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## ARTIFICIAL INTELLIGENCE IN ECONOMIC RESEARCH

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**ABSTRACT.** The issue of artificial intelligence is among the priority areas of scientific research at the national level. Modern research and practical use of artificial intelligence should take into account the results of domestic researchers (in par., V. Glushkov), as well as the understanding that artificial intelligence systems often provide the most probable, and not accurate, reliable information.

**KEYWORDS:** artificial intelligence, economy, quality of life.

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## BIG DATA ANALYSIS AND ANALYTICS FOR MARKETING AND RETAIL

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**ABSTRACT.** Effective management of big data of corporations and companies (and the new knowledge obtained from them), possibilities of intellectual analysis and analytics of big data - is an important technology for companies in the direction of achieving their sustainable development. Understanding how big data increases a company's competitive advantage and transforms its business models is indispensable in the context of crisis phenomena on emerging markets. This article discusses the conceptual features of solving the current problem of effective use of Big Data analysis and analytics in marketing and retail.

**KEYWORDS:** management, big data, analysis and analytics, marketing, retail.

### I. Introduction

Today, the term Big Data, as a rule, is used to denote not only the largest arrays of data, but also tools for processing them and extracting possible benefits that can be obtained as a result of their deep intellectual analysis [1].

Regardless of the specifics of the industry, there are two directions for the application of technologies based on Big Data analysis in each company, this is internal and external interaction.

In the framework of external interaction research, the accumulated customer experience is of interest, namely, understanding customers through social network analysis, their social status, age, preferences, etc., information about regions, market segments, satisfaction with a product or service, methods of promotion, as well as methods of contact, etc. . External interactions can also include everything related to the business model and structure of the business and its interaction with the outside world, for example, suppliers, partners and sales channels.

The study of internal interaction is aimed at the study and optimization of operational processes in the company, the purpose of which is to increase the productivity of not only equipment, but also employees, as well as the rational use of resources. It is worth noting that enterprises will be able to gain the main competitive advantage not so much at the expense of data collection, but at the expense of the ability to quickly obtain useful information from the overall huge amount of generated Big Data [2].

Let's consider the advantages of using Big Data in enterprise management:

First, it helps to improve the efficiency of decision-making. The Big Data platform has the function of collecting data resources in real time and can obtain key information based on the rapid processing and analysis of massive data, which can meet the urgent needs of enterprises.

Second, promote more and more diverse decision-making tools.

Thirdly, it increases the persuasiveness and quality of the decisions made, because they are based on a large statistical base of source information, which significantly strengthens the trust in decision-making schemes [3].

Fourth, big data technology is also a guide for the company's operational strategy.

Evaluating the directions of influence of Big Data technologies on the process of management decision-making, the following should be emphasized:

- 1) Impact on the management decision-making environment.
- 2) Impact on the participants of the management decision.
- 3) Influence on the process of making management decisions by the organization.
- 4) Influence on management decision-making technologies.

## **II. Data mining of big data for marketing and retail**

The retail company receives a huge amount of information every day - it can be detailed information about each purchase from each check, information about consumers, the history of their purchases, statistics of purchases of goods with and without discounts, purchases by location of stores. Also, companies have data about regular customers - gender, age, full name, purchase history, etc. It is obvious that these data need further analysis in order to extract from them subsequent economic benefit. So, as stated above, large retail companies in modern realities face the problem of intellectual management of a huge amount of different information.

For a retail company, Big Data Analysis and Analytics technology can solve a range of important issues:

First, forecasting with the use of time series opens up the possibility of high-quality supply planning, due to the analysis of the sales forecast based on the trends of past periods.

Secondly, the solution to the task of analyzing the shopping basket and placing complementary products on the shelves appears - "What products do you buy together?", "If they bought product A, then with a probability of 84% they will buy product C."

Thirdly, sales analysis and assortment formation. The formation of detailed product profiles allows you to identify patterns specific to leading products or products with the lowest demand, to understand what type of buyer buys certain products, in other words, to answer the question: "Who buys expensive products?" What is the most important thing for such buyers? or "What kind of buyer audience is typical for a product that was recently launched?" etc. This allows you to more consciously understand the target audience and, consequently, to position and promote the product in the most effective way.

Fourth, formation and analysis of the profile of the client and supplier. Under the profile of the client or supplier are meant general features corresponding to a certain group. Thus, with the help of Big Data Analysis technology, a profile of high-income clients is built, which includes the characteristics and features of consumer behavior. In the future, the acquired knowledge can be used when carrying out actions aimed at a profiled group of clients, for example, to provide a system of discounts on goods that complement what they have already bought. The analysis of aggregate characteristics of profiles, which as a result can reveal knowledge that is not available when analyzing each individual profile unit, is of great value. This technology allows you to structure the client base, reduce marketing costs and effectively plan work with suppliers.

For the retail sector, the use of Big Data technology will allow companies to:

1) Monitor and compare various indicators for all retail outlets in real time. Large retailers, as a rule, have many sales outlets. In the conditions of a constantly changing market, it is necessary to apply quick solutions, for which it is necessary to monitor sales indicators in real time. Here it is necessary to visualize the main metrics on one control panel. These metrics can be such indicators as the number of current sales, the number of current sales by product type, the amount of revenue of each store for a certain period of time, etc.

2) They will reveal the best-selling products in a certain period of time, products that are "in trend". The retailer needs to know which products bring him the greatest profit, which ones do not, but which ones need to be disposed of, since they are ineffective for a number of reasons and only take up space on the shelves.

3) Evaluate the interdependence of the sale of one product from another. Modern algorithms of Big Data technology (not some specific solutions, but the technology itself) will allow determining the interdependence of goods (correlation) in a matter of seconds, which will make it easier for retail companies to put different types of goods on store shelves. Key products and related products should

be located next to each other, which will allow you to make additional profit from the sale of both of these products.

4) Identify client preferences depending on gender, age, type of activity, education, and lifestyle. Here, it is necessary to apply a personalized approach to literally every client. Modern practice shows that this approach will be key in the future competition of retailers. It is necessary to understand the preferences and habits of clients, their lifestyle. To do this, it is proposed to introduce social network analytics, the boom of the twenty-first century. Many companies in the communications sector and partially in the banking sector are already mastering social networks as part of the predictive analytics business process. As for retail, social networks have not yet found application here. However, in the conditions of competition between retailers, the application of a personalized approach with the use of social networks will make it possible to achieve the availability of maximum information about each client of the store, and therefore, identify the client's needs and, with the help of the analysis of his previous purchases, predict future ones. Thus, this analytics will help build an almost ideal model for selling goods.

5) Identify the current needs of the market. With the help of the analysis of behavioral patterns of buyers, it is possible to identify the current needs of the market, to whom and at what time a new product is offered. Now, with the help of analytics, it is possible to find out in a short period of time whether the market will accept a given product, who will be interested in it, and in what period of time.

Marketing based on data has been popularized under the term “data-driven marketing”. This approach in marketing assumes that the company's strategies are based on conclusions/insights obtained from Big data analysis, which are collected after the consumer performs certain actions, for example, on the company's website or with an advertising banner. In the future, on the basis of this, it is possible to create forecasts of consumer behavior in the future, predict demand and optimize campaigns. This approach differs from traditional marketing in that marketers can broadcast the right advertising message or simply contact a potential client in the right place and at the right time. Marketing based on data provides further personalization, allows you to display ads only to those consumers who are interested in the product or service, so that marketers can improve their strategies over time.

Moreover, such an approach gives marketers the opportunity to effectively influence the rate of customer outflow through the use of predictive analysis and tracking of customer activity, develop new topical products based on the study of past data to predict future success, assess the level of customer satisfaction, thanks to the study of customer purchase patterns and the calculation of customer metrics to forecast sales.

Large companies use their own data management platforms, systematizing platforms for collecting, organizing and analyzing first-, second- and third-party data from various sources, including online, offline, mobile devices, etc. These platforms are the basis of data-based marketing, as they provide a unique insight into consumers:

first party data — data obtained by the company independently. They can be used to create a detailed portrait of the user. It is possible to collect the company's own data by registering the trajectory of interaction with clients and taking into account the traces that the user leaves when performing the actions we need.

second party data — data of third-party partner companies, used subject to compliance with user agreements of sites containing this information. This is depersonalized information: conclusions and knowledge of other market players about consumer audiences.

third party data — data obtained from companies specializing in market research, on the basis of which it is possible to supplement data on one's own audience with missing knowledge and form a three-dimensional, most systematic and accurate view of the user — 3D customer view.

Each of these types of data has a special meaning for solving marketing problems, the most in-depth analysis gives better quality and relevant results, so if the company has opportunities, it is better to use all 3 types.

The active implementation of Big Data in marketing gives companies a number of advantages:

1. Creation of the most accurate portrait of the target user.

2. Prediction of consumer reaction to marketing "messages" and offers of a particular product.
3. Personalization of advertising messages.
4. Optimization of production and distribution strategies.
5. Creation of digital marketing and advertising campaigns.
6. Retention of a large number of clients by means of minimal expenses.
7. Getting a better idea of the company's own product, etc.

The toolkit of the work may be similar, but the boundaries of application, forms of organization, and consequences of implementation are different. Marketing in this sense moves from the use of big data to the transformation of marketing technologies under the influence of big data:

Firstly, analytics, which for a long time in marketing were equal to statistical tools, comes first [4].

Secondly, new marketing technologies are emerging at the interface of big data and specific marketing tools (merchandising, implementation of advertising campaigns, management of the marketing department are changing).

Let's take a closer look at the problems in using big data in marketing.

First, this is a scaling problem. Big data is, as we noted above, always a large volume of information that requires not only storage, but also constant access. Most corporate information centers were not designed for such volumes. Consequently, the company has to think not only about the expansion of its own corporate storage centers, but also look for optimization methods, for example, use common storage and processing standards, transfer data to the "cloud".

Secondly, it is the integration of data collected earlier. For a marketer, it is important to have access to data on customers, conducted campaigns, and marketing research of past periods. Without them, it is often impossible to build a trend, to understand the specifics of consumer behavior in the market. Such data storage systems were never intended for real-time use. All experts in the field of Big Data agree that Big Data technologies are meaningless if server systems cannot support real-time transactions.

Thirdly, data collection and processing systems in modern large companies resemble a real zoo. Organizations collected data for different purposes, in different ways, rarely integrated collection systems with each other. No one imagined that one day it would be necessary to interact with completely unrelated systems and data stores, both inside and outside the enterprise, for analysis and visualization. Even when technology can provide solutions for integration and interaction, business owners are reluctant to relinquish control or require IT staff to prioritize projects based on current business interests.

Fourthly, Big Data technologies do not work without talented people. When collecting and analyzing data, it is necessary to ask the right questions. This is especially important in the world of big data, where there is a high probability of not receiving important data, not interpreting it correctly. Even well-funded marketing departments will find it difficult to buy talented analysts from investment and financial companies. The specialists available on the IT market are often oriented towards IT projects and are unfamiliar with the philosophy and culture of classic product marketing. It is important to understand that employers themselves are often not yet able to correctly formulate a request for a search for specialists in the field of Big Data and accurately assess the abilities and opportunities of available candidates.

Fifth, there is the problem of developing a common language for discussion and working with data within the company. Business is used to the fact that IT specialists speak one language, marketers another. However, integration is vital for Big Data technologies. Consequently, companies will have to train a large number of employees in basic data skills. Only the joint work of all employees will be able to give a cultural shift and force the entire company to use Big Data technologies correctly and effectively.

### **III. Conclusions**

Companies and projects in the field of retail and marketing are constantly looking for ways to overcome the problems described above and are developing their own strategies for working with big data. To overcome obstacles to the implementation of big data, the following are used: interdepartmental working groups that unite specialists from different directions, capable of working with big data; project groups or startups offering innovative tools for working with big data; democratization of work with big data, i.e. transition from complex processing systems to

visualization or well-known BI tools [5]; new roles and statuses in companies, i.e. the positions of directors of digital technologies or directors of marketing technologies appear.

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## OVERVIEW OF THE INTELLIGENT DATA ANALYSIS IN THE DATA-DRIVEN AUDITING PRACTICES

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**ABSTRACT.** In the contemporary financial landscape, auditing and risk assessment stand crucial, especially amidst the increasing financial discrepancies in public finance. Such discrepancies not only impact economic outcomes but also challenge the credibility of institutions. The rapid technological progression further amplifies the risks in public finance due to expanding vulnerabilities. This research delves into the fusion of statistical and computational methodologies to discern inconsistencies within public finance systems, emphasizing the importance of data mining for anomaly detection. By examining large datasets emblematic of today's financial systems, the study underscores the necessity of progressive data mining techniques for effective auditing and risk assessment. Highlighting public procurement, public finance and auditing areas, the research explores intelligent techniques that bolster public finance risk assessment, shedding light on financial discrepancies, their origins, consequences, and the transformative role of technology in their detection. Central to the research is the ambition to harness cutting-edge technological means to enhance risk assessment capabilities in public finance. As technology continuously evolves, the study aims to recommend innovative solutions harnessing the ever-growing potential of data mining.

**KEYWORDS:** auditing, artificial intelligence, data-driven risk assessment, public procurement.

### 1. Introduction

Auditing and risk assessment have become the linchpin of the dynamic financial sector in our contemporary age. Financial discrepancies in public finance, besides their evident economic consequences, can deeply compromise the integrity and trustworthiness of the institutions involved. As technology continues to evolve at a blistering pace, the scope of risk-related challenges in the realm of public finance broadens, heightening the potential for overlooked vulnerabilities. This research adopts a fusion of statistical and computational techniques to scrutinize inconsistencies within public finance systems. Utilizing data mining strategies is pivotal in identifying anomalies in these systems. Such methodologies support intricate data examination, enabling the identification and amalgamation of emergent trends and correlations, thus yielding critical insights for risk mitigation in public finance.

Today's economic milieu contends with a rising wave of financial irregularities in public finance. Given the massive datasets emblematic of present-day financial infrastructures, the application of progressive data mining methods becomes essential for proficient auditing and risk assessment within public finance. Key sectors grappling with financial discrepancies include Public Expenditure, Budgeting, Debt Management, and Revenue Collection. At its core, data mining entails delving into