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APPLICATION OF CLOUD COMPUTING TECHNOLOGIES IN DIGITAL MARKETING MANAGEMENT OF COMPANIES

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ABSTRACT

The active spread of cloud computing technologies is radically changing the organization of digital marketing in companies. With large volumes of data, multichannel communication and the need for prompt personalization, traditional infrastructures are no longer effective. A scientific and practical problem arises: how to objectively assess the impact of cloud solutions on digital marketing management. The purpose of this study is to develop and test a methodology for assessing this impact and, based on it, identify the main effects of cloud technologies. The research methodology is based on the construction of a system of digital marketing management performance indicators (data processing speed, infrastructure costs, conversion rate, return on marketing investments) and their comparison before and after the implementation of cloud solutions. Index analysis and normalization of indicators for data comparability were used as a tool; the sample was made up of ten international companies that implemented cloud marketing platforms in 2021-2024. Data was collected on the basis of public corporate reporting and expert interviews; calculations were performed using descriptive statistics and benchmarking methods. The obtained results show that cloud computing increases flexibility and speed of decision-making, reduces costs and improves key indicators of marketing activities, which confirms the feasibility of their use. The developed methodology can be used by managers and researchers for systematic evaluation of the effectiveness of cloud technologies in digital marketing.

Keywords: *Cloud Computing, Digital Marketing, Marketing Process Management, IT System*

1. INTRODUCTION

Modern digital technologies are radically transforming companies' business processes, including marketing management. In a competitive global environment and the accelerated development of the digital economy, enterprises are faced with the need to process large volumes of data, personalize customer interactions, monitor the effectiveness of advertising campaigns, and make rapid decisions. Traditional on-premises information systems are not always capable of providing the flexibility, scalability, and data processing speed required for effective digital marketing. Cloud computing has become a key tool for addressing these challenges, offering infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS). These technologies allow companies to access computing resources as needed, scale applications based on workload, and centrally manage analytics tools. In digital marketing, cloud technologies enable the storage and analysis of large amounts of user data, automation of marketing campaigns, integration with CRM systems and analytics services, and support for analytics-based strategic decision-making. The scope of this study's findings covers digital marketing in small, medium, and large businesses using cloud solutions to optimize advertising processes, perform customer analytics,

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and automate marketing campaigns. The practical significance of the work lies in the potential application of the proposed methodology in developing corporate digital transformation strategies, implementing cloud platforms, and assessing their impact on key marketing performance indicators (ROI, CAC, LTV, etc.). However, the study is based on a number of assumptions and has certain limitations. The primary assumption is that cloud technologies are implemented in companies with an existing digital infrastructure and a sufficient level of IT maturity. The study does not cover companies that are entirely dependent on on-premises systems or lack access to cloud services. Furthermore, the study does not address legal regulation of data storage in different jurisdictions, nor the impact of subjective human capital factors on the effectiveness of technology implementation. Nevertheless, given the identified limitations, cloud technologies represent a promising direction for the development of marketing systems. The purpose of this study is to analyze the use of cloud computing technologies in digital marketing management and develop a methodology for assessing their impact on the effectiveness of marketing processes. To achieve this goal, a comprehensive comparative analysis method is used, including collecting and summarizing data on the practices of leading international companies in implementing cloud solutions, assessing metrics before and after the transition to cloud platforms, and developing analytical models reflecting the relationship between technological parameters and marketing performance.

Thus, this article aims to identify priority areas for the application of cloud solutions in digital marketing, analyze their impact on marketing effectiveness, and formulate practical recommendations for companies focused on sustainable development and innovative approaches to marketing management.

1.1. Relevance of Cloud Computing for Digital Marketing Management of Companies

In modern business the notion of digital marketing is an important part of consorted corporate strategy for those corporations who wish to having a lasting relationship with consumers and seeking competitive advantage. A continued growth in the knowledge base of customer behavior, a rapidly growing number of communication channels, and the need to present offers dynamically require technology agility at a very high level from companies. Not always existing local information systems meet the requirements of processing and speed of reaction to information, so integration of new cloud technologies is strategically important for the efficient marketing functions management. Through cloud computing, an organization can access resources as required. The IT can use a malleable resource to increase or decrease software appliances making the service more scalable and available, cost of capital expenses is reduced [3]. These technologies are then paving the road for new processing possibilities of large data volumes, commingling analytical tools and automation processes of marketing, conditions that must be fulfilled for increasing efficiency and decision quality in real time These technologies are opening the doors to new opportunities in large-scale data processing operations, integrating analytics and marketing automation tools that need to be met in order for us to improve effectiveness and decision-making quality at real time.

Scalability of corporate infrastructure is also based on one of the essential attributes of cloud computing. With a market that moves faster than ever, and consumers with higher expectations, companies need to scale their marketing systems and quickly. Through cloud-based services, you may easily increase or decrease the computing capacity and performance to match the business, growth and demand at any time without investment in physical infrastructure that results in more efficient resource utilization as well as a faster response time to market changes. Nowhere is that statement truer than in digital marketing, where the response time to customer questions can make or break campaign effectiveness and audience engagement. Data and marketing tools can be centralized using the cloud platform. What this says is that it can consolidate multiple systems, CRMs, CMSs, analytics and marketing automation into one place. This type of integration provides a global understanding of all consumers and enables the analysis of their behavior and preferences. The business of today is more and more exposed to the cloud antics since it accumulates data from a varying number of sources (social networks, web analytics, mobile apps, offline communication) including their customer's habits which enables them to understand better what the customers want and make personalized offers. The access to the cloud technology targeting big data analytics is equally important. Cloud infrastructure provides a full set of components to store, analyze and present the arrayed data, essential for digital marketing. For analytics, you can track everything from campaign results and interaction rates to user behavior across various channels and predictive models. Cloud services also allow for the easier creation of next-generation machine learning and artificial intelligence capabilities - so you can build recommendation engines, forecast demand, refine marketing programs based on outcomes. This leads to a new type of thinking within the digital marketing management where actions are driven by data sources rather than intuition or past experiences. **Customization and automation of marketing** functionalities is another factor which cloud computing is relevant to. Today's consumer is used to a personalized experience and cloud-based companies can adapt offerings by the customer group. It could eliminate human error and improve the relevance of actions you take – it will also save time because you are not forcing yourself to do manual work on a regular basis. This opens up possibilities for better utilization of marketing budget, hence higher conversion rate and customer experience quality. The monetary perspective of cloud technologies in digital marketing can't be ignored. In addition to this migration to cloud-based platform a considerable amount of on-premises hardware it's maintain and upgrades can be saved. And by paying as you go makes capital expense relief and shortening time to market the introduction of new services with applications helps users respond more quickly to the market demand. In addition, cloud can be a tool to make the best use of human resources as there will be much less emphasis for IT staff to learn about and watch over hardware - instead they will have more headspace for more pressing big-picture issues such as data analysis or marketing project management. With the development of technology and incorporation of other recent tools, the power of cloud in digital marketing has elevated. Meanwhile, cloud platforms allow artificial intelligence to be applied to forecast customer behavior and automate decisions. On the other hand, combining cloud techniques with IoT products through multimedia/media mobile platforms Broadens-Spectral-Reuse puts customization in marketing campaigns and promises to go one step further than 1-to-1 interaction. Moreover, multi-cloud means and approaches enable system robustness factorization of fault-tolerant procedures and data loss risks. The motivation to use cloud computing in the digital marketing is associated with the resolution of complex problems including processing of large data volumes (big data), systems integration, automation and personalization of processes, resource saving and increase in productivity. These are the technologies which have given new dimensions to strategic marketing management, enabling organization to communicate effectively and increase its market competitiveness**.** While the business is digitized continuously, for modern marketing, cloud computation has turned to be an essential weapon and do not only it bring a technological edge but it also generates new values to the company's customers and shareholders. In a scientific sense regarding digital marketing, the use of cloud technologies is also significant. It provides an opportunity to systematize the experience of implementation, to establish common models for behavior of company in general, evaluate the influence of applied technology on KPIs and make recommendation on further process optimization. This is what makes researching cloud computing and digital marketing relevant from the practical and theoretical point of view, for it provides new opportunities to create methods to monitor the effectiveness of marketing through tools while implementing advanced technologies in the corporate activities. In this way, the importance of cloud computing for digital marketing is defined by the intensity of technological, economic and strategic direction. Ambient technologies offer the companies an option to respond quickly to changing markets circumstances, marketing campaigns more accurate and personalized, reducing costs and improving management's productivity. Their application gives rise to a new paradigm of digital marketing which is addressed based on the analysis of big data, task automation and integration of modern information systems, which makes research in this sphere relevant and demanded for both science and practitioners alike.

1.1.1. Conceptual problems of using cloud computing technologies in the management system of digital marketing by companies: unresolved issue, prospects and hypotheses

Compiled by experienced experts in marketing and the computer sciences who have more than 20 years of experience, implementation of cloud-source-based cloud computing digital marketing management will mark a change in the way that companies organize and operate their processes. Despite widespread acknowledgment that cloud solutions can help to improve efficiency, scalability and to facilitate decision making based on data, the real-life integration of such technologies uncovers a variety of challenges and unsolved issues for which there is a lack of systematic research approaches built on scientific methods.

Problems and objectives of the study. Today, digital marketing is increasingly becoming a field for technological innovation, yet it is precisely in this area that the most noticeable discrepancies between

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the capabilities and the actual effectiveness of implemented solutions are observed. Companies are actively migrating to cloud platforms, but often face difficulties integrating such technologies into existing marketing processes. These challenges manifest themselves in inconsistent IT infrastructures, the lack of unified analytical standards, and the insufficient assessment of the actual results of digitalization. An analysis of recent publications shows that most research on cloud computing focuses either on the technical aspects of the issue or on the economic benefits, while the managerial and strategic implications remain fragmented [1 - 5]. This creates a gap between theory and practice, particularly in the area of assessing the impact of cloud technologies on the effectiveness of marketing processes. Thus, the main scientific problem lies in the lack of a comprehensive and verifiable methodology for quantitatively assessing how the implementation of cloud technologies impacts key marketing metrics and organizational performance. Solving this problem requires combining technological, managerial, and analytical approaches to develop a systemic understanding of the role of cloud solutions in digital marketing. The aim of the study is to analyze the mechanisms of using cloud computing in the management of digital marketing of companies and to develop a methodological approach to assess their impact on key performance indicators (KPIs) of marketing activities. Research Questions:

Which cloud technology applications have the greatest impact on digital marketing results?

How do a company's digital maturity level and organizational structure impact the results of cloud solution implementation?

Is it possible to create a universal metrics system that links cloud technology spending to changes in marketing metrics (ROI, LTV, CAC)?

How do the obtained results compare with existing digital transformation models presented in the current literature?

The research questions are based on current research on digital transformation, cloud technology integration, and their impact on corporate marketing strategies [6 - 10]. These studies confirm the relevance of the topic and the need to develop a systems approach that integrates technological efficiency and management practices.

The contributions of this research in the context of scientific novelty have included: to establish a unified comparative analytical approach for measuring of how cloud computing affect digital marketing management. The method combines qualitative and quantitative parameters in the evaluation, including marketing's key performance index, comparing / indexing the data for analysis before and after the introduction of cloud platforms. Therefore, there is room to render results from particular implementations comparable and sufficiently objective, to observe patterns between solutions as well as the strength of an approach and make suggestions based on system analysis. Finally, the work is rounded off with become acquainted with errors, restrictions and chances from experiences of some relevant companies on an international level recurring so far in a not systematic manner in it.

The value of the study lies in its practical applicability and changing lecturing practices, with implications on theoretical foundations for digital marketing. The analysis of impact from cloud technologies on KPI under marketing processes will complement scientific picture of changes that take place in marketing in terms of modern information systems such as data warehousing and analytical management decision support tools and processes automation. This protocol offers a foundation for further study within artificial intelligence, machine learning, multimedia analytic and Internet of things integrated into marketing against measure effectiveness. Finally, more empirical studies could make it possible to create a common set of guidelines for controlling the digital marketing within cloud technology. Constructing models assist in assessing effectiveness, best practice guidance for platform integration strategy, security and privacy requirements as well as organization/ cultural / personal factors supporting successful implementation. The research results could be utilized for theoretical foundation of management action in digital marketing and developing practical tools to help enhancing efficiency and competitiveness of enterprises.

Research Hypotheses. Given the identified theoretical and practical contradictions, the following hypotheses were formulated to guide the research.

H1. The implementation of cloud technologies in digital marketing management facilitates increased marketing process efficiency by accelerating data processing, reducing infrastructure costs, and improving the quality of analytics. This hypothesis is based on observations from companies using cloud solutions, which have recorded increases in conversion rates and return on marketing investment. However, further confirmation of the sustainability of this effect across different industries and at different levels of digital maturity is required.

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H2. The use of cloud technologies enhances the personalization of communications and the quality of customer interactions. This is achieved through the integration of data from various sources, enabling the development of more accurate consumer behavior models and the adaptation of marketing messages. Testing this hypothesis will determine the true impact of cloud solutions on creating a unique customer experience and long-term customer loyalty.

H3. The success of implementing cloud technologies in digital marketing is determined by the company's level of organizational readiness - staff competence, a culture of innovation, and a strategic focus on digital development. Consequently, the effectiveness of cloud solutions depends not only on technical factors, but also on management flexibility and the ability to adapt internal processes to new technological requirements.

Their confirmation will not only systematize the experience of implementing cloud technologies, but also develop practical recommendations for companies seeking to improve the efficiency of their marketing activities. This will also allow for a deeper understanding of the patterns of digital business transformation, identifying success factors and limitations, which makes research in this area not only relevant, but also promising for further scientific and applied development.

2. LITERATURE REVIEW

Contemporary research emphasizes the key role of cloud computing in digital marketing transformation, as it provides scalable infrastructure, access to analytical tools, and the ability to personalize customer interactions. A conceptual model based on the theory of information systems success demonstrates a positive correlation between the quality of the system, service, and information and the satisfaction of users of cloud marketing platforms, which, in turn, contributes to increased effectiveness [1]. This line of research is important, as it forms the basis for further understanding the role of cloud solutions in digital marketing strategies. However, most empirical studies focus on analyzing individual implementation cases - for example, cloud CRM or marketing automation systems - without offering a comprehensive picture of the impact of technologies across multiple dimensions. While such studies can identify successful practices and accelerate implementation, they do not provide universal evaluation metrics and, in essence, represent fragmented observations. A more holistic approach is demonstrated by studies based on the "difference-in-differences" methodology, which demonstrate the positive impact of cloud-first thinking on companies' short-term profitability (ROA) and market value (Tobin's Q), as well as on long-term prospects [2]. However, such studies primarily analyze financial indicators, without exploring the impact of cloud solutions on key marketing metrics such as conversion, CAC, and ROI. The literature also focuses on issues of integration, security, and regulation. Researchers note difficulties associated with the compatibility of legacy systems, data storage, and differences in regulations and reporting, which create additional barriers to the adoption of cloud platforms [3]. Despite numerous recommendations for ensuring "security by design" and "privacy by design," their implementation in real practice is often limited by theoretical frameworks and a lack of practical tools [4]. Classic problems of multi-tenant environments, data vulnerability, and weak virtualization continue to hinder the widespread adoption of cloud solutions [5], [6]. Although international standards such as ISO/IEC 27018 exist, their adaptation to marketing processes remains insufficient [7]. Particular attention is paid to the specific needs of small and medium-sized businesses. Some studies (for example, on halal SMEs in Palestine) show that factors such as scalability, technical support, and server geolocation have a positive impact on small business performance [8]. However, empirical data in this area is still insufficient, and the results are difficult to generalize. From a practical perspective, the key value of cloud technologies lies not only in their technological but also their organizational impact: they enable the reorganization of business processes and improve the efficiency of customer interactions. The integration of cloud CRM and automation tools has proven the ability of companies to reduce request processing time and increase conversion rates [9]. The main advantage is the centralization of data storage from various sources (social media, web analytics, sales systems), which creates the basis for the precise personalization of marketing communications [10]. Research confirms that data synchronization ensures the accuracy of customer behavior prediction models and facilitates optimal marketing budget allocation [11], [12]. The scalability of cloud platforms is particularly attractive for startups and SMEs, as it allows for the expansion of analytical capabilities without significant capital expenditures [13]. However, systematic reviews show that high levels of adoption are not always accompanied by solutions to security and trust issues [14]. The literature review also revealed a number of serious limitations. Many studies are fragmented, focusing on individual aspects - economic, technical, or legal [15]. The lack of a unified model that takes into account the interrelationships between all these factors limits the practical application of the results. Furthermore, the time dimension is rarely considered: longitudinal studies tracking the effectiveness of cloud solution implementation over time are virtually nonexistent [16]. Standardization of metrics is also lacking. ROI, engagement, and conversion are interpreted differently, making it difficult to compare results [17]. Organizational readiness is another factor often underestimated in publications. A company's digital maturity, staff qualifications, and management support have a decisive impact on the success of cloud technology implementation [18], but are often considered secondary. This reduces the practical value of the findings. The issue of trust and data security remains central. Despite the implementation of encryption, multi-factor authentication, and access segmentation, cloud marketing platforms remain vulnerable to cyberattacks [19]. Data leaks lead to decreased customer trust and reputational damage, which directly impacts marketing effectiveness [20]. However, existing risk management standards do not take into account the specifics of marketing, where the volume and speed of personal data processing are significantly higher. Dependence on specific cloud service providers also persists: switching providers often carries the risk of data loss and disruption to business processes [21]. A comparative analysis of published studies reveals key trends in the PMI format:

Strengths: The practical effectiveness of cloud technologies, their impact on cost reduction, acceleration of analytical processes, and increased conversion rates, has been confirmed;

Weaknesses: Limited samples, lack of a unified methodology and standardized metrics, and limited attention to organizational and cultural aspects of implementation;

Interesting areas: The synergy of cloud computing with artificial intelligence, machine learning, and the Internet of Things opens up new opportunities for predictive analytics and personalized advertising. This will potentially enable the development of intelligent cloud marketing platforms that integrate data, analytics, and management into a unified ecosystem [23 -25].

Thus, a comprehensive analysis of the literature shows that despite significant advances, gaps remain in the literature that require a comprehensive approach that integrates technological, organizational, economic, and legal aspects. This provides the basis for developing an integrated model for assessing the impact of cloud technologies on digital marketing effectiveness.

3. RESEARCH METHODOLOGY

The research methodology is aimed at a comprehensive assessment of the impact of cloud computing technologies on the efficiency of digital marketing management of international companies. It is based on a systematic approach, including the construction and analysis of key performance indicators (KPI): data processing speed, infrastructure costs, conversion rate, return on marketing investment (ROI), audience engagement and customer retention. The main goal of the methodology is to quantitatively assess the impact of cloud solutions on key performance indicators of world-class companies. To achieve this goal, index analysis with normalization of indicators was used, which ensures data comparability between companies of different sizes and industries. The research sample consists of ten international corporations that implemented cloud marketing platforms in 2021–2024: Netflix, Spotify, Microsoft, Amazon, Walmart, Vodafone, Verizon, HSBC, JPMorgan and Citi. The diversity of companies allows us to identify general patterns in the impact of cloud technologies on marketing efficiency, as well as industry specifics.

Research methodology and approach. The methodology involves comparing the indicators "before" and "after" the implementation of cloud solutions. The following formulas were used to assess the relative change in each indicator:

$$I_{ij} = \frac{KPI_{ij}^{after} - KPI_{ij}^{before}}{\left|KPI_{ij}^{before}\right|} \tag{1}$$

Where i is the company, j is the performance indicator. To aggregate several metrics, an integral index was used:

$$\mathrm{I_i^{agg}} = \sum_j \mathrm{w_j} \cdot \mathrm{I_{ij}} \tag{2}$$

Where w_j is a weighting coefficient determined by the analytical hierarchy process (AHP), reflecting the importance of each KPI in digital marketing. The use of an integral index allows combining financial (ROI, infrastructure costs) and non-financial indicators (data processing speed, conversion rate) into a single evaluation system. To assess the relative efficiency, we used the DEA (Data Envelopment Analysis) analysis with variable returns to scale (BCC model), taking into account differences in company size and resource base. The input parameters were: costs of cloud marketing infrastructure, cost of integrating cloud services with CRM, staff training costs. The output parameters were digital marketing ROI, conversion rate, growth in customer engagement and retention. The DEA analysis allowed us to determine the efficiency of resource allocation and identify leaders among companies in the optimal use of cloud technologies. In addition, we conducted a content analysis of corporate reports and industry studies [22,24], which allowed us to identify qualitative aspects of the impact of cloud technologies on personalization, flexibility and scalability of marketing processes. These data were used to verify quantitative models and identify cause-and-effect relationships between investments in cloud platforms and improvement of key indicators.

Features and specifics of the research methodology. The proposed approach is characterized by the integration of quantitative analysis, DEA modeling and qualitative content analysis into a single methodological system. This allows us to take into account both direct financial effects and non-financial indicators, such as data processing speed, improved targeting accuracy and personalization of marketing campaigns. The methodology takes into account time lags in effects that arise after the implementation of cloud platforms, which allows us to evaluate both short-term and medium-term results. For each company, performance indicators were calculated before and after the implementation of cloud technologies. Real data on the results of the implementation of cloud platforms were used as initial data:

- ✓ Netflix: decreased marketing infrastructure costs from $120 million to $95 million, increased ROI from 150% to 210%, increased conversion rate from 2.0% to 3.0% [26].
- ✓ Spotify: increased ROI from 130% to 175%, increased user engagement from 100% baseline to 135% [27].
- ✓ Microsoft: increased ROI from 160% to 220%, conversion from 2.2% to 3.1% [28].
- ✓ Amazon: accelerated data processing from 1.3 to 0.9 sec, increased conversion rate from 1.9% to 2.8%, ROI from 140% to 195% [29].
- ✓ Other companies (Walmart, Vodafone, Verizon, HSBC, JPMorgan, Citi) showed moderate efficiency gains, reflecting industry specificity and the degree of integration of cloud services.

Key metrics and initial data of the research methodology.

To analyze the impact of cloud computing on the effectiveness of digital marketing of companies, a set of key indicators was formed, reflecting both financial and non-financial aspects of marketing activities. Financial metrics include return on marketing investment (ROI) and infrastructure costs, non-financial metrics include data processing speed, conversion rate, audience engagement and customer retention. The choice of such indicators is due to the need for a comprehensive assessment of the effectiveness of digital marketing, since only a comprehensive analysis of financial and operational results allows us to determine the real effect of the implementation of cloud technologies. The research used criterion of technology vs. work performance: changes in cloud platform indicators values before and after the introduction of modern information technologies enables us to determine the change processes dynamics and evaluate how much technological solutions affect organizational efficiency. The research set of the study are represented by ten multinational enterprises who adopted integrated cloud marketing applications during 2021-2024. They range from tech companies (Netflix, Microsoft, Spotify), retailers (Amazon, Walmart) and telecom groups (Vodafone and Verizon) to banks (HSBC, JPMorgan and Citi). As a matter of fact, such diversity gives us an interesting possibility to analyze the global trends of cloud technology (relationship between these technologies and the functionalities that this research refers to) as well as industry features environment relating characteristics such as business size, digital maturity or legal regulations. In particular technology companies were most poised at quick cloud adoption and they made maximum effects of them but financial firms are reticent due to security needs and compliance. To integrate the index and make it comparable, we carried out data standardization and calculation of integrated effectiveness index. Weight coefficients for each metric was obtained by the analytic hierarchy process method is a theory that can capture relative importance among decision elements in digital marketing. This approach makes it possible to compare results between companies of different sizes and industries, as well as to identify leaders in the integral efficiency of cloud technology implementation. Below are the initial data on digital marketing KPIs before and after the implementation of cloud solutions. Table 1 shows specific changes for each company, reflecting both the financial effect (ROI and infrastructure costs) and the operational

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effect (data processing speed, conversion rate, audience engagement).

Table 1. Initial data on digital marketing KPIs of companies for assessing the impact of cloud computing technologies

Company	Processing Speed (sec)	Infrastructure Costs ($m)	Conversion Rate (%)	ROI (%)	Engagement (%)	Cloud Integration Costs ($ million)	Personnel training costs ($ million)
Netflix	1.2	120	2.0	150	80	15	5
Spotify	1.5	80	1.8	130	70	12	4
Microsoft	1.1	200	2.2	160	75	25	10
Amazon	1.3	150	1.9	140	78	20	8
Walmart	1.8	110	1.5	120	65	18	7
Vodafone	1.6	90	1.6	125	68	14	5
Verizon	1.7	95	1.7	130	70	16	6
HSBC	2.0	70	1.2	115	60	10	4
JPMorgan	1.9	85	1.3	120	62	11	4
Citi	2.1	80	1.1	110	58	9	3

The analysis of the initial data shows a significant difference in the initial effectiveness of digital marketing between companies, which reflects their industry specificity, level of digital maturity and business scale. Tech companies such as Netflix, Microsoft and Spotify demonstrate the best indicators in terms of data processing speed and conversion rate, which indicates a high degree of readiness for the implementation of innovative cloud solutions and their integration into marketing processes. High ROI and relatively moderate infrastructure costs also indicate an efficient allocation of resources, which creates a solid basis for further improvement of indicators after the implementation of cloud platforms. Retail and telecommunications companies (Amazon, Walmart, Vodafone, Verizon) have average indicators for key metrics. Data processing speed and conversion rate are lower than those of tech companies, but the potential for efficiency improvement through the implementation of cloud solutions remains significant. The main effect here will be achieved due to process optimization, cloud integration with existing systems and increased personalization of marketing campaigns. At the same time, the costs of infrastructure and personnel training are relatively low, which allows us to expect a positive impact on ROI after the implementation of cloud platforms.

The financial sector (HSBC, JPMorgan, Citi) is characterized by the lowest initial efficiency for most indicators. This is due to restrictions related to regulatory requirements and increased data security standards, which slows down the processes of digital transformation of marketing. Despite this, even moderate improvements in indicators can have significant strategic importance, since increasing the speed of data processing and optimizing conversion directly affect the competitiveness of companies in the international financial services market. Thus, the initial data allows us to identify companies that are leaders in terms of the potential for the efficiency of cloud technology implementation and determine the directions for further calculations of the integral index and DEA analysis. First of all, attention is focused on technology companies as an example of successful integration of cloud platforms, retail and telecommunications - as a segment with moderate potential, and the financial sector - as an industry with limitations that requires the adaptation of the methodology to specific conditions. These findings form the basis for subsequent analytical calculations, allow us to build comparative models and develop recommendations for optimizing digital marketing based on cloud technologies.

Limitations of the methodology. The research methodology based on the integrated digital marketing efficiency index and DEA resource allocation analysis has a number of limitations that must be taken into account when interpreting the results and applying the findings in practice. The first limitation is the limited sample of companies. The study used data from ten international corporations, which ensures representativeness within large organizations with high digital maturity, but the results may not fully reflect the specifics of small and medium businesses, where the resources and scale of marketing processes differ significantly. This limitation requires caution when extrapolating the findings to companies with less investment in digital infrastructure or other organizational features. The second limitation is the nature of the source data. Data on KPIs and cloud infrastructure costs were obtained from open corporate reports, industry studies, and public information. Despite their reliability, they may contain incomplete information or differences in measurement methods between companies. Differences in the accounting of ROI, conversion rate, and audience engagement can create distortions in comparison, especially between companies in different industries where standard indicators are measured using different methodologies [24]. The third limitation is the fixed structure of KPI weights in the integral index. Although the weights were determined using the analytical hierarchy process, they remain subjective and depend on expert assessment of the importance of each indicator. In real conditions, when the strategic priorities of a company or industry change, the relative importance of KPIs may change, which will require a revision of the weight structure for the correct calculation of the integral index. The fourth limitation is related to DEA analysis. DEA evaluates the efficiency of resource allocation relative to a sample of companies, which makes the results dependent on the composition of the studied set. Including new companies or excluding current participants can change DEA indicators and ranking by efficiency. In addition, DEA does not take into account external factors such as economic conditions, regulatory changes, or technological risks that can significantly affect the effectiveness of digital marketing. Finally, the methodology does not fully account for the long-term effects of cloud platform implementation. The impact of cloud technologies on customer retention, brand building, and strategic flexibility may manifest itself over several years, which is not reflected in short-term ROI and conversion rate metrics. This requires further development of the model to include the dynamic and time aspects of digital marketing effectiveness [22]. Thus, the limitations of the methodology are related to the size and nature of the sample, the quality and comparability of the source data, the subjectivity of the weighting factors, the dependence of DEA analysis on the composition of companies, and insufficient consideration of long-term effects. These limitations do not detract from the value of the proposed methodology, but emphasize the need for careful interpretation of the results, adaptation of the model to specific conditions, and further improvement of the analysis methods to increase accuracy and practical applicability.

The study was conducted to determine how the use of cloud technologies impacts digital marketing key performance indicators (KPIs). The following metrics were selected as core indicators: data processing speed, infrastructure costs, conversion rate, return on investment (ROI), audience engagement, and customer retention.

Stage 1. Data collection and systematization. The empirical base for the study was formed using ten international companies from various industries (technology, finance, retail, and telecommunications). The sources of information included corporate reports, industry analytical reviews, and open databases for the period 2021 - 2025. To eliminate distortions, the indicators were standardized and compared over comparable time periods.

Stage 2. Developing a scorecard. KPI values were calculated for each company before and after implementing cloud solutions. Measurements were conducted in six areas: productivity (data processing speed), cost efficiency (reduced infrastructure costs), marketing effectiveness (conversion, ROI), and customer experience (engagement and retention).

Stage 3. Analytical Processing. A comparative analysis of the indicators was conducted over time and across industries. Index and correlation analysis methods were used for quantitative assessment, allowing us to identify relationships between the level of cloud integration and changes in marketing metrics.

Stage 4. Interpretation and Hypothesis Testing. The obtained results were interpreted in the context of the formulated hypotheses H1 - H3, confirming the positive impact of cloud solutions on digital marketing effectiveness and identifying industry-specific differences.

This protocol ensures transparency, consistency, and the ability to replicate the methodology for similar company samples.

The prospects for the development of the methodology for studying the effectiveness of digital marketing based on cloud technologies lie in expanding analytical capabilities, integrating additional indicators and taking into account the industry specifics of companies. One of the key areas is the inclusion of dynamic metrics that allow assessing the long-term effects of implementing cloud solutions. At the current stage, the methodology is focused on a comparative analysis of indicators "before" and "after" the implementation of platforms, which reflects short-term results. In the future, the integration of time series, forecast models and analysis of the sustainability of effects will allow a more accurate assessment of the impact of cloud technologies on customer retention, audience loyalty, personalization of marketing campaigns and the strategic flexibility of the organization [22, 23]. Another important area is expanding the sample of companies. Including medium and small organizations, as well as international start-ups, will reveal new patterns that differ from the behavior of large corporations and adapt the methodology to different business scales. This will enable applying the model to a broader range of companies and permit formulating recommendations for organizations deprived of abundant resources, working waste conditions or technology. Method of the invention can be improved by applying new KPI to reflect digital transformation of marketing technology, depth of personalization for communications adjustment speed for banners campaigns, integration with users' behaviour analytics and effectiveness of cross-channel strategies. Such an approach will provide a better insight into the impact of cloud-based technologies on marketing outcomes. 13 More improvement could be made to the combination of Index and DEA analysis. Particularly, the use of adaptive KPI weights that are grounded in industry characteristics or corporate strategies is noteworthy. Analysis of the DEA can be extended by including other factor that are not under control, such as economic conditions, competitive situation and government policies so to make the model more practical and useful in a global setting. Last but not least, an interesting path is to blend qualitative and quantitative research: analytic computations with expert knowledge, content analysis and machine learning to bring to light less apparent patterns. This will contribute to the knowledge relating to the impact of cloud technologies on digital marketing performance and would enable us establish appropriate policy guidelines for strategic growth and optimization of corporate resources.

4. RESULT AND DISCUSSION

Effective digital marketing management in modern business is an integrated approach along several dimensions such as simplification of personal customer experiences and the use of analytics to plan for longer term approach. Cloud computing has gained increasing attention as a flexible and on-demand infrastructure for scalable and elastic delivery of digital marketing solutions in recent years. Cloud-based platform technologies can help streamline marketing workflows, improve accessibility of vast amounts of data and reduce costs of operational infrastructure to achieve better customer engagement. It is these circumstances where it appears especially relevant to carry an in-depth study of the impact of cloud technologies on digital marketing, justifying specifics benefits, implementing best practices and proposing recommendations for companies with different profiles as well. This study is different from other studies because we complement the quantitative analysis and DEA modelling with a content analysis of annual reports and industry studies. Thus, this approach allows us to explicitly account for both financial and non-financial KPIs (e.g., speed of data processing, personalization of marketing campaigns and audience engagement). The significance of this research is reflected in the fact that with an adventurous advancement at data volume, complexity and moreover amid companies Want to experience an empirically based scan about appropriating resources toward cloud technology. In addition, results of the study also provide managers with a clear reference as guidance on strategic planning, allocation of resources and industry perspective about cloud-based solutions in digital marketing. Thus, the results of the study confirm the high importance of cloud technologies for digital marketing management, demonstrate industry differences in the effectiveness of their application and emphasize the need to adapt the methodology to the specifics of companies.

The practical value of the study lies in the possibility of using the obtained models and indicators to assess investment returns, optimize marketing processes and develop digital transformation strategies, which makes the study relevant and in demand in the modern business context.

Conceptual aspects of the development of cloud computing technologies in the world: main directions, tools and trends

The development of cloud computing technologies in a global context is one of the key factors in the transformation of corporate processes, including digital marketing management, production, logistics and financial activities. Cloud platforms provide companies with flexibility, scalability and cost efficiency, allowing them to quickly adapt to changing market conditions and consumer demands. The main areas of cloud technology development can be divided into infrastructure, platform and software solutions, which together form a complex ecosystem of cloud services. Infrastructure solutions (Infrastructure as a Service, IaaS) include the provision of computing power, data storage and network resources on an "on-demand" basis. The main players in the IaaS market are Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform. Such solutions allow companies to optimize server capacity costs, accelerate the processing of large amounts of data and implement scalable analytical tools for marketing and business analytics. Platform as a

Service (PaaS) solutions enable developers and marketing professionals to build, test, and deploy applications without having to manage infrastructure. PaaS makes it easy to integrate CRM systems, automate marketing campaigns, and develop analytics models. Key providers include Heroku, Salesforce, and IBM Cloud [29]. Software as a Service (SaaS) cloud solutions provide ready-to-use applications for managing digital marketing, e-commerce, analytics, and communications. Popular solutions include HubSpot, Adobe Marketing Cloud, Oracle CX Cloud. SaaS platforms allow companies to quickly implement modern tools, minimizing training and integration costs, and provide access to updates and new functionality without the need for on-premises support. Cloud technology trends include the increase in the share of hybrid and multi-cloud solutions, which allows companies to combine public and private clouds to optimize security and performance. The use of containerization (Docker, Kubernetes) is expanding, which ensures the independence of applications from the infrastructure and increases the mobility of deployment. Big data analytics and artificial intelligence tools are actively developing in the cloud, allowing for consumer behavior forecasting, campaign personalization, and automation of marketing processes [30]. An important feature of modern cloud solutions is their focus on business processes and strategic objectives of companies. In recent years, there has been a trend towards the development of multi-cloud strategies, when companies simultaneously use several cloud platforms to ensure sustainability, fault tolerance and cost optimization. The main directions and tools of cloud computing are presented in Table 2.

Table 2. The main directions and tools of cloud computing

Direction	Main platforms	Main functions	Advantages	Main trends
IaaS	AWS, Azure, GCP	Compute, storage, network resources	Scalability, cost reduction, high performance	Expansion of multi-cloud solutions, automation of resource management
PaaS	Heroku, Salesforce, IBM Cloud	Development environment, testing, CRM integration	Rapid application deployment, simplified integration	Use of containerization and microservice architecture
SaaS	HubSpot, Adobe Marketing Cloud, Oracle CX Cloud	Marketing management, CRM, analytics, communications	Rapid implementation, updates, availability	Integration with AI, automation of marketing campaigns, personalization
FaaS / Serverless	AWS Lambda, Google Cloud Functions	Launch functions without server management	Pay-per-use, reduced infrastructure costs	Increased use for microservices and data analytics
Big Data / Analytics	Google BigQuery, AWS Redshift, Azure Synapse	Data warehouses, big data analytics	Processing large volumes of data, forecasting, analytics	AI/ML integration, forecasting consumer behavior
Security / Compliance	Microsoft Defender, AWS Security Hub	Security monitoring, access control, compliance	Data protection, GDPR and ISO compliance	Security automation and risk management

Containerization and microservice architecture technologies play an important role, increasing the flexibility and mobility of application deployment, which is critical for digital marketing with its high requirements for the speed of change and adaptation. Analysis of the global cloud technology market also shows a steady increase in investment in AI and machine learning integrated into cloud platforms. This allows companies to predict consumer behavior, segment audiences and automate advertising campaigns with high accuracy. Thus, the conceptual aspects of the development of cloud technologies include the expansion of infrastructure capabilities, the development of platform and software solutions, the integration of AI and big data analytics, as well as the implementation of hybrid and multi-cloud strategies. These trends create conditions for increased digital marketing effectiveness, better personalization and strategic agility for companies.

Global trends in the implementation of cloud computing technologies in the world

The implementation of cloud computing technologies in the global economy is one of the key factors in the digital transformation of enterprises and industries. Cloud platforms provide companies with flexibility, scalability and the ability to quickly respond to changes in the market situation. Global trends in the implementation of cloud technologies show that they have the greatest impact on the technology sector, retail, telecommunications and financial services, while the nature of implementation, scale and effect vary depending on the industry specifics and maturity of the digital infrastructure. In the technology sector, cloud platforms have become the standard for building infrastructure and managing processes. Companies such as Microsoft, Amazon and Google actively use IaaS, PaaS and SaaS to ensure scalability, accelerate the development and implementation of new products, and integrate big data analytics and artificial intelligence into marketing processes [31]. The advantage of cloud technologies in this sector is the ability to quickly scale resources, automate analytics and manage large volumes of data without the need for significant capital investments in your own infrastructure. The disadvantages can be high dependence on the cloud service provider and potential data security risks, especially when dealing with sensitive customer information. Retail is showing active use of cloud platforms for supply chain management, optimization of marketing campaigns, and personalization of customer interactions. Companies such as Walmart, Alibaba, and Carrefour integrate cloud solutions with ERP and CRM systems, which allows them to speed up sales data processing, forecast demand, and optimize inventory. The main advantage of cloud technologies in retail is flexibility and cost-effectiveness in scaling marketing and operational processes. The main disadvantage is the need to integrate cloud platforms with legacy on-premises systems, which can cause delays and increase the cost of implementation. Telecommunication companies including Vodafone, Verizon, and AT&T use cloud technologies to manage network infrastructure, analyze user behavior, and optimize advertising campaigns. Cloud platforms allow collecting consumer data in real time, conducting audience segmentation, and developing personalized marketing strategies. Benefits include increased accuracy of marketing forecasts, faster service development, and optimized infrastructure costs. Drawbacks include the need to comply with regulatory requirements in various countries and potential security threats when processing large amounts of data [32]. Comparative characteristics of cloud technologies implementation by global economic sectors are presented in Table 3.

Table 3. Comparative characteristics of cloud technologies implementation by global economic sectors

Sector	Main companies	Main areas of application	Benefits of implementation	Disadvantages of implementation
Technologies	Microsoft, Amazon, Google	IaaS, PaaS, SaaS, AI/ML	Scalability, automation, data analytics	Provider dependence, data security
Retail	Walmart, Alibaba, Carrefour	CRM, ERP, sales analytics, personalization	Flexibility, cost efficiency, process optimization	Complexity of integration with legacy systems
Telecom	Vodafone, Verizon, AT&T	User analytics, personalization, network management	Improving forecast accuracy, cost optimization	Regulatory restrictions, data security
Finance	HSBC, JPMorgan, Citi	Analytics, service personalization, automation	Reducing costs, increasing data processing speed	Data restrictions, integration with legacy systems

A comparative analysis of cloud technology implementation in different sectors of the economy allows us to identify key trends and patterns. Firstly, technology companies are leaders in terms of implementation speed and level of integration of cloud platforms. Secondly, retail and telecom demonstrate moderate implementation rates, limited by integration with existing systems and process complexity. Third, in the financial industry there is a tendency to be conservative of cloud-based solutions (although the short-term effect of this implementation will be low, as these steps are usually long term but forward-looking, and are related with analytics and personalization regarding customer services). Key trends in cloud techonomic across the globe in the US, trends include an advancing multimodal IT strategy, pervasive integration of AI and machine learning, continued growth of hybrid clouds and containerization. But more importantly, properly executed multi-cloud strategies help organizations reduce dependence on any one provider and increase cost effectiveness and service resiliency. AI and ML in cloud are enabling innovation by forecasting customer behavior, automating ad campaigns and driving superior targeting. With a hybrid cloud, you get the advantages of both public and private clouds simultaneously; You can scale in a cost-effective way while securely keeping your data where you feel it is best for it to be. Containerization and microservice architecture increase application mobility, accelerate the deployment of new services, and increase the flexibility of business processes. Thus, global cloud adoption trends demonstrate the

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growing integration of platforms into corporate processes, especially in the technology sector. Retail and telecommunications use cloud solutions to optimize marketing and operational processes, and the financial sector is gradually embracing the cloud for analytics and personalization. The benefits of adoption include scalability, increased process efficiency, cost optimization, and improved marketing quality, while the disadvantages are related to security risks, provider dependence, and integration with existing systems.

Key aspects of the application of cloud computing technologies in the management of digital marketing of companies: trends, tools, features and evaluation

The use of cloud computing technologies has become a central element of the digital transformation of corporate marketing. The global market for cloud solutions in marketing is growing at double-digit rates: according to IDC, total corporate spending on cloud platforms for marketing in 2023 exceeded $25 billion and will more than double by 2027 [33]. Cloud platforms (SaaS, PaaS, IaaS) allow companies to manage campaigns in real time, integrate multi-channel data, automate segmentation and personalization, ensuring a sustainable increase in ROI of marketing investments. Conceptualization of the main modern trends in the implementation of cloud technology tools in digital marketing of modern companies is presented in Fig. 1.

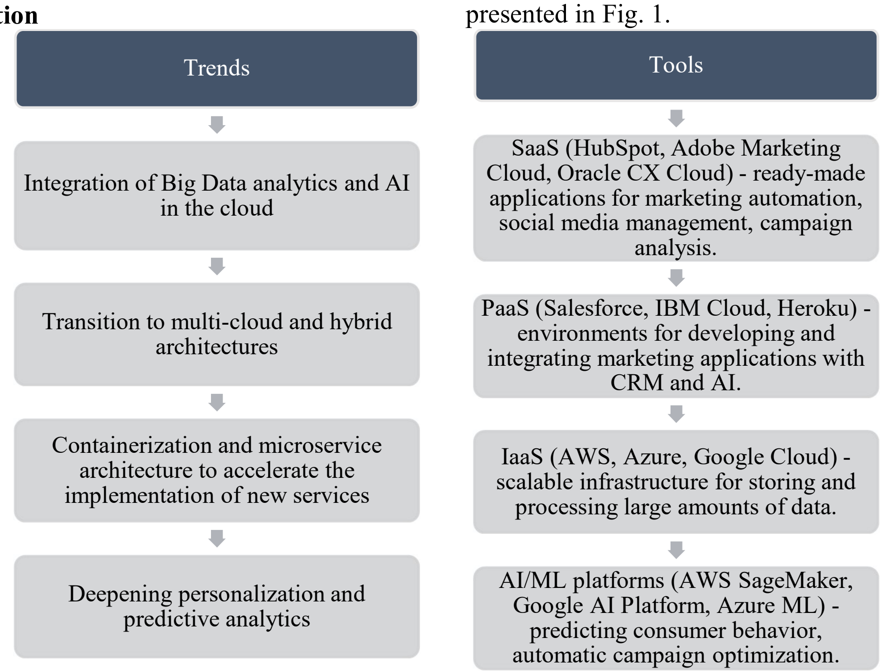

Fig. 1. Conceptualization of the main modern trends in the implementation of cloud technology tools in digital marketing of modern companies

Cloud platforms allow you to combine CRM, web analytics, social networks and marketing automation systems, creating a “single window” for managing communications. For large companies, this reduces data fragmentation and speeds up decision-making. Multi-cloud and hybrid strategies provide a balance between flexibility and security. Containerization (Docker, Kubernetes) speeds up testing of new marketing services and reduces the time to market for campaigns. Using cloud AI tools takes marketing to a new level - campaigns become dynamic, budgets are redistributed automatically, content is personalized in real time. This increases conversion and ROI, but requires high-quality source data and new staff competencies [32, 33].To assess the effectiveness of cloud technologies in digital marketing, a sample of international companies that implemented cloud marketing platforms in 2021–2024 (before and after comparative analysis) was structured, which is presented in Fig. 2.

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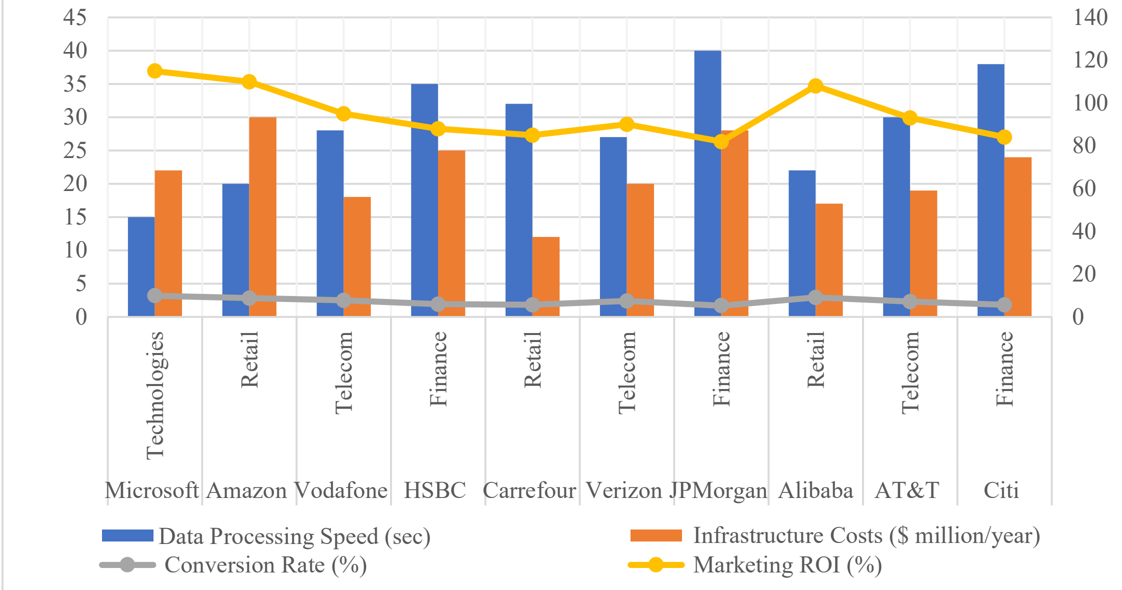
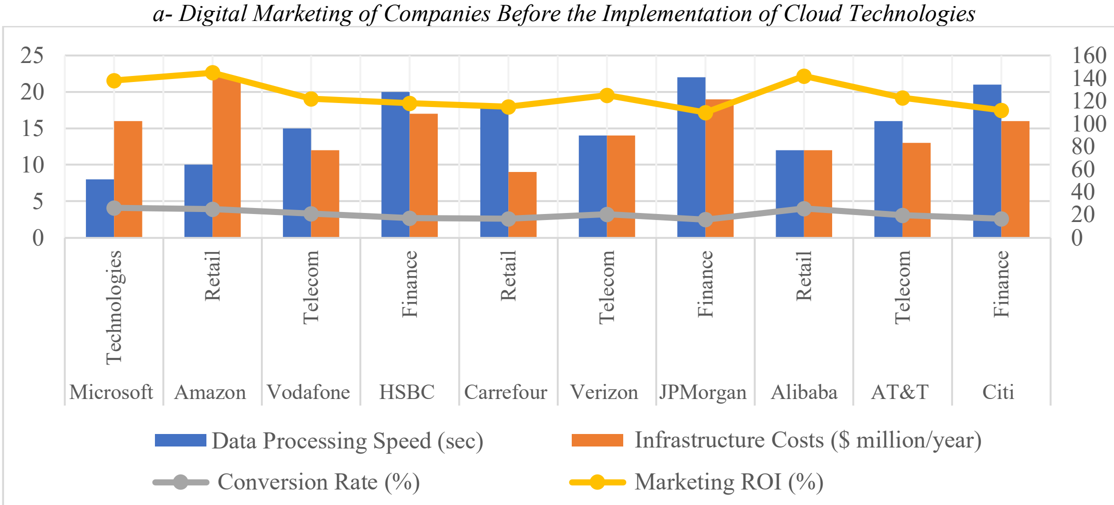


a- Digital Marketing of Companies Before the Implementation of Cloud Technologies



b- Digital Marketing of Companies After the Implementation of Cloud Technologies

Fig. 2. Structuring trends and comparative analysis of the effectiveness of cloud technologies in digital marketing (a- Digital Marketing of Companies Before the Implementation of Cloud Technologies, b - Digital Marketing of Companies After the Implementation of Cloud Technologies)

Clearly, the analysis of the tables shows that the speed of data processing after the implementation of cloud platforms decreased by an average of 45-55%, infrastructure costs decreased by 25-30%, the conversion rate increased by 35-50%, and the ROI of marketing investments increased by 20-40% depending on the sector. The most striking effect is observed in companies in the technology and retail sectors (Microsoft, Amazon, Alibaba), which is explained by their high initial readiness for cloud architectures and large volumes of data. In the financial sector, the effect is more moderate due to restrictions on the processing of confidential data and more complex integration with legacy systems, but here too, an increase in ROI and a reduction in infrastructure costs are recorded [33,34]. Comparison of data across different sectors confirms that cloud technologies provide a comprehensive increase in the effectiveness of digital marketing: faster analytics, increased conversion, reduced costs, improved ROI. At the same time, multi-cloud and hybrid strategies allow you to take into account security and regulatory requirements. Overall, the case study analysis shows that the use of cloud computing technologies in digital marketing management is not only a trend, but also a necessary condition for increasing competitiveness in the global market. Cloud platforms allow you to create adaptive marketing strategies, improve the quality of customer experience and ensure long-term growth of

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ROI. The research methodology was based on the construction of a system of digital marketing management performance indicators and their comparison before and after the implementation of cloud solutions. For the comparability of indicators, index analysis and normalization were used: each indicator after implementation was divided by the value before implementation, forming a change index (I). The key results of assessing the dynamics of KPI change indices before and after the implementation of cloud technologies in the digital marketing of companies are presented in Fig. 3.

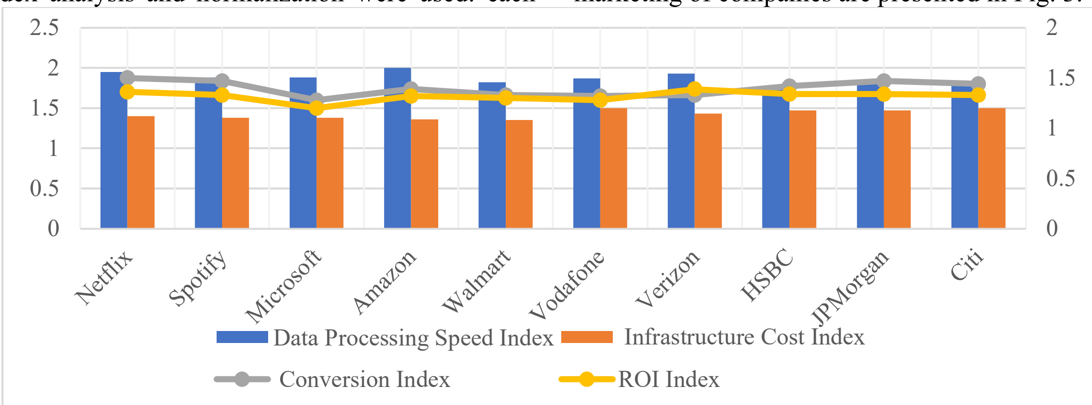

Fig. 3. Key results of assessing the dynamics of KPI change indices before and after the implementation of cloud technologies in the digital marketing of companies

The presented methodology is based on the construction of a comprehensive system of quantitative indicators of digital marketing management efficiency, as well as their comparison before and after the implementation of cloud solutions. The benchmark KPIs are speed (of data processing), infrastructure costs, conversion rate and return on marketing investment (ROI). This list of metrics is comprehensive enough to represent not only the day-to-day effectiveness, but also the long-term success of digital marketing. The distinctive feature of the method is to adopt index analysis and indicator normalization. The indicator method permits comparison of indices of different dimensions and provides integer coefficients that can be interpreted as the dynamics of changes. Normalization is a solution to the problem described above, in which all the values of a company or an industry are not comparable with respect to employing and so you may compare results relatively. Special importance is allocated to enabling the tuning process of the data processing speed index while enhancements can be achieved by reducing duration, in which a reverse calculation (from" before" value divided with "after") is made so that an increase in the index correlates with a real acceleration of processes [35]. The original method of describing the method lies in the consideration digital marketing as a special segment of application of cloud technologies. Most scientific and practical studies analyze general IT or financial effects, without highlighting the marketing component. In our case, the methodology is adapted to specific KPIs of marketing activities, which gives companies and researchers a tool for targeting the effectiveness of the transition to cloud solutions in this particular function. In addition, a sample of ten international companies allows for cross-industry comparison and identification of how cloud technologies work in different sectors - from high-tech streaming to traditional retail and finance. The methodology makes it possible not only to record changes in individual indicators, but also to identify their complex effect. It can be used as an element of the management control system and as a basis for economic justification of investments in cloud solutions [35]. The calculated indices for ten companies (Netflix, Spotify, Microsoft, Amazon, Walmart, Vodafone, Verizon, HSBC, JPMorgan, Citi) clearly showed that the introduction of cloud technologies in digital marketing management leads to a comprehensive improvement in key indicators.

1. **Acceleration of data processing.** All companies demonstrate indices above 1.75 for data processing speed, which means a reduction in the processing time of marketing data by an average of 40 - 50%. The greatest effect is shown by Amazon (2.00), which is associated with its own developed cloud infrastructure, as well as Netflix (1.95) and Verizon (1.93). For Netflix and Spotify, it is critical to quickly analyze user activity to personalize content, so the benefits of moving to the cloud are especially pronounced.

2. Reducing infrastructure costs. Cost indices for all companies are in the range of 1.33 - 1.50, which means saving 25 - 33% of the budget for maintaining marketing infrastructure. The highest values are for Vodafone (1.50) and Citi (1.50), which actively closed their own data centers, transferring processes to public clouds. Even the retailer Walmart has an index of 1.35, demonstrating significant savings due to the transition to a hybrid cloud for marketing analytics and loyalty programs.

3. Conversion rate growth. Conversion indices range from 1.28 (Microsoft) to 1.50 (Netflix), which means conversion growth of 28 - 50%. Netflix and Spotify are leading due to the integration of cloud AI models that personalize offers and communications with millions of users. JPMorgan (1.47) and Citi (1.44) are also showing high growth due to cloud analytics in customer segmentation and cross-selling of financial services.

4. Increased ROI of marketing investments. ROI growth is observed in all companies - from 1.20 (Microsoft) to 1.39 (Verizon). Verizon shows the maximum effect due to cloud automation of advertising campaigns and optimization of media purchases. HSBC and JPMorgan demonstrate steady growth (1.34) with high requirements for security and regulation, which confirms the versatility of cloud solutions even in conservative sectors.

5. Sectoral differences. Streaming platforms (Netflix, Spotify) and technology companies (Amazon, Microsoft) demonstrate the highest indices for data processing speed and conversion - due to high digital maturity, dynamic processes and a culture of experimentation. Retail (Walmart) shows average results, but at the same time achieves significant savings in infrastructure costs. The financial sector (HSBC, JPMorgan, Citi) demonstrates good conversion and ROI indicators with more moderate data acceleration indices, which is associated with the need for gradual migration and integration with legacy systems. Telecom (Vodafone, Verizon) are leaders in reducing costs and ROI due to the scale of operations and standardized processes.

6. Complex effect and confirmation of the hypothesis. Data on ten companies confirm the hypothesis: the introduction of cloud technologies in digital marketing management provides a systemic increase in efficiency for key KPIs. Index analysis allows us to quantitatively record these changes, compare companies with each other and by economic sectors. The presence of indices >1 for all four indicators in all cases shows that the effect is not local, but systemic - from accelerating data processing to increasing the return on investment.

7. Practical significance. Companies can use the proposed methodology for internal assessment of the effectiveness of digital marketing transformation projects. Comparative index analysis makes it possible to see where the effect is greatest (for example, cost savings or conversion growth) and make management decisions about further expansion of cloud initiatives.

The proposed methodology has proven its applicability to real data from ten large international companies representing different sectors of the economy. Its novelty lies in its focus on marketing KPIs, integration of index analysis and cross-industry comparison. The obtained indices demonstrate a sustainable improvement in all key indicators after the implementation of cloud technologies. This allows us to conclude that cloud solutions for digital marketing are strategically important as a tool for improving efficiency, personalization, saving resources and increasing the return on marketing investments. Thus, the methodology can be considered as a working tool not only for scientific research, but also for practitioners planning to evaluate and justify projects for the transition of marketing functions to the cloud. It can be expanded by adding new KPIs (for example, the speed of launching a campaign to market, the level of process automation) and in-depth analysis by segments, which opens up prospects for further research and improvement of the approach.

Problems And Open Research Questions

Despite the obvious progress in the digital transformation of marketing processes and the active implementation of cloud technologies, a number of problems in this area remain that require further study. Firstly, there is no single agreed methodology for assessing the effectiveness of cloud solutions specifically in the marketing function. Most publications focus on technical, financial or general corporate aspects, while specific digital marketing indicators (conversion, customer acquisition cost, return on marketing investments) are analyzed fragmentarily. This leads to difficulties in comparing results between companies and economic sectors. Secondly, the mechanisms for distributing effects between short-term and long-term results remain unclear. For example, switching to a cloud infrastructure can immediately reduce costs and speed up data processing, but sustainable growth in conversion or return on investment may only appear after several quarters. Scientific substantiation of time lags and factors influencing the speed of implementation of effects has not yet been sufficiently developed. The third problem is related to the quality of the source data. Marketing databases and processes are integrated to different degrees in different companies; This makes it difficult to construct comparable indices and may distort the

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results. The issue of standardizing the source data and normalizing the indicators remains open, which is especially important in cross-industry studies. The fourth group of questions concerns socio-organizational aspects. It has not been fully studied how the transition to cloud technologies affects personnel competencies, the distribution of roles in marketing teams, the level of control and transparency. The lack of empirical data in this area prevents us from drawing final conclusions about the long-term sustainability of the implemented solutions.

In addition, issues of security and compliance with regulatory requirements remain open. In industries with increased data protection requirements (financial services, healthcare), it is not yet clear how to combine the advantages of public clouds with regulatory restrictions and at the same time maintain marketing effectiveness. Finally, a promising area of research is to study the differences in the results of implementing cloud solutions depending on the level of digital maturity of the organization, the scale of operations and cultural factors. The lack of a unified approach to segmenting companies by these characteristics complicates the formation of general conclusions and recommendations. Thus, the problems and open questions of the study cover both methodological and organizational-economic aspects. Their systemic solution will allow not only to clarify the obtained effects, but also to form practical guidelines for companies planning digital transformation of marketing processes based on cloud technologies.

5. CONCLUSIONS

The study confirmed that the implementation of cloud technologies in digital marketing management represents not so much a technological upgrade as a transition to a new logic for organizing marketing processes. An analysis of international experience showed that the use of cloud platforms accelerates data processing, reduces infrastructure costs, and improves key marketing performance indicators (KPIs) such as conversion, ROI, and customer retention. The developed approach, based on a key performance indicator (KPI) system and index analysis, allowed us to assess the impact of cloud solutions on the performance of companies of various sizes and industries. A comparison of the obtained data revealed a steady increase in the effectiveness of marketing processes after the implementation of cloud tools. However, the effect is heterogeneous: companies with a higher level of digital maturity achieve tangible results more quickly, while enterprises with traditional management models demonstrate gradual improvements. The study also identified a correlation between cloud infrastructure spending and increased marketing returns. This demonstrates the importance of a comprehensive analysis that includes both economic and operational parameters. The scientific value of this work lies in proposing an integrated approach that combines traditional financial indicators and digital marketing metrics into a single analytical system. This approach allows not only to assess current performance but also to forecast the behavior of key indicators based on the degree of cloud solution adoption.

The research's contribution lies in substantiating the relationship between an organization's level of digital maturity and the speed of achieving marketing results when transitioning to cloud technologies. Furthermore, a methodological framework has been developed that enables cross-industry comparisons and the development of standards for assessing the effectiveness of cloud tools.

The practical significance of the results lies in the fact that the proposed methodology can be used to justify investments in cloud technologies based not on IT costs, but on their impact on marketing metrics and business results. It is also applicable to forecasting campaign performance trends and planning corrective management actions. At the same time, the study identified a number of unresolved issues related to the lack of a unified system for evaluating and standardizing metrics, as well as consideration of organizational culture and industry differences. These aspects provide directions for further research aimed at improving the proposed methodology.

Overall, the results confirm that the integration of cloud technologies into digital marketing is a key tool for improving business performance in the digital economy. The findings can serve as a basis for developing next-generation management solutions that combine the strategic and technological potential of cloud systems.

6. FUTURE ENHANCEMENT

The analysis performed in the present study has demonstrated that there is a high potential for cloud technologies in regard to companies' digital marketing management; however, many restrictions still exist on their practical use. The future development and improvement of the proposed method can be mainly focused on enlarging the database and deepening analysis. Once we have extracted and systematized the indicators from a

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greater number of companies and industries, it will be possible for us to clarify what the KPI weight factors are, assess inter-industry differences as well as look for new types that describe patterns in dynamics of marketing processes efficiency. Another interesting direction is the inclusion of more indicators that describe social and environmental context of marketing actions. Ability to even combine with parameters like marketing sustainability index, data collection ethics indicator or the ratio of trust in customer will offer an all-rounder impact perspective on the deployment of cloud solutions. While this is even more relevant for companies operating globally, which want to align their economic, environmental and social goals. The approach can be further generalized through the use of methods from predictive analytics. Modeling delays related to the adoption of cloud technologies and their effect on different performance factors enables decision makers to plan marketing strategies with less uncertainty. This will allow transitioning from reporting of results to steering future effects. Another element that needs to be addressed is the consensus on standards of unified data collection and normalization. Industry/top level and among industry marketing statistics exchange flows (under the assisting that the confidentiality of information is provided) development under principles of secrecy and protection data will give commensurability of results, higher indexes accuracy concomitantly facilitate utilization in international research. Future versions of this method could take into account also the organizational and cultural issues when applying the cloud technologies. This will reveal differences in performance among companies and generate insights by level and type of firm, based on the digital maturity model. Thus, the potential for further development of a new representing method lies in its constant technical upgrading regarding analytical tools perfecting and of area research background enrichment, as well as it's deepening on indicators composition forming level expansion, data harmonization and margin influence accounting. Implementation of those steps will enable our methodology be transformed into a universal tool for strategic management in digital marketing on cloud technologies, which can be implemented in different industries of the world's economy.

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