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**INTERNATIONAL PRACTICES OF USING BUSINESS-
INTELLIGENCE IN THE ECONOMIC ANALYSIS IN RUSSIA**

S. Mitrovic (a)*

*Corresponding author

(a) University of Novi Sad, Dr Zorana Đinđića, 1, 21000, Novi Sad, Republic of Serbia, e-mail:
Mitrovic.Stanislav@hotmail.com

Abstract

The present-day pace in development of the modern information technologies in Russia greatly exceeds the speed at which the methodological, recommendatory, standardization and regulatory/reference framework is being developed for the governing documents that are in force in our country and are actually used by economic entities. In many cases the present-day methodical tools of business intelligence used in the domestic environment lag behind the evolution of the information tools or turn out to be insufficiently adapted to the peculiarities of the economy. Thus, they make it impossible to adequately assess the existing level of economic threats and risks, to develop an adequate mitigation strategy, to monitor compliance with the economic security requirements, etc. This study is aimed at identifying the basics for integrating and adapting the world-wide experience of using business intelligence solutions (Business Intelligence, BI) for the business entities' economic performance analysis in order to optimize this domain in the Russian environment for various purposes, including elaboration of an information quality improvement program and development of corporate-wide business intelligence systems. Based on the analysis of foreign experience, the author substantiates the national companies' capability of elaborating the data control methodology and ensuring data transparency. The author concludes the wider methodological directions in using the business intelligence, which may be extrapolated from the international practice to the national companies' business. The author developed the data handling algorithm in the course of the economic performance analysis in companies by means of the BI-technologies.

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Keywords: Business intelligence, economic analysis, information quality, data management.



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1. Introduction

Business process management is the foundation and the basics for implementing the organizational procedures, information systems, financial and management accounting processes (Suits & Bayev, 2018). The latest analytical research carried out by Forrester Research (USA) shows that business intelligence technology continues to be at the top of the list of the business information solutions that foreign companies are planning to buy or upgrade in 2018. The data collected during the inquiry of the heads of the largest European enterprises that was carried out by experts from the Merrill Lynch financial conglomerate (USA) in 2016–2017 show similar trends. They confirm that the introduction and the more profound and detailed integration of BI technologies into business analysis is still one of the three main priorities of contemporary organizations (previously, this trend ranked only fifth).

For the purposes of this study, the term business intelligence (Business Intelligence, BI) refers to a system for information support of organizations, which combines the technology (tools) and the concept (methodology and algorithm) mainly aimed at researching and analysing large amounts of data in order to identify general trends in economic processes, understand the situation and develop the position that enables the company to take effective management decisions in the future.

Inquiries and a series of studies carried out in September – November 2017 by experts from the foreign research magazine Information Week.com, which studies data management and usage of the advanced information tools for the companies' business, showed that financial analysis, business activity monitoring and forecasting will be most popular with foreign companies for integrating business intelligence technologies and the corresponding solutions and analytical tools in 2018.

According to the forecast data obtained by the same periodical, business intelligence specialists and IT management will still remain the most active users of the BI solutions and analytical tools in the short term, as in the previous year. However, the interest of analysts and data processing specialists in these technologies and tools is expected to grow in 2018.

The integration of the business intelligence technology with the Big Data technology is an important aspect of using the BI technology for economic analysis. The consulting company Forrester briefly defines this phenomenon as follows: Big Data combine techniques and technologies that extract sense of data at the extreme limits of practicality (Yuhanna, Leganza, & Lee, 2017). There are four attributes that are essential to defining the Big Data: volume, variety, velocity and veracity (Chen, Chiang, & Storey, 2012).

In Big Data environments, it is very important to analyse, decide, and act quickly and frequently. The Big Data may make a huge contribution to science and all aspects of our society, but extracting information from the Big Data is a challenging task (Sohangir, Wang, Pomeranets, & Khoshgoftaar, 2018).

2. Problem Statement

Unlike the Russian market, the foreign market of modern information technologies usage for the analytical processing of economic information has a long history and is developing more rapidly (Mitrović, 2017). However, the study of business practices showed that despite the difficulties, the Russian companies have succeeded significantly in assimilation of the BI in recent years. They

demonstrate the growing interest and activity of specialists at various levels in using these technologies and tools for the economic analysis and survey of its outputs. The methods they apply to implementing the BI in the economic analysis, with the information method gaining prevalence and the key importance, become more effective and mature. The extent of development of the Russian market for introducing the BI into economic performance analysis of companies still differs from that of the foreign market in terms of quality, scope and methodological level of project implementation in this field, despite the significant number of innovative software solutions created by Russian developers.

It is logical to conclude that it is possible and necessary to adapt foreign experience of introducing BI-technologies into the economic analysis of domestic business entities. Companies need a reliable tool that will allow them to independently identify the problems that need to be solved and to substantiate the measures aimed at enabling their sustainable development (Barilenko, 2014).

3. Research Questions

This study is aimed at identifying the basics for integrating and adapting the world-wide experience of using business intelligence solutions (Business Intelligence, BI) in the business entities' economic performance analysis in order to optimize this domain in the Russian environment for various purposes, including elaboration of a program for improving the information quality, identifying the general trends in the economic processes, understanding the situation and developing the position that will enable the company to take effective management decisions in the future.

4. Purpose of the Study

Let us consider the main directions for updating the methodology of integrating business intelligence solutions into business analysis of economic entities operating in the Russian environment. We will rely on the foreign experience and advanced methodological trends in addition to the perspective trends in development of the methodology for introducing information technologies into the economic analysis of organizations, which have been identified as fundamental.

4.1. BI as a tool for improving the quality of information in economic analysis

Information quality improvement is one of the main directions. It is the basis for identifying a significant number of problems in the integration projects and, along with that, the basis for their effective implementation.

It should be noted that several years ago, as may be seen from our observations, almost no Russian company was ready to admit the poor quality of its data and solve this problem on a large scale, that is, at the level of the entire company. This aspect has been rarely considered in terms of methodological development. However, many Russian businesses have come to realize that the quality of information should be the starting point for improving the quality of economic performance analysis.

At present the methodology of the BI integration into economic analysis, which has been developed by foreign companies, includes the information quality improvement program as an integral part of the integration projects and their respective development. It is a highly important component that has been scarcely used in the Russian practice. It is a long-term project that is complex from the

methodological point of view. The recommended ways to implement this program step by step may be derived from the foreign practices and used in the Russian conditions. Many foreign organizations have come to the conclusion that the regulatory and reference information management is an effective basis for improving the quality of all information used in the economic performance analysis of companies.

The three key components mentioned below shall be pointed out in any information quality improvement program on the general methodological level: systematic measurement as a starting point, quality improvement as a continuous process and information quality assessment.

We analysed and presented the elements of the information quality improvement program as separate components of the methodology. Let's start the analysis with the regulatory and reference information management.

The methodology for managing the regulatory and reference information and its practical implementation processes have been developed recently, and this activity has shown a significant growth. For many foreign companies the regulatory and reference information management is the starting point for solving the information quality problems. This practice may also be adopted by Russian organizations that almost fully lack the methodological basis for handling this element and using its economic potential. Experts estimate that the rather disconnected attempts to create systems for maintaining the regulatory and reference information that have been undertaken in Russia show that most organizations face multiple problems, when trying to develop and implement a system of that kind on a corporate level. The difficulties are caused by the lack of knowledge of the methodology and lead to significant material, labour and time expenditures (Konoval, 2009). Although the reference source dates to 2009, we have observed no significant changes in the situation with the methodology of handling the regulatory and reference information and using it as a source for the computer-aided economic analysis that may be seen in the Russian practice.

Let us proceed to studying the data management aspect from the methodological point of view. We should note that data management has gained importance in the economy of business entities and enterprises after the global financial crisis.

Data management is “a business function that provides a strategic direction for information improvement programs, establishes standards and processes, and contributes to achieving the goals of information improvement programs”. According to the analytical agency Experian, a high percentage of sales decisions will be taken based on the available customer information. However, errors that may be found in about a quarter of all customer data negatively affect the economic analysis quality and results. Data management is also complicated by the rapidly growing volumes of information and changes in the use of communication channels.

The proper organization and distribution of authorities is one of the important aspects in ensuring the effective data management. The international practices show that the authorized persons should include IT-specialists, as well as the top management representatives, business units represented by department management, whose tasks include carrying out the economic analysis, and the key employees of these departments, since they possess the higher scope of the information on the data ownership and management in the company. Foreign companies often engage a third-party consultant who ensures the required impartiality and guarantees that the methodology will be met, and the company will not lose

sight of the more general picture when identifying and achieving the goals of information quality improvement.

Besides, a position of a Chief Data Officer (CDO), who is responsible for working with data and ensuring the higher-quality business performance analysis, is gaining importance in the present-day international practice. The current research results show that 82% of foreign companies plan to employ data specialists in the next five years (Davenport and Petl, 2012). However, this position remains rare in Russia at the top and medium management level and at the lower level of employment.

4.2. Developing corporate-wide business intelligence systems for the economic performance analysis

Development of corporate-wide BI systems is a tool for obtaining an integral business picture; it should be mentioned as the next line for development of the methodology. It is advisable to adapt it to the Russian conditions. Such systems have already been created in many foreign companies. Such cases still remain scarce and the methodology in this area is still poorly developed in the Russian practice. However, there is an urgent need in such effort.

Recently, both Russian and foreign companies have attempted to practically use the methodology for introduction of corporate BI systems. The study by Knightsbridge Solutions that covered more than 500 business representatives and information technology specialists showed that such attempts were more successful abroad: approximately one fifth of the respondents achieved tangible results in creating and implementing such systems.

However, it is impossible to formulate the standard recommendations that could be applicable to each particular company. The companies that attempt to improve the data management efficiency should first analyse the ways to introduce or extend the existing components to the level of a corporate BI system and its structure that reflects the inputs of business units, as well as the IT experts. The effective development and implementation of the methodology requires financial and organizational support from the company management, a continuous and systematic approach and a long-term strategy. Attempts to immediately create a corporate BI system in any company, even in the largest and most experienced in operating BI systems in the field of economic analysis, are doomed to failure.

As we consider the methodological reserves for improving the quality of implementing the BI projects for economic analysis based on international experience, we cannot help mentioning such an important aspect as ensuring compliance with legal requirements and standards. Today foreign organizations practice a comprehensive approach to meeting the relevant legal requirements. As the legislative requirements differ in various industries, and the standards have certain implementation peculiarities, compliance may not be achieved through implementing any generic solution but requires setting out the special methodological tools.

Development of a data control methodology also plays an important role in fulfilling the legal requirements. It allows companies to analyse the business information collected during longer periods of time. However, expanding the analysis time frame (for example, over the previous five years) makes the task much more complex. The possibility to carry out the “historical” data analysis (analysis of the organization’s business history) contributes much to fulfilment of the existing legal requirements and the

contemporary company's stable development in the highly competitive market environment and inflationary economy.

From the methodology point of view, the concept of data control is closely related to the need to ensure the corporate data transparency in the Russian environment. The methods of data control are introduced and improved in order to ensure data transparency, which means that the data source and data alteration algorithm is always traceable.

Foreign companies are using the Big Data management technologies, including the extraction, transformation, and loading (ETL) applications, more often at the present stage. Let us note that the Big Data allow the extraction of complex data at a high level of abstraction (Arel, Rose, & Karnowski, 2010). This technology helps to maintain data transparency during the economic analysis by means of the business intelligence tools.

Nowadays IT specialists (mainly the IT specialists in the domestic practice) are the most active users of the Big Data tools. However, business users (such as management, accountants and analysts) also gain access to these tools over time. Nowadays the Big Data tools in the BI solutions are seen to evolve to a certain extent towards their simplification for business users. This trend should not be ignored by Russian organizations. That implies development of an appropriate methodology at both the generic and corporate levels.

It is also necessary to draw the attention of the Russian companies that implement the BI into their economic analysis to active development of the methodology in the so-called Actionable analytics (Actionable BI). As the modern companies face the growing need for corporate efficiency management, companies often notice that there is no clear connection between the overall strategy and the tactical solutions, including daily processes. Then the organization naturally raises the question of how to use a large amount of the existing information for the business performance analysis and how to use the obtained results in order to improve this connection and enhance the efficiency.

5. Research Methods

The basics of the information theory and business intelligence; the theory of economic and business analysis; the concept of information and economic security standardization and management; and the present-day fundamental scientific research, theoretical concepts, methodological and practical works of the national and foreign authors on implementation of business intelligence, management, introduction and development of the related systems, solutions and technologies in order to improve the companies' economic efficiency lie in the theoretical and methodological foundation of this research.

A wide range of statistical and analytical materials from reviews of the international specialized, standardizing and research organizations; regulatory and conceptual acts, standards and statistical data; publications in specialized journals that reveal the expert opinions of international organizations and specialists from domestic and international companies on using business intelligence solutions for improving the economic and business analysis constitute the reference basis of the study.

6. Findings

The analysis carried out by the author shows that the currently established methodological approach to computerization of economic performance analysis in companies, including BI-aided analysis, may be characterized as mature, but requiring further qualitative development. The functionality of business intelligence solutions used in the economic performance analysis in companies has provided opportunities to develop and implement business solutions with various functions:

- business planning;
- investment projects attractiveness analysis and management, short-term and long-term decision making. The short-term period involves the creation and usage of the information in the real time mode within the periods ranging from several minutes to three months (a quarter)' (Suits, 2012);
- procurement planning;
- customer relations management, including the social networks development, which leads to a larger increase in users and digital content (Boyd & Ellison, 2007), as well as the CRM (customer relations management) systems development with a recognized crucial role of the information technology in their implementation (Agapitou, Bersimis, & Georgakellos, 2017);
- large-scale logistic and production systems management;
- conditioning the productivity increase, since the information technologies have been considered for decades as an important lever for increasing productivity at the level of both an individual enterprise and overall economy (Zimin, Markin, & Skripkin, 2012);
- financial state assessment, which is an obligatory element of all methods that are used to determine the investment attractiveness of a business entity (Sheremet, 2017).

At the same time, the studies revealed that in the foreign practice BI is also required for the analytical and mandatory reporting, including standardized reporting; it is primarily needed to establish non-obvious patterns that may have a great impact on the business outcome. For example, in the last decade substantial progress has been made in the field of communication technologies. That led to a surge in the intelligent transport systems development and usage. Driving styles identification using data from vehicle sensors is an interesting research challenge and an important real requirement in the automotive industry. A good representation of the traffic characteristics may be extremely valuable for protection against theft, for car insurance, autonomous driving and many other application scenarios (Ezzini, Berrada, & Ghogho, 2018). Another example is the problem of quantifying how certain words in a text (in advertising) may positively or negatively affect a certain numerical signal. Those words may lead to meaningful solutions for such important applications as e-commerce. The problem is to identify the exact keywords that affect the price of the property (Abdallah, 2018).

Considering the well-grounded potential of tools for information and analytical support of the economic analysis, the author based the research on the domestic and foreign theory and practice surveys. Based on the practical implementation and testing of the survey's results, the author developed an algorithm for implementing BI solutions with data for the informational and analytical support of the economic analysis. The algorithm relies on the Big Data processing and the principles of business intelligence systems. The structure of this algorithm (its model is presented in Figure 01) includes five

consecutive components (steps), which were detailed in the research and which provide reliable, objective and measurable results in developing the companies' economic analysis.

1) Preparing a BI solution	<ul style="list-style-type: none"> a) Identifying the key components of the companies' economic performance b) Defining the main factors influencing the result of the company's economic performance c) Defining the goal and technical development of the BI solution
2) Data collection and storage	<ul style="list-style-type: none"> a) Defining the data collection timing, sources and methodology b) Data collection c) Creating a database for information storage
3) Data integration and analysis, forecasting	<ul style="list-style-type: none"> a) Data integration and processing b) Establishing forecast variants – scenarios c) Analysing and testing the results for different predetermined values of factors (scenario analysis) d) Logical and mathematical verification of the results e) Interpreting the outcome
4) Data presentation and development of management decisions	<ul style="list-style-type: none"> a) Analysis results presentation (visualization) b) Development of management decisions c) Development and approval of action plans for implementing the managerial decisions d) Controlling the action plans implementation and adjusting the plans to achieve the desired result
5) BI-solutions model check and improvement	<ul style="list-style-type: none"> a) Post-factum check of the BI-solution b) Identifying the criteria for successful implementation of the BI-systems in the companies' economic performance analysis c) Making adjustments to the algorithm in order to improve the analysis results

Figure 01. Algorithm for implementing the BI solutions with data for the informational and analytical support of the economic analysis
 Source: Developed by the author.

In accordance with the proposed algorithm, the following steps should be taken in order to establish the BI solutions for the informational and analytical support of the economic analysis:

1. Preparing a BI solution

This stage should identify the key elements of the companies' economic performance, such as the business type and volume, industry, business results (products and services), etc. Then particular factors that influence the companies' business results and that should be included into the model for forecasting and scenario-based economic analysis are to be identified. Defining the goal and developing the technical solution (writing the program code) is also an important task at this stage.

2. Data collection and storage

First, the periodic (operational, accounting, statistical) reporting data should be used. They present the overall information about the company's business expressed in the summarized and generalized

indicators. They make possible the effective ongoing control and management in the company. Data on manufacturing and service provision, progress of raw materials and ordinary materials supply, fulfilment of supply contracts, etc. should be studied during the economic analysis and ongoing reports processing. The interrelated indicators that characterise company's cash circulation in the monetary and physical terms should be extracted and analysed when processing the accounting data. Such indicators may be found in primary documents, consolidated accounting ledgers and reporting forms. The technical and economic data of the business entity, such as the details of the new equipment commissioning, the equipment state, productive-capacity balance, etc. should be studied during the economic analysis of statistical reports.

3. Data integration and analysis, forecasting

The methodical tools for extracting and transforming data, that is, bringing them to the required format, processing the data in accordance with certain rules, combining with other data, etc. should be used at the stage of integrating the data into the BI solutions. Besides, the data should be loaded and recorded into a repository or other database for subsequent processing by the intermediate or end users for solving various problems of economic analysis.

4. Data presentation and development of management decisions

The so-called dashboards and scorecards based on the key performance indicators (KPIs) analysis are one of the main ways to present the results of data analysis by using the BI solutions and tools. They provide additional means for visualization of the final analytical data by representing them as scales and indicators. They make it possible to monitor the current values of the selected indicators, compare the actual and the planned (target) indicators, display the dynamics of their changes over time, compare them with the critical (minimum/maximum) values and thus identify the potential business threats in the interactive, rather than the delayed mode.

5. BI-solutions model check and improvement

The proposed algorithm is based on the assumption that development of the economic analysis in companies based on survey, processing and integration of large amounts of data for the unbiased and reliable identification of the general trends in economic processes, understanding the situation and developing the company's position for the future effective decisions is the main task of implementing the BI solutions with data for the informational and analytical support of the economic analysis.

So the necessity to obtain reliable, objective and measurable results from the economic analysis and forecasts to be used for the future management decisions is the main focus of attention.

6. Results

The author suggests that the present-day economic processes in Russia set a new vector for developing the economic analysis methodology in the information environment towards the economic performance analysis of business entities acting in the market economy.

To date, the Russian economic science has developed a relatively integral and scientifically grounded concept of organizing the economic performance analysis in the information and communications environment. This concept is based on generalizing the several decades' experience of designing and applying the modern information technologies and approaches to the economic analysis aided by such technologies and approaches to be organized in companies. It also relies on the

development stages of the information technologies, information tools and methodology of the economic analysis in the Russian and foreign practice. The surging progress in the information technologies development and the vast introduction of the interactive, cloud-based technologies require the further continuous development of the related theoretical and methodological concepts.

The Business Intelligence makes it possible to collect, store, manage, distribute, analyse and provide information for working out the vision of the problem that enables making the best decision. This research resulted in an algorithm for handling data, when the BI technologies are applied for the companies' economic performance analysis. This algorithm implies successive conversion of such data into information, information - into understanding, understanding - into knowledge, and general knowledge - into the goal-oriented applied knowledge that facilitates decision-making (Figure 02).

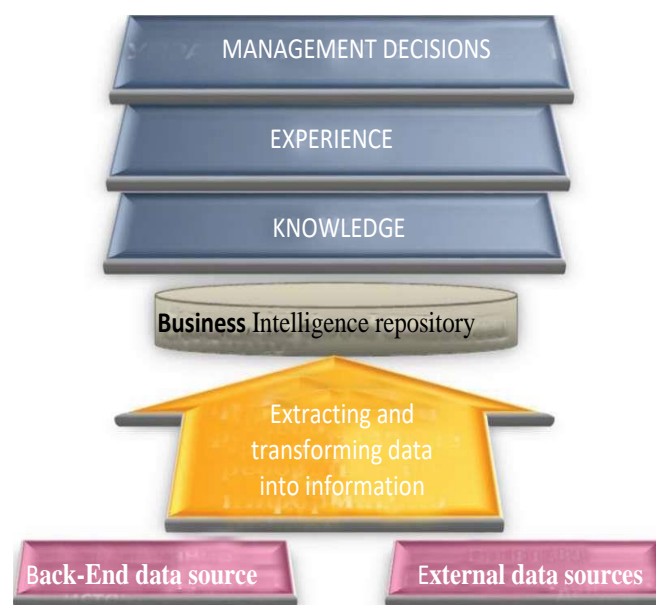


Figure 02. The algorithm for handling data, when using the BI-technologies for the economic performance analysis in companies
Source: Developed by the author.

The continuous improvement and development of the business intelligence solutions in the economic analysis make it possible to integrate the strategy for development of the contemporary companies, which was derived from the study results, with the key processes and operational business objectives. They also make it possible to effectively communicate the management's vision to employees and expediently control their performance and contributions to achieving the business objectives in the course of the decision-making process. The foregoing actualizes the need to consider and subsequently develop (in terms of the methodology) the usage of the Business Intelligence systems as an integral instrument for managing various processes in the present-day business.

7. Conclusion

To conclude the analysis, it is necessary to state that the majority of the areas analysed above are methodically interrelated. They have two main components: ensuring the information quality and creating

the corporate business intelligence system. These components reflect the broadest methodological areas that can be extrapolated from foreign practice to the businesses of the national companies.

The scientific novelty of this research is that it deals with development of a number of theoretical, methodological and practical issues of using the business intelligence systems in the economic analysis of companies. These issues are based on the foreign experience analysis and the possibility to adapt it in order to optimize it in the Russian context with due account of the following areas: information quality improvement and elaborating an information quality improvement program, working out the methodology for monitoring the data and ensuring their transparency, determining the optimal algorithm for handling such data, when the BI solutions are used for the economic performance analysis of the Russian organizations.

The main findings of the study indicate that we observe some difficulties in introduction and using the business intelligence for economic analysis both in our country and abroad. However, the BI methods and technologies are progressing rapidly. In this respect it becomes easier for the Russian companies to obtain methodological support based on the foreign developments (among other things), as needed for the projects on integrating business intelligence into the economic performance analysis of companies.

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