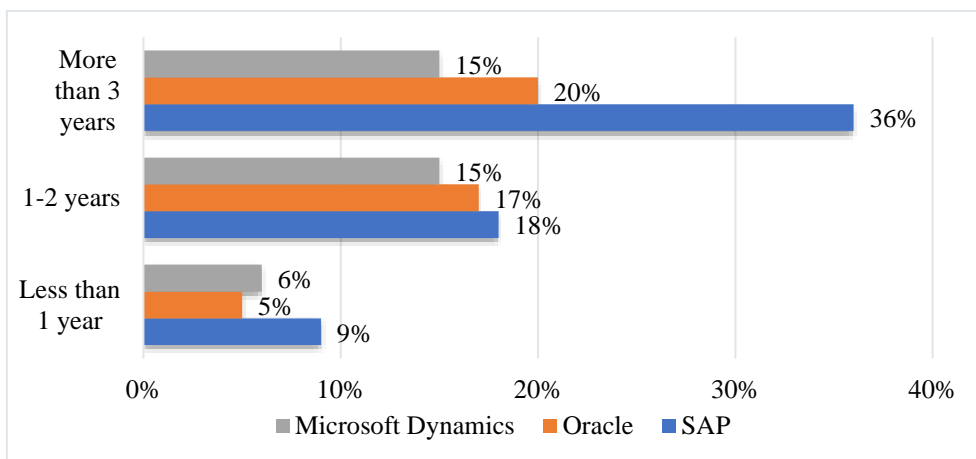
Reimbursement is defined as a period of time during which the organization recovers its initial investment in the project. This measurement can only be determined if key performance indicators (KPIs) and benchmarks have been applied before implementation (Figure 5).



**Figure 5. Total Repayment Period**

Panorama research shows that among organizations that receive reimbursement from ERP software implementations, the average payback period is 2.4 years. It is important to note, however, that 31% of respondents indicated that they had not yet recovered their costs. Nearly a third of respondents (30 percent) also indicated that it took them three or more years to receive a refund (Subramanian & Jeyaraj, 2018, pp. 28-42; Wang & Tang, 2016).

In our experience, organizations may have a somewhat wrong approach to reimbursement, assuming that the project will begin to generate financial benefits when the “switch is reversed”. Although this can indeed happen, it is essential to accurately assess this risk and integrate the findings into a pre-implementation business case (Figure 6).

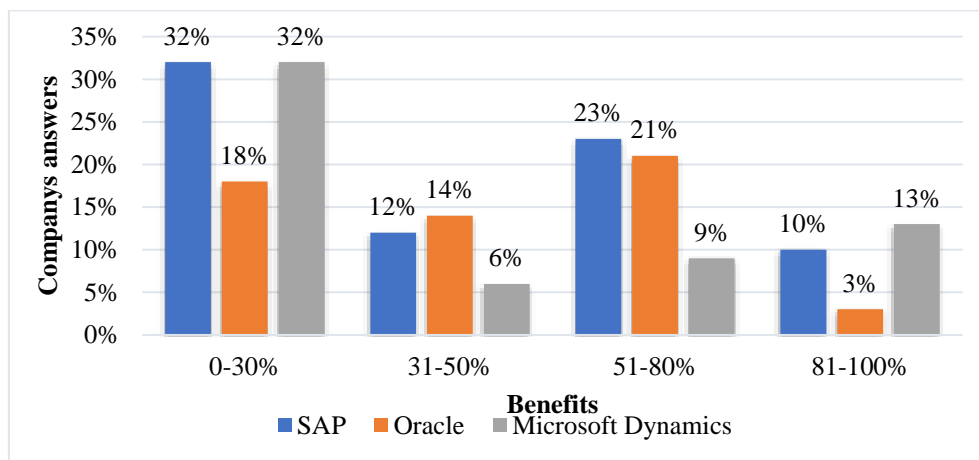


**Figure 6. Reimbursement period by the supplier**

Most SAP implementations took more than three years to provide reimbursement (36 percent). Interestingly, SAP also had the highest implementation depreciation rate, which lasted less than a year (nine percent).

Oracle and Microsoft Dynamics implementations have had very similar payback rates overall. Fifteen percent of respondents had a Microsoft Dynamics deployment that offered a refund in one to two years, and 15% had a Microsoft Dynamics deployment that reimbursed for more than three years. With Oracle, these rates were 17% and 20%, respectively. It took less than a year for 5% of Oracle users and 6% of Microsoft Dynamics users to receive a refund (Wazurkar, Bhadoria, & Bajpai, 2017; Singh, et al., 2020c, pp. 661–664; Bellini, Cenni, & Nesi, 2015).

Benefit statistics reflect the measurable benefits experienced compared to the projected benefits for each respondent. The following graph illustrates the levels of satisfaction reported by organizations that had a business case and were able to measure them against expected results (Figure 7).



**Figure 7. Realization of Benefits by the Supplier**

SAP implementations have been “worldwide” in terms of benefits. Nearly half of respondents (44 percent) achieved 50 percent or less of the anticipated benefits from their SAP systems, 23% achieved between 51 and 80% of the benefits, and 10% achieved between 81 and 100% of the benefits (Xu, Xu, & Li, 2018, pp. 2941–2962).

One-fifth of Oracle users (21%) realized between 51 and 80% of the anticipated benefits from their solutions, while only three percent realized between 81 and 100% of the anticipated benefits. Although two-fifths (39%) of Microsoft Dynamics users made 50% or less of their anticipated earnings, Microsoft also had the highest percentage of users (13%) who made between 81 and 100% of their earnings (AltexSoft, 2021; Lindstrom, 2017).

It is clear to anyone in the ERP market that SAP, Oracle, and Microsoft Dynamics have built strong reputations as software strengths for Tier I enterprises.

But the market is changing, enterprise solutions are marketed, cloud and SaaS ERP providers are gaining ground, and companies are looking for more than just a brand name in their ERP software. They are looking for a real return on investment (Wazurkar, Bhadoria, & Bajpai, 2017).

While SAP, Oracle and Microsoft Dynamics continue to enjoy enviable market share and selection rates, extended durations, long payback periods and lack of benefits indicate problems on the horizon. Although the “fault” for these issues is probably more in the implementation organizations than in the software itself, the perception is the name of the game. If the market starts to realize that this software





(or any) simply does not bring the profits needed to justify its price, there will soon be a significant drop in market share (Xu, Xu, & Li, 2018, pp. 2941–2962).

Although an analysis of ERP selection and implementation trends is always interesting, it is essential that any organization wishing to implement an ERP system evaluates the software and vendors in the light of the specific requirements of its organization. Because the process is so complicated and cumbersome, it is best to hire the services of an independent ERP consulting firm to help you make the best choice for your organization. Call Panorama today to find out how we can help your organization with selection processes, implementation and realization of ERP benefits.

### **3. Conclusions**

Since 2010, the global cloud services industry has grown year on year to reach a valuation of \$ 370 billion in 2020, marking a growth of over 380% in ten short years. However, when put in the context of the fact that 90 percent of the world's data in 2013 was created between 2011 and 2012, it is inevitable that more data will lead to more data storage. At the end of 2020, the virtual weight of all information in the world was 44 zettabytes (trillions of gigabytes), a figure that contains 21 zeros. Not surprisingly, about 50% of all corporate data is stored in the cloud by 2020.

The cloud is more than an efficient storage solution, it is a unique platform for data generation and innovative solutions to capitalize on this data. This intense focus on adaptability has facilitated a service-oriented way of thinking previously considered inaccessible. The capacity for specialization has expanded, allowing organizations to innovate their business models and processes in pursuit of their core competencies and objectives, without compromising agility.

As we move closer to a cloud-based world, organizations that want to take advantage need to understand the flows and flows in the cloud services industry. We've compiled a list of 25 trends that we believe will help you contextualize your existing cloud capabilities and identify areas that could lead to future growth.

In 2020, it became clear that consumers see not only organizations as a catalog of their top goods or services, but also as a representation of values. The approach to the environment will strongly determine how customers view the business. In fact, 80% of consumers consider sustainability to be the most important issue to consider when evaluating organizations from nine potential areas of concern.

Improving cloud services requires a commitment to agility and change. These various trends are endemic to the cloud and will evolve at a faster pace as adoption grows and calibrates the cloud to generate clearer perspectives. Tracking and unpacking these trends will help the organization open its doors by leveraging industry expertise and knowledge. As the world continues to embrace cloud services, these doors will prove essential to sustained growth in 2021 and beyond.



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