https://doi.org/ 10.7251/EMC2402711P
UDK: 005.346:338.46]:659.113.25
Datum prijema rada: 28. oktobar 2024.
Submission Date: October 28, 2024
Datum prihvatanja rada: 15. decembar 2024.
Acceptance Date: December 15, 2024
Časopis za ekonomiju i tržišne komunikacije
Economy and Market Communication Review
Godina/Vol. **XIV** • Br./No. **II**
str./pp. 711-720

KRATKO ILI PRETHODNO SAOPŠTENJE / SHORT OR PRELIMINARY REPORT

BIG DATA TECHNOLOGIES IN ANALYSIS OF CONSUMER BEHAVIOR

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Abstract: *The study of consumer behavior at all stages of marketing is related to Big Data analysis. The purpose of the study is to structure information on assessing consumer behavior, which relates to Big Data on the components of marketing max, to form methods for analyzing this information and basic results that will contribute to sustainable business development in the conditions of information and technological transformations. During the research, methods of synthesis, system analysis, comparison and systematization were used to track trends in the use of Big Data analysis in a system for assessing consumer behavior. The result of the study is the systematization of information data, methods of Big Data analysis for assessing consumer behavior. The proposed tools for assessing consumer behavior based on Big Data technologies make it possible to improve the marketing strategy for enterprise development and form a mechanism for strategic marketing management. Further research may concern generalizing the methodology for using Big Data for different categories of consumers.*

Keywords*: Big Data Technologies, Consumer Behavior, Marketing Analysis.*

JEL Classification: *M31, C81, D12.*

INTRODUCTION

Marketing research of consumer behavior involves a lot of information. Any company uses various Big Data when studying consumer behavior. Due to the large number and heterogeneity of data streams on consumer behavior, it is difficult to build effective strategies.

The technique of analyzing Big Data in the study of consumer behavior is used to find hidden patterns, market trends (Buhalis, D. & Volchek, K., 2020)) and other information that can help make effective marketing decisions.

Big Data makes it easy to gain insight into changing customer tastes and preferences. The more information there is about the consumer, the more it is possible to take into account his wishes and needs, and set the price of products accordingly. Big Data allows effectively form advertising strategies for the target client base. Knowing the customer and their preferences can provide insight into the customer's decision making before choosing any particular brand. Having data about consumers and their preferences allows showing the right products at the right time in the form of recommended products. Having data about a brand's customer base can help a business position its brand in the market (Jabbar, A., Akhtar, P., & Dani, S., 2019). Brand positioning can be based on various consumer indications regarding price, quality, target audience, etc. Big Data can allow companies to analyze information about competitors' prices, inflation rates to understand the purchasing power of brand users.

The purpose of the study is to structure information on assessing consumer behavior, which relates to Big Data on the components of marketing max, to form methods for analyzing this information and basic results that will contribute to sustainable business development in the conditions of information and technological transformations.

The hypothesis of the research is the following; the analysis of big data on consumer behavior can help attract consumers, reduce marketing costs, form an individual approach to the client, provide targeted advertising, and promote brand development.

The article describes marketing approaches and tools using big data technologies, conducted an analysis of the use of Big Data technologies in Ukraine and abroad, systematized information data, big data analysis methods and analysis results for evaluating consumer behavior, provided the results of a survey on the impact of big data analytics consumer behavior on the formation of a marketing strategy.

LITERATURE OVERVIEW

Consumer data helps you understand your target audience. Email addresses, purchase history, and web searches are important pieces of information. Equally important are audience attitude metrics that can be gathered on social media through surveys of online communities. Financial data helps evaluate business performance. Important Big Data in this segment are sales statistics, costs and profits, financial data of competitors, pricing (Liu, S., 2024). Operational data refers to business processes, namely delivery and logistics, customer relationship management systems (Davis, L., & Wislon, G., 2022). Analyzing this data will help increase productivity and reduce costs. In marketing, Big Data provides insight into what content is most effective at each stage of the sales cycle, and how customer relationship management investment systems can be improved (Stefanska, M., & Smigielska, G., 2020).

The use of Big Data in study of consumer behavior allows to get to know your customers better, attract a similar audience on the Internet, evaluate the level of customer satisfaction (Pavicevic, A., Jovanovic, S., & Dokovic, G., 2024), understand whether the offered service meets expectations and needs, find and implement new ways that increase customer trust, create projects that benefit by demand (Parkhomenko, N., Starchon, P., Vilcekova, L., & Olsavsky, F., 2024).

The main methods of collecting and analyzing Big Data in assessing consumer behavior are Data Mining, cluster and regression analysis (Han, B., Xiong, Z., Xu, X.,

& Zhang, Y., 2024); crowdsourcing Machine Learning, network analysis, optimization methods (Zhang, C., Wang, X., Cui, A.P., & Han, S., 2020), predictive analytics, simulation modeling, spatial and statistical analysis, etc.

Table 1. Approaches and tools of marketing using Big Data technologies

Title of approach	Description	Example of use
Data-driven marketing, Marketing engineering	Data-driven marketing is based on the analysis of arrays of consumer data. In this case, the work consists in maximally automating the optimization of the internal and external processes of the company, and tracking various types of data, such as the rate of customer outflow, the level of customer satisfaction, the share of engaged consumers, the lifetime value of the customer, conversion, profit, internal rate of return, payback, etc. Marketing engineering is a systematic approach to gathering data and knowledge to make effective marketing decisions in various areas. In marketing engineering, decisions are made on the basis of data and knowledge, which allows avoiding the subjectivity of emotional factors during strategy selection.	Google Music uses data to create personalized playlists. Time of day, year, user preferences, listening history and number of listening are taken as data sources
Programmatic advertising	Programmatic advertising is an automatic offer of the price of advertising impressions as in real time; a set of online advertising purchasing methods using automated systems and algorithms to make transaction decisions without human intervention based on socio-demographic and behavioral user data available to both the platform and the advertiser	Google Ads advertising campaigns
Recommender systems	Recommender systems are programs that, taking into account the collected data, try to predict which objects or goods will be of interest to the client	Sections of recommendations in online stores ("You might like it", "If you liked it, don't miss it", "This product is also bought", etc.)
Dynamic pricing	Dynamic pricing is dynamic adjustment prices for consumers depending on the value that these customers attribute to the product or service. Dynamic pricing allows changing the price due to fluctuations in demand or the situation in a competitive environment	Wizzair, Pegasus etc.

Source: authors based on (Khorrami, M.S., Esfidani, M.R., & Delavari, S., 2015), (Parkhomenko, N., Starchon, P., & Vilcekova, L. , 2024), (Zafran, M., & Masud, S., 2023).

Today, the Crossss, 1CBitrix Big Data and CDP (customer data platform) services available to marketers provide the opportunity to use data from online and offline channels, integrate them into customer profiles, and conduct segmentation and analysis. The integration of the CDP platform with Facebook Ads and Google Ads allows using information for the most accurate targeting and increases the effectiveness of the advertising campaign. Crossss personalization system for online stores based on the analysis of user behavior allows forming personal recommendations for each user

based on more than twenty algorithms, which allows you to increase conversion, the average check and the frequency of repeat purchases. 1CBitrix Big Data cloud service, which processes data of users of online stores located on the "1C-Bitrix" platform, analyzes visitors who came to the site according to their interests, purchases, consumer behavior, and guarantees full data anonymity. The CDP client database platform collects the client database and forms it into a consumer profile.

The advantages of using Big Data in evaluating consumer behavior are creating the most complete portrait of the consumer, predicting his reaction to the product and advertising messages, differentiating consumers, optimizing the advertising budget, and getting an adequate idea of one's own product.

We will analyze options for using Big Data technologies in Ukraine and abroad for certain sectors of the economy.

Ukrainian companies use Big Data analysis in the fields of marketing, sales, insurance and optimization of internal processes (Lazebnikov, 2024). The driver of the application of Big Data analytics in Ukraine is companies in the energy, agro-industry, training, retail, banking and other industries (Fedirko, 2023).

In the banking sector, the introduction of Big Data technologies is aimed at improving the quality of service, developing new banking products and services, ensuring security and optimizing costs. So, for example, the ING financial holding uses Big Data technologies to collect and analyze information about the actions of website visitors. At HSBC Bank, Big Data technologies are used to fight against credit card fraud. Commonwealth Bank of Australia analyzes all transactions of its depositors, supplementing this analysis with the collection of data about them in social networks. By connecting these data streams, the bank achieved a significant reduction in loan defaults (Liu, X., Shin, H., & Burns, A.C., 2021). Tatra Bank in Slovakia reduced customer churn using big data analytics. PJSC "PrivatBank" (Ukraine) centralizes the process of risk assessment, determining the credit limit of one or another client depending on socio-demographic, behavioral data, as well as many other details. PJSC "Pravex Bank" (Ukraine) places branches where the largest target customer segment is located.

Another sector in which Big Data technologies are most in demand is retail trade. The American chain Guess, which sells denim clothes and accessories, uses Big Data technologies to track information about sales and the movement of goods. The Wal-Mart supermarket chain uses Big Data technologies to solve the tasks of demand forecasting, price optimization, development of promotions and marketing campaigns. Procter & Gamble uses Big Data to design new products and create global marketing campaigns (Which branches of Ukrainian business have the greatest need for Big Data: trends from Kyivstar, 2021). The company "Fozzy Group" (Ukraine), which owns the supermarkets "Silpo" and the stores "Fora", used the Big Data of the mobile operator "Vodafone" for the planning and development of the retail network. Fozzy Group analysts received data on how busy this or that place is at different times of the day, weekdays and weekends, as well as a qualitative portrait of the audience passing through the stores (Fedirko, 2023). It allows you to divide the flow of people at the location of the store into those who live / work / pass by, as well as determine the predominant audience at a given point in terms of gender, income level, car availability and many other characteristics. Such an analysis allows evaluating the effectiveness

of existing and planning the opening of new stores, correctly determining the most effective store format and choosing locations (Lazebnikov, 2024). Big Data technologies are also being implemented by the Citrus and Low Price Pharmacy chains, which use big data analysis when setting up targeting. "Silpo" network signed an agreement with "Kyivstar" on the provision of non-personal analytical data in cities with a population of 20,000 or more, in order to take into account the information received using the Big data Heatmap tool, which allows you to plan the opening of points taking into account the location of the audience when making a decision on the development of the network (Vasilopoulou, Ch., Theodorakopoulos, L., & Giotopoulos, K., 2023). The implementation of modern Big Data solutions for collecting, processing, analyzing and providing data allows retail enterprises to optimize prices and work with the assortment, improve logistics processes, and more effectively manage stocks and transport flows.

METHODOLOGY

During the research, methods of synthesis and system analysis were used to track trends in the use of big data by Ukrainian and foreign enterprises, methods of comparison and trend analysis were used to evaluate approaches and marketing tools that use Big Data.

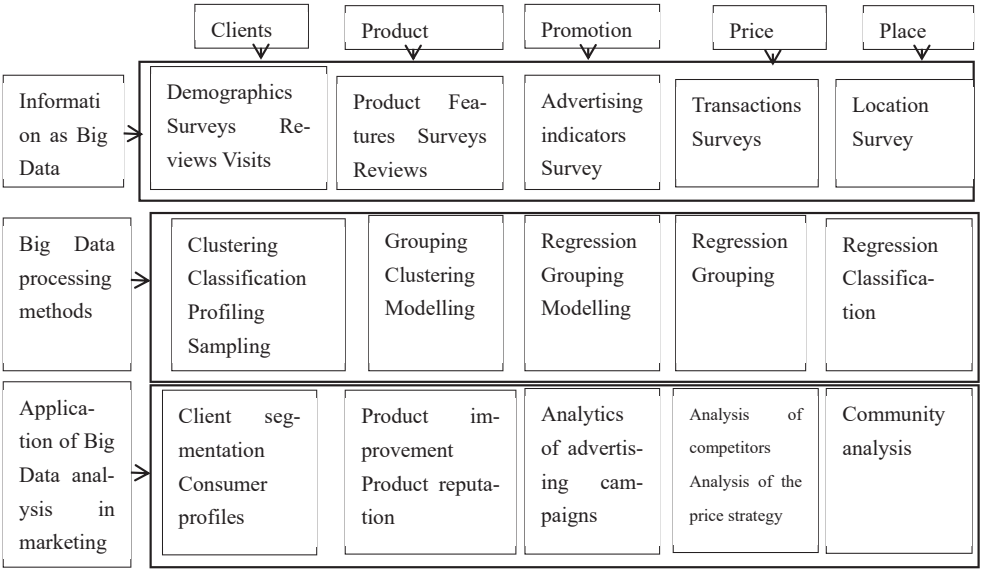
Quantitative testing of the study involved the collection of primary data, which was carried out on the basis of a questionnaire. The structure of the questionnaire provided for obtaining data on the demographic map of the respondents and monitoring consumer behavior. The questions were formulated in such a way that the response was rated on a Likert scale. Questions in Google form were offered for answers to food product sales managers. The data collection period was 8 weeks. The geography of the survey was focused on Ukrainian respondents. During the survey, 96 correctly filled out questionnaires were received. SPSS Statistics 26 software was used for primary data screening and analysis. In order to check the reliability of the research results, Cronbach Alpha was used. According to all survey criteria, the alpha value was greater than 0.6, which indicates the reliability of the results. According to the criterion of involvement of consumers, the Cronbach Alpha value was 0.783, according to the criterion of cost reduction 0.722, individual approach to client 0.866, targeted advertising 0.853, and brand development 0.743.

In the study, the results of the expediency of Big Data analysis in the system of evaluating consumer behavior and forming the company's marketing strategy are systematized and summarized.

EMPIRICAL EVIDENCE

When evaluating consumer behavior, all components of the marketing mix are important, which include the product, promotion, price, and place of sale. All these components have Big Data elements. Fig. 1 shows the information that can be attributed to Big Data by the components of the marketing mix, the methods of analyzing this information, and the results of Big Data analysis, which allow for the formation of an effective marketing strategy.

Fig. 1. Information presented by Big Data, methods of its analysis and results used in the assessment of consumer behavior



Source: authors

A survey of food sales managers was conducted to assess the importance of big data evaluation and analytics in marketing. The structure of the questionnaire provided for obtaining data on the demographic map of the respondents and monitoring consumer behavior. The questions were formulated in such a way that the response was rated on a Likert scale. The data collection period was 8 weeks. The geography of the survey was focused on Ukrainian respondents. During the survey, 96 correctly filled out questionnaires were received. Regarding the profile of the respondent, the demographic results indicate that the majority of respondents are female 78.5% compared to male 21.5%. Regarding education and experience, the majority of respondents had higher education (68.4%) and work experience of more than 2 years (84.2% of the total sample).

SPSS Statistics 26 software was used for primary data screening and analysis.

The results of the static survey data of the respondents, namely the mean value and standard deviation, showed that all the respondents positively evaluated all the statements of the questionnaire, as all the average evaluations had an average value above 3 points according to the proposed scale. The results of the statistical evaluation of average values and standard deviation according to the results of the survey are given in the table 2.

Table 2. Survey results on the feasibility of big data analytics in marketing

Survey criteria	Mean	Std. Deviation
Involvement of consumers		
Big data enables customer retention	3,612	1,264
Having information about consumers, you try to use it to increase loyalty	3,623	1,121
Process of meeting the needs of customers is enhanced by collecting information about them	3,74	0,971
Good content attracts the attention of consumers	4,11	0,952
Cost reduction		
Big sales data allows you to optimize costs	4,386	0,965
Big data allows you to increase sales volumes	3,825	1,129
Focusing on a certain interested audience of consumers allows you to avoid unnecessary advertising and thus reduce advertising	3,886	1,088
Individual approach to the client		
Thanks to an individual approach to the client, his needs are better understood	3,925	0,901
Individual approach to customers allows you to set the optimal price	4,022	0,892
Individual approach to customers improves the product promotion policy	3,624	1,055
Targeted advertising		
Big data about consumer preferences and consumer needs allows for targeted advertising	3,721	0,973
Big data makes it possible to predict trends in the market and apply advertising accordingly	3,964	0,966
Big data analytics allows you to optimize marketing promotion channels	4,024	0,972
Brand development		
Increasing brand awareness increases brand awareness	3,877	0,984
Big data analytics provides the growth of intangible assets	3,961	1,113
Big data analytics help build brand equity	4,127	0,922

Source: Authors

Regarding the highest rated positive response from respondents, the statement "Big sales data enables cost optimization" with a mean of 4.3 out of 5.0 and a standard deviation of 0.965. The statement "Big data enables customer retention" was rated the lowest with a mean score of 3.6 out of 5.0 and a standard deviation of 1.264.

RESULTS AND DISCUSSION

The importance of Big Data in evaluating consumer behavior is difficult to overestimate, as the use of this technology provides assistance to companies in determining which of their products will have the best market potential. The company can increase the scope of the products and services that are valued by the target demographic and focus its sales and marketing efforts on them. It will also save the business from filling warehouses with goods in low demand. Big Data technology also gives promising brands the confidence they need. Big Data provides an informed prediction as to

whether a brand's new products and services will be popular or not. Big Data helps increase sales by optimizing prices. There are many strategies that can be used to determine the right pricing policy for a company's products. Big Data helps optimize pricing not only by learning how much consumers are willing to spend by analyzing their spending habits, but also by considering other related factors such as competitor pricing, product demand, industry conditions, etc. Big Data helps improve the effectiveness of marketing campaigns. The use of Big Data in marketing can point to the elements that enable successful marketing campaigns to achieve their goals, and the aspects that doom unsuccessful ones to failure. Marketing analytics based on Big Data will generally help to make more informed decisions.

In assessing consumer behavior, Big Data enables audience segmentation, namely the collection, research and analysis of various aspects of behavioral criteria – how people use their products and services, as well as social and demographic factors. The results can help identify consumer preferences more effectively so that marketing messages can be refined and optimized. In addition, big data allows analysis of customer sentiment. By analyzing social media posts, reviews and search queries, marketers can better understand how consumers feel about a brand. Big Data enables targeted marketing to deliver more relevant content to consumers, through product recommendations, social media advertising, and email marketing campaigns. Big Data provides predictive and prescriptive analysis. Marketers can work with the supply chain to help ensure more adequate production of goods through Big Data demand forecasting. Big Data analyzes the profiles of users of certain services and monitors social media to determine the attitude towards its own product/brand and the product/brand of competitors, search for ideas for improving the product, and analyze the quality of service. Big Data implements the analysis of various sales channels and the selection of the best for specific customers, as well as provides analysis of competitors' activities.

According to the obtained results, it should be noted that specialists of Ukrainian food enterprises have a high level of awareness of brand development management and big data analysis in marketing, as their answers had a high level of reliability. The study confirms that the analysis of big data is essential for the development of a company's marketing strategy and brand development. That is, the company should have a strategy for collecting and analyzing big data, thanks to which the company will be able to receive important information about consumer behavior in a timely manner, which will provide an opportunity to maintain the customer base and increase the capital of the company's brand. If you correctly evaluate the big data that the company can get during certain marketing campaigns, it will create conditions for flexible organization of marketing activities, saving time, and forming an interested target audience.

Big Data technology has a high value in evaluating consumer behavior, because it allows you to regularly receive detailed information about your customers in a personalized way. This determines the transition to personalized customer service with the automatic formation of an individual marketing program for each consumer. Thanks to the increasing level of relevance of information offered by brands to consumers, companies manage to significantly increase the effectiveness of marketing investments.

Therefore, thanks to the analytics of Big Data, marketing will be able to reach a new level of understanding, which will allow to reduce costs and increase sales, create an accurate portrait of target consumers, predict consumer reactions to marketing mes-

sages, personalize advertising messages as much as possible, determine the reasons for the popularity of in-demand goods and products, improve products and services, increase customer loyalty, improve service quality, etc.

CONCLUSION

The analysis of big data on consumer behavior can help attract consumers, reduce marketing costs, form an individual approach to the client, provide targeted advertising, and promote brand development. The result of the study is the systematization of information support, methods of Big Data analysis and the results of such analysis for assessing consumer behavior. The proposed tools for assessing consumer behavior based on Big Data technologies make it possible to improve the marketing strategy for enterprise development and form a mechanism for strategic marketing management. The prospects of the study are related to the comprehensive testing of the proposed methodology for assessing consumer behavior based on Big Data technologies.

Acknowledgments

This research was funded by EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia, project number 09I03-03-V01-000145.

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