

# THE APPLICATION OF DATA ANALYTICS IN THE OPTIMISATION OF DIGITAL MARKETING CAMPAIGNS

Aleksandra Marković<sup>1\*</sup>, Saša Kukolj<sup>2</sup>, Nemanja Deretić<sup>3</sup>

<sup>1</sup>Department of business studies in Blace, Toplica Academy of Applied Studies, Republic of Serbia, e-mail: [aleksandra.markovic@vpskp.edu.rs](mailto:aleksandra.markovic@vpskp.edu.rs)

<sup>2</sup>Faculty of Management, University Union Nikola Tesla, Republic of Serbia, e-mail: [sasa.kukolj@famns.edu.rs](mailto:sasa.kukolj@famns.edu.rs)

<sup>3</sup>Belgrade Business and Arts Academy of Applied Studies, Republic of Serbia, e-mail: [nemanja.deretic@bpa.edu.rs](mailto:nemanja.deretic@bpa.edu.rs)

**Abstract:** Digital marketing campaigns today are increasingly based on the collection, processing and interpretation of large volumes of data generated through user interactions with websites, social media, email campaigns, mobile applications and e-commerce platforms. The application of data analytics enables organisations to monitor campaign performance more accurately, understand consumer behaviour and make decisions based on measurable indicators, rather than solely on intuition or previous experience. Key performance indicators are particularly important, such as click-through rate, conversion rate, user engagement, website bounce rate, customer acquisition costs and return on investment, as they enable the continuous measurement of the effects of marketing activities and their alignment with business objectives. Data analytics contributes to the optimisation of digital campaigns through user segmentation, content personalisation, customer journey analysis and the prediction of future consumer behaviour. By using big data processing technologies, customer relationship management systems and data on purchasing patterns, companies can develop more detailed customer profiles, identify the most valuable segments and adapt marketing messages to the specific needs and interests of users. This increases the relevance of communication, improves the user experience and creates a greater likelihood of conversion. Advanced forms of analytics, including predictive analytics, machine learning and artificial intelligence, further improve campaign efficiency. These approaches enable the prediction of user engagement, the ranking of potential customers, and the optimisation of advertisements, budgets and communication channels in real time. However, the successful application of analytics depends on data quality, the integration of different sources, privacy protection and the ethical use of user information. It is concluded that data analytics represents a key instrument for optimising digital marketing campaigns, as it enables more precise advertisement targeting, greater personalisation, better cost control and the improvement of overall marketing results.

**Keywords:** data analytics, digital marketing, campaign optimisation, consumer behaviour, personalisation.

**Field:** Social Sciences, and Humanities.

## 1. INTRODUCTION

Contemporary business increasingly depends on digital communication channels, which is why digital marketing is becoming one of the key elements of organisations' market presence. Today, companies use websites, social media, email, search engines, mobile applications and e-commerce platforms to communicate with existing and potential customers. In such an environment, large volumes of data are generated on user behaviour, interests, purchasing habits, responses to advertisements and movement through different stages of the customer journey. For this reason, data analytics plays an increasingly important role in the planning, monitoring and optimisation of digital marketing campaigns (Al Adwan et al., 2023). The application of data analytics enables marketers to make decisions not solely on the basis of intuition, but on the basis of measurable indicators and concrete insights. By measuring website performance, analysing activity on social media, monitoring the results of email campaigns and examining the customer journey, organisations can better understand the needs, preferences and level of engagement of their target audience (Al Adwan et al., 2023). In addition, reporting systems based on key performance indicators help organisations link marketing activities with business objectives, monitor results in real time and adapt campaigns more quickly to changes in the market (Kufile et al., 2022).

Big data, predictive analytics and machine learning are of particular importance, as they enable the identification of patterns in consumer behaviour, the personalisation of messages and the prediction of users' future responses. Such an approach helps companies target advertisements more precisely, identify valuable customer segments, increase the conversion rate and allocate the marketing budget more efficiently (Agboola et al., 2022; Theodorakopoulos & Theodoropoulou, 2024). However, the successful application of analytics depends on data quality, the integration of different sources, the protection of user privacy and the ethical use of information. Therefore, the aim of this paper is to show how data analytics

\*Corresponding author: [aleksandra.markovic@vpskp.edu.rs](mailto:aleksandra.markovic@vpskp.edu.rs)



contributes to the optimisation of digital marketing campaigns and the improvement of overall marketing results.

The paper consists of five chapters. Following the introductory considerations, the second chapter explains the key performance indicators and the importance of measuring the performance of digital marketing campaigns. The third chapter discusses consumer behaviour analytics and campaign personalisation as a basis for more precise targeting and more relevant communication with users. The fourth chapter analyses the role of predictive analytics, machine learning and automation in the optimisation of marketing decisions. The concluding chapter summarises the main findings of the paper and highlights the importance of data analytics for improving the efficiency, personalisation and overall results of digital campaigns.

## 2. KEY PERFORMANCE INDICATORS AND CAMPAIGN PERFORMANCE MEASUREMENT

Key performance indicators represent the basis for monitoring, evaluating and optimising digital marketing campaigns. In the contemporary digital environment, marketing decisions cannot be based solely on subjective judgement, but must rely on specific and measurable data showing the extent to which a campaign achieves its set objectives. According to Kufile et al. (2022), reporting systems based on key performance indicators enable organisations to convert large volumes of marketing data into useful insights that support tactical decisions and the long-term adjustment of strategy. Such indicators are particularly important in rapidly developing campaigns, as they enable results to be monitored in real time, problems to be identified promptly and marketing activities to be corrected quickly.

In digital marketing, the most commonly monitored indicators include click-through rate, conversion rate, website bounce rate, cost per click, customer acquisition cost, user engagement, return on investment and return on advertising spend. These indicators make it possible to view campaign performance from several perspectives: through user behaviour, financial viability and the degree to which communication objectives have been achieved. Kufile et al. (2022) emphasise that indicators can be viewed as behavioural, financial and attitudinal, with priority given to those indicators that are directly linked to growth objectives and business results. For this reason, it is not sufficient to monitor a large number of metrics; rather, it is important to select a smaller number of relevant indicators that genuinely demonstrate campaign success.

Campaign performance measurement includes the analysis of different digital channels. Al Adwan et al. (2023) state that the effectiveness of digital marketing campaigns can be monitored through website performance, social media metrics, the success of email campaigns, the analysis of customer data for targeting and personalisation, and customer journey analysis. In this way, the campaign is not viewed in isolation, but as part of a broader process in which the user passes through multiple touchpoints with the brand. The results of the study by Al Adwan et al. (2023) indicate a significant relationship between social media data, customer journey analysis, successful advertising and strategy formation, confirming that performance measurement has a direct role in shaping further marketing decisions. Dashboards and data visualisation tools play a particularly important role in performance measurement. They enable marketers and managers to present complex data in a clear and accessible manner, using charts, timelines, alerts and comparisons of results across different platforms. Swetha et al. (2025) emphasise the importance of dashboards that display key metrics such as click-through rate, engagement, conversions, bounce rate and impressions, with the possibility of comparing performance by platform, demographic group and advertisement type. Such an approach enables weaker campaigns to be identified quickly, while successful activities can be further strengthened.

Performance measurement is important not only after a campaign has ended, but also during its implementation. Real-time analytics enables the continuous monitoring of user behaviour and the adjustment of campaign elements, such as budget, target audience, advertising content and the choice of communication channels. According to Agboola et al. (2022), predictive analytics enables the dynamic adjustment of campaigns based on current insights into consumer behaviour and campaign results. In this way, organisations can reduce costs, allocate resources more effectively and increase the likelihood of conversion. However, successful performance measurement depends on the quality and reliability of data. If data are incomplete, outdated or poorly integrated from different sources, conclusions about campaign success may be inaccurate. It is therefore necessary to ensure standardised data collection, processing and verification, as well as clearly defined indicators linked to campaign objectives. When properly selected and monitored, key performance indicators form the basis for making reliable marketing decisions, optimising investment and increasing the overall efficiency of digital marketing campaigns.

Table 1 presents the most important areas of digital marketing campaign measurement, the key performance indicators, their importance for optimisation and the sources from the literature used. Table

1 indicates that campaign success is assessed through a combination of different indicators, rather than on the basis of a single metric.

Table 1. Key performance indicators in measuring the performance of digital marketing campaigns

Measurement area	Key performance indicators	Importance for campaign optimisation	Sources
Website performance	Number of visits, page views, average session duration, bounce rate	Show how many users visit the website, how long they stay and whether the content meets their expectations.	Al Adwan et al. (2023)
Social media and email	User engagement, reach, open rate, click-through rate, conversion rate	Enable the assessment of communication effectiveness with the audience and the adjustment of content, format and posting time.	Al Adwan et al. (2023)
Financial efficiency of the campaign	Return on investment, return on advertising spend, cost per click, customer acquisition cost	Shows whether the campaign justifies the invested resources and helps with better allocation of the marketing budget.	Kufle et al. (2022)
Conversions and potential customers	Conversion rate, number of potential customers, quality of potential customers, sales results	Show whether the campaign leads to concrete business results, such as a purchase, registration or enquiry.	Agboola et al. (2022)
Customer journey and personalisation	Brand touchpoints, user behaviour, purchasing habits, user preferences	Help in understanding consumer behaviour and enable more precise targeting of messages towards different segments.	Theodorakopoulos & Theodoropoulou (2024); Kuštelega et al. (2024)
Predictive analytics and automation	Probability of conversion, engagement prediction, sales forecasting, real-time advertisement performance	Enable the advance assessment of user responses and the continuous adjustment of the campaign for greater efficiency.	Al Rafi (2023); Swetha et al. (2025)

Source: Authors' research

### 3. CONSUMER BEHAVIOUR ANALYTICS AND CAMPAIGN PERSONALISATION

Consumer behaviour analytics represents one of the most important elements in the optimisation of digital marketing campaigns, as it enables organisations to understand how users search for content, respond to advertisements, make purchasing decisions and interact with a brand across different digital channels. In the digital environment, consumers leave a large number of traces through visits to websites, clicks, time spent on a page, searches, purchases, comments, reactions on social media and the use of mobile applications. By analysing these data, it is possible to obtain a clearer picture of consumers' interests, needs and habits, which provides a basis for more precise campaign planning. Theodorakopoulos and Theodoropoulou (2024) emphasise that big data enables a deeper understanding of consumer preferences, behaviour and user experience, thereby improving the effectiveness of digital marketing.

A particularly important part of consumer behaviour analytics is customer journey analysis. This involves tracking consumers from their first contact with the brand, through the stages of interest and consideration of the offer, to purchase and post-purchase experience. Al Adwan et al. (2023) state that customer journey mapping enables the identification of touchpoints between users and companies, as well as the detection of weak points, obstacles and user needs at each stage of the purchasing process. Such an approach helps companies better understand what users expect, what content they need and at what moment a particular marketing message should be delivered. In this way, analytics is not used only to observe past results, but also to actively shape future campaigns.

Campaign personalisation is based precisely on the insights obtained from the analysis of consumer behaviour. Instead of showing the same message to all users, companies can create content adapted to specific audience segments or even to individual users. Personalisation may include product recommendations, tailored advertisements, individualised email messages, special offers and content that corresponds to users' previous interests.

According to Theodorakopoulos and Theodoropoulou (2024), the application of big data enables companies to adapt marketing strategies to individual consumers, thereby increasing satisfaction, engagement and the relevance of communication. Consumer segmentation is the basis of successful

personalisation. Traditional approaches to segmentation mainly rely on demographic data, such as age, gender, income or location. However, contemporary digital campaigns require more precise segmentation based on actual user behaviour. Adelusi et al. (2023) indicate that traditional segmentation models often fail to capture the dynamic nature of contemporary consumer behaviour, as they overlook interactions across multiple platforms, changes in interests and differences in device usage. For this reason, models based on behavioural, technographic and contextual data are increasingly used, as they enable the creation of more precise and usable consumer profiles. In e-commerce, consumer behaviour analytics is particularly important, as it enables the understanding of purchasing patterns and the prediction of users' future decisions. Caroline, Yuswardi and Rofi'i (2023) emphasise that data on transactions, customers and products can be used to identify purchasing patterns, understand trends and improve service personalisation. Such insights help companies create more effective marketing strategies, improve the user experience and increase customer loyalty. Similarly, Pande et al. (2025) point out that consumer behaviour analytics enables an understanding of how users search for products, what they are interested in, how they make decisions and which factors influence purchasing.

Contemporary personalisation increasingly relies on machine learning and artificial intelligence. These approaches enable consumers to be grouped according to behaviour, frequency of interactions, purchase history, devices used and responses to previous campaigns. On this basis, it is possible to predict which users are more likely to make a purchase, which content interests them most and which communication channel is the most effective for them. Swetha et al. (2025) emphasise that systems based on artificial intelligence can analyse changes in user behaviour in real time and adjust campaigns through personalised messages, advertisement optimisation and automated performance management. However, campaign personalisation must be implemented carefully, as the collection and analysis of user data raise issues of privacy, trust and the ethical use of information. Consumers expect relevant and useful messages, but at the same time they want their data to be protected and used transparently. Pande et al. (2025) point out that there is a delicate boundary between useful personalisation and the excessive use of data, which is why companies must apply responsible data management practices. Adelusi et al. (2023) also emphasise the importance of informed consent, data minimisation and algorithmic transparency in consumer profiling processes.

Based on the above, it can be concluded that consumer behaviour analytics and campaign personalisation represent key mechanisms for improving digital marketing. By analysing the customer journey, purchasing patterns, responses to content and interactions across different channels, companies can create more relevant, precise and effective campaigns. Personalisation enables marketing messages to be better aligned with users' needs, while the proper use of data contributes to greater engagement, a higher conversion rate and the strengthening of the long-term relationship between consumers and the brand.

#### **4. PREDICTIVE ANALYTICS, MACHINE LEARNING AND THE OPTIMISATION OF MARKETING DECISIONS**

Predictive analytics and machine learning play an increasingly important role in the optimization of digital marketing campaigns, as they enable decisions to be made on the basis of predictions of future consumer behavior, rather than solely on the analysis of previous results. Unlike traditional analytics, which mainly describes what happened in the past, predictive analytics uses historical and current data to assess the likelihood of future user responses, such as a click, purchase, registration, cart abandonment or a higher level of engagement. Agboola et al. (2022) emphasize that predictive analytics enables the identification of potentially valuable customers, the improvement of lead ranking and the personalization of marketing activities, thereby increasing conversion rates and reducing customer acquisition costs. Similar findings confirm that predictive analytics, machine learning and artificial intelligence can improve direct marketing through more accurate prediction of user responses, personalization of offers and optimization of marketing strategies in digital and financial environments (Theodora kopoulos, Theodoropoulou, & Klavdianos, 2025; Zaki et al., 2024).

Machine learning further improves this process, as it enables the analysis of large and complex datasets from different sources, such as websites, mobile applications, social media, email, customer relationship management systems and purchase history. Algorithms can identify patterns that are difficult to detect using traditional methods, particularly when dealing with changing user behavior and multichannel communication. Al Rafi (2023) emphasizes that models such as Random Forest and AdaBoost can improve the prediction of user engagement and sales, as they use data on interaction frequency, recent activities, purchases and responses to campaigns.

The application of predictive analytics is particularly useful in making marketing decisions related to the selection of the target group, budget allocation, advertisement display timing, channel selection and the design of message content. In the field of digital advertising, systems based on artificial intelligence can analyze indicators such as click-through rate, conversion rate, user engagement and the demographic characteristics of the audience, and then automatically recommend or adjust advertisements, formats and budgets in real time (Swetha et al., 2025).

However, the effectiveness of these approaches depends on data quality, proper processing, the selection of an appropriate model and the ethical use of user information. If data are incomplete, inaccurate or biased, predictions may lead to incorrect marketing decisions. For this reason, predictive analytics and machine learning represent powerful tools for campaign optimization, but they require responsible data management and continuous monitoring of results.

## 5. CONCLUSION

Data analytics plays a key role in the optimization of digital marketing campaigns, as it enables organizations to understand consumer behavior more precisely, monitor campaign results and make decisions based on measurable indicators. In the contemporary digital environment, users generate a large amount of data every day through visits to websites, interactions on social media, email, mobile applications and e-commerce platforms. Through the proper processing and interpretation of these data, companies can gain deeper insight into consumers' needs, interests and purchasing habits. Key performance indicators enable the continuous monitoring of campaigns and the assessment of their effectiveness. Through indicators such as click-through rate, conversion rate, user engagement, customer acquisition costs and return on investment, marketers can determine which activities produce the best results and which need to be improved. In addition, customer journey analysis and consumer segmentation enable the creation of personalised messages that are more relevant to the target audience. Predictive analytics, machine learning and artificial intelligence are of particular importance, as they enable the prediction of user behaviour, better ranking of potential customers, budget optimisation and campaign adjustment in real time. In this way, digital marketing becomes more efficient, more precise and more focused on concrete business results. However, the successful application of data analytics requires high-quality, accurate and connected data, as well as responsible management of user information. Particular attention should be paid to privacy protection, transparency and the ethical use of data. It can be concluded that data analytics represents the foundation of contemporary digital marketing and an important instrument for increasing the efficiency, personalisation and overall success of marketing campaigns.

## REFERENCES

- Adelusi, B. S., Uzoka, A. C., Hassan, Y. G., & Ojika, F. U. (2023). Developing Predictive Technographic Clustering Models Using Multi-Modal Consumer Behavior Data for Precision Targeting in Omnichannel Marketing. *International Journal of Management and Organizational Research*, 2(2), 206-214. <https://doi.org/10.54660/IJMOR.2023.2.2.206-214>
- Agboola, O. A., Ogeawuchi, J. C., Abayomi, A. A., Onifade, A. Y., George, O. O., & Dosumu, R. E. (2022). Advances in lead generation and marketing efficiency through predictive campaign analytics. *International Journal of Multidisciplinary Research and Growth Evaluation*, 3(1), 1143-1154. <https://doi.org/10.54660/IJMARGE.2022.3.1.1143-1154>
- Al Adwan, A., Kokash, H., Al Adwan, R., & Khattak, A. (2023). Data analytics in digital marketing for tracking the effectiveness of campaigns and inform strategy. *International Journal of Data and Network Science*, 7, 563-574. [https://www.growingscience.com/ijds/Vol7/ijdns\\_2023\\_37.pdf](https://www.growingscience.com/ijds/Vol7/ijdns_2023_37.pdf)
- Al Rafi, M. (2023). Machine learning-enhanced predictive marketing analytics for optimizing customer engagement and sales forecasting. *International Journal of Research and Applied Innovations*, 6(4), 9203-9213. <https://doi.org/10.15662/IJRAI.2023.0604004>
- Caroline, Yuswardi, & Rofi'i, Y. U. (2023). Analysis of e-commerce purchase patterns using big data: An integrative approach to understanding consumer behavior. *International Journal Software Engineering and Computer Science (IJECS)*, 3(3), 352-364. <https://doi.org/10.35870/ijsecs.v3i3.1840>
- Kufile, O. T., Otokit, B. O., Onifade, A. Y., Ogunwale, B., & Harriet, C. (2022). Constructing KPI-driven reporting systems for high-growth marketing campaigns. *Journal of Frontiers in Multidisciplinary Research*, 3(1), 403-413. <https://doi.org/10.54660/JFMR.2022.3.1.403-413>
- Kuštelega, M., Gregurec, I., & Lovrenčić, S. (2024). Coherency of Big Data Analytics and Customer Relationship Management Strategy: Insights from Content Analysis. In *International Scientific-Business Conference-LIMEN 2024 Leadership, Innovation, Management and Economics: Integrated Politics of Research: Vol 10. Selected Papers* (pp. 109-117). Beograd: Association of Economists and Managers of the Balkans, Belgrade, Serbia. <https://doi.org/10.31410/LIMEN.S.P.2024.109>
- Pande, P., Kulkarni, A. K., Balamurugan, P., Balakrishnan, S., Ramalingam, V., & Revathi, R. (2025). Big data analytics in e-commerce driving business decisions through customer behavior insights. In *ITM Web of Conferences* (Vol. 76, p. 05001). EDP Sciences. <https://doi.org/10.1051/itmconf/20257605001>
- Swetha, K., Kumar, T. A., & Kanimozhi, P. (2025). AI-Based Advertisement Optimization and Performance Analytics. *Asian*

- Journal of Applied Science and Technology (AJAST), 9(2), 10-21. <https://doi.org/10.38177/ajast.2025.9202>
- Theodorakopoulos, L., & Theodoropoulou, A. (2024). Leveraging big data analytics for understanding consumer behavior in digital marketing: A systematic review. *Human Behavior and Emerging Technologies*, 2024(1), 3641502. <https://doi.org/10.1155/2024/3641502>
- Theodorakopoulos, L., Theodoropoulou, A., & Klavdianos, C. (2025). Interactive viral marketing through big data analytics, influencer networks, AI integration, and ethical dimensions. *Journal of Theoretical and Applied Electronic Commerce Research*, 20(2), 115. <https://doi.org/10.3390/jtaer20020115>
- Zaki, A. M., Khodadadi, N., Hong Lim, W., & Towfek, S. K. (2024). Predictive Analytics and Machine Learning in Direct Marketing for Anticipating Bank Term Deposit Subscriptions. *American Journal of Business & Operations Research*, 11(1), 79-88. <https://doi.org/10.54216/AJBOR.110110>