

MTÜ International Research, Education and Training Center

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# **FINANCIAL AND ECONOMIC SECURITY OF BUSINESS**

Monograph

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**Reviewers:**

**Alla Dmytrenko**

Doctor of Economics, Docent, Professor at the Department of Finance, Banking and Taxation National University "Yuri Kondratyuk Poltava Polytechnic"

**Isazade Namig** - PhD in Business Administration, Shareholder, Tallinn, Estonia.

**Viktoriia Mykytenko**

Doctor of Economic Sciences Institute of Demography and Quality of Life Problems of the National Academy of Sciences of Ukraine

**Author's team:**

**Isazade Namig**

PhD in Business Administration, UNEC scientist, IRETC MTÜ, Shareholder, Tallinn, Estonia.

**Liana Ptashchenko**

Doctor of Economics, professor National University «Yuri Kondratyuk Poltava Polytechnic» Ukraine,

**Rostyslav Orlenko**

Postgraduate, National University «Yuri Kondratyuk Poltava Polytechnic» Ukraine

**Vitaliia Skryl**

PhD in Economics, Associate Professor National University «Yuri Kondratyuk Poltava Polytechnic» Ukraine,

The monograph is devoted to the national economy of Ukraine as a whole and business structures in all sectors of the economy that have suffered from the full-scale war unleashed by the Russian Federation, the issue of adequate economic security is extremely relevant. After all, this situation has significantly deteriorated not only at the national level, but also at the business level. Today, risks and threats accompany all components of the functional and structural decomposition of economic security: financial (due to the instability of the national currency, the exacerbation of economic egoism among market participants in banking and insurance services, etc.), investment and innovation (due to a significant deterioration in the investment attractiveness of Ukrainian business), intellectual and human resources (due to the mass migration of the economically active population abroad, conscription and service in the defense of Ukraine by qualified, highly intellectual citizens of Ukraine), technical and technological (due to constant destruction caused by rocket and shahid attacks on enterprises, mining of a significant part of arable agricultural land), informational (due to the aggressor's intensification of information warfare and dissemination of disinformation, frequent hacker attacks), institutional and legal (due to military actions, frequent changes in the provisions of current legislation on property, economic and labor law, taxation, etc.), environmental (due to pollution of the environment by the Russian aggressor and, accordingly, negative impacts on natural ecological systems, land and its subsoil, surface and groundwater, atmospheric air, flora and fauna) physical (due to the ineffectiveness of preventive measures to protect property, employees, information, etc., due to the unpredictability of armed and hacker attacks by the aggressor). In this context, an important issue is the formation of a system of economic security for business using advanced digital technologies.

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**Liana Ptashchenko**

Doctor of Economics, professor, National University «Yuri Kondratyuk Poltava Polytechnic», Ukraine  
<https://orcid.org/0000-0002-4228-0421>

**Isazade Namig**

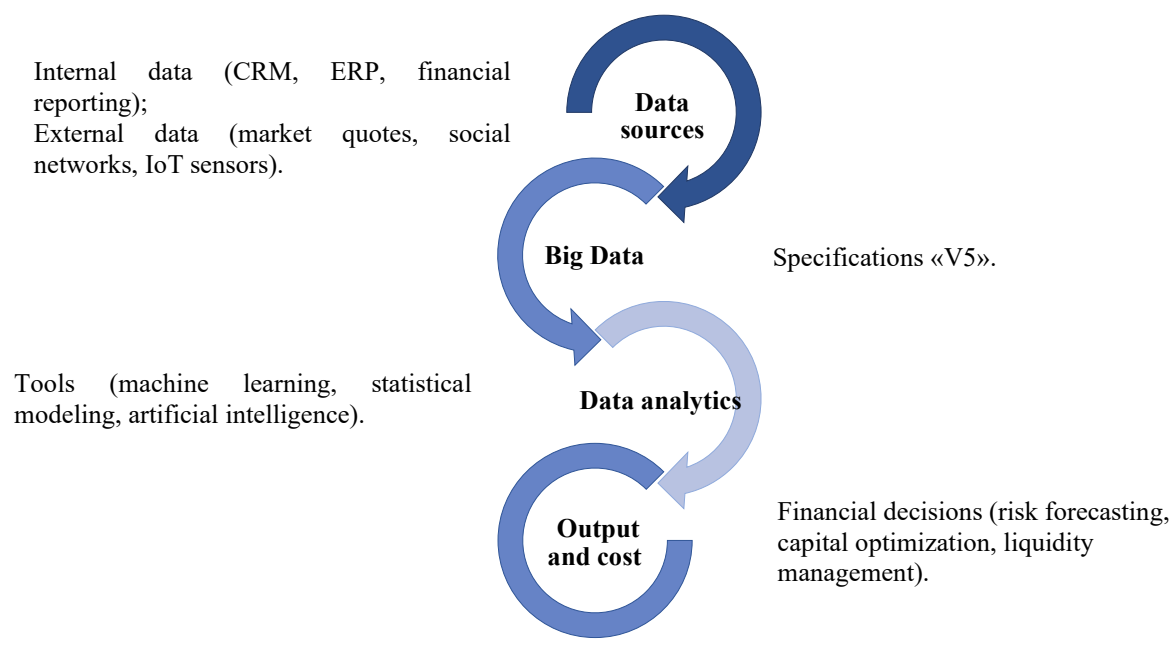
PhD in Business Administration, UNEC scientist, IRETC MTÜ, Shareholder, Tallinn, Estonia.  
<https://orcid.org/0000-0002-8255-2540>

**USE OF BIG DATA AND DATA ANALYTICS IN ENSURING FINANCIAL AND ECONOMIC SECURITY OF BUSINESS**

For the national economy of Ukraine as a whole and business structures in all sectors of the economy that have suffered from the full-scale war unleashed by the Russian Federation, the issue of adequate economic security is extremely relevant. After all, this situation has significantly deteriorated not only at the national level, but also at the business level. Today, risks and threats accompany all components of the functional and structural decomposition of economic security: financial (due to the instability of the national currency, the exacerbation of economic egoism among market participants in banking and insurance services, etc.), investment and innovation (due to a significant deterioration in the investment attractiveness of Ukrainian business), intellectual and human resources (due to the mass migration of the economically active population abroad, conscription and service in the defense of Ukraine by qualified, highly intellectual citizens of Ukraine), technical and technological (due to constant destruction caused by rocket and shahid attacks on enterprises, mining of a significant part of arable agricultural land), informational (due to the aggressor's intensification of information warfare and dissemination of disinformation, frequent hacker attacks), institutional and legal (due to military actions, frequent changes in the provisions of current legislation on property, economic and labor law, taxation, etc.), environmental (due to pollution of the environment by the Russian aggressor and, accordingly, negative impacts on natural ecological systems, land and its subsoil, surface and groundwater, atmospheric air, flora and fauna) physical (due to the ineffectiveness of preventive measures to protect property, employees, information, etc., due to the unpredictability of armed and hacker attacks by the aggressor). In this context, an important issue is the formation of a system of economic security for business using advanced digital technologies.

The modern economy is characterized by the rapid development of digital technologies that are changing traditional approaches to accounting and investment analysis. The use of Big Data in combination with advanced data analytics and artificial intelligence (AI) tools opens up new opportunities for companies in the areas of financial control, forecasting, and risk management. At the same time, such technologies pose new challenges related to data protection and financial and economic security.

Despite the widespread use of the term “big data,” its meaning is still shrouded in many myths. The term is used to describe a wide range of concepts: from the technological ability to extract, store, and process data to the cultural shifts that occur as a result of the spread of big data. The essence of Big Data is revealed through the entire cycle of transforming raw data into insights, which is the basis for making decisions on business economic security (Figure 1).



**Figure 1.** Conceptual model of Big Data  
 Source: compiled by the author based on data from [1]

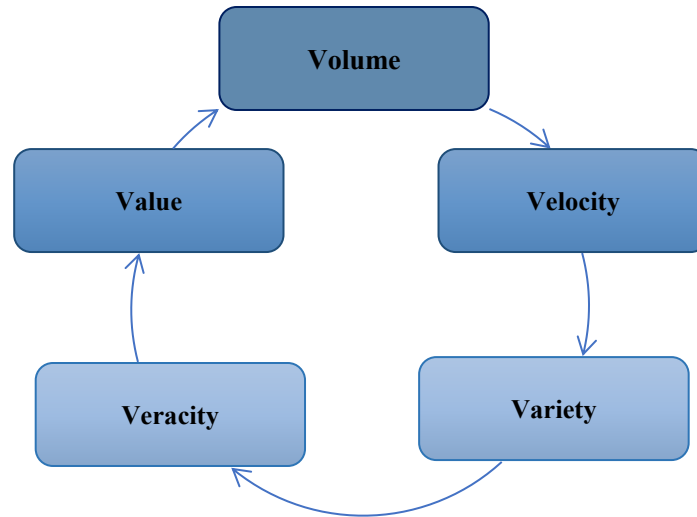
In this regard, let us first consider the contexts of application and evolution of the interpretation of the term “Big Data”.

It should be noted that the concept of Big Data covers not only the volume of information, but also specific methods of its processing and analysis that go beyond the capabilities of standard software [1]. Ukrainian researchers offer their own definitions of this term. According to Y. Khudoliy [2], Big Data is a set of technologies and methods that allow analyzing and processing large arrays of both structured and unstructured data to obtain new knowledge. The researcher emphasizes that such data cannot be processed using traditional methods due to its volume. According to M. Odegov, M. Gadzhiev, M. Bukata, M. Glazunova, and M. Kochetkova [3], the concept of Big Data is conditional and variable, as it describes a situation where existing algorithms or technical means do not allow a specific task to be solved within a specified time frame. At the same time, as noted by M. Tkalich and O. Tkachenko [4], the use of Big Data in marketing and advertising involves the collection, analysis, and interpretation of large amounts of data from various sources in order to obtain unique insights into the behavior, preferences, and needs of the target audience.

Thus, Big Data is a large volume of data processed using modern analytics technologies. In other words, Big Data allows for in-depth analysis of large volumes of financial information, which significantly increases the accuracy of management decisions.

In the context of researching the problems of modern society, O. Kislova [5] emphasizes that Big Data is not just a technology, but a “new methodological paradigm” that transforms the process of knowledge production and requires a revision of traditional methods of statistical and sociological analysis. This definition confirms the thesis that Big Data is not limited to volume, but also concerns a fundamental change in approaches to working with information.

The basic conceptual foundations of Big Data are best structured around the ever-expanding “V” model. Initially, it included three main characteristics, the “3Vs,” but was later expanded to five “5Vs” and more. These characteristics reflect the demands that Big Data places on infrastructure, analytical tools, and employees (Figure 2).



**Figure 2.** Key characteristics of Big Data “5V”  
 Source: compiled by the author based on data from [5-7]

A graphical interpretation of the main characteristics of Big Data is essential for further systematization of their functional significance. Data Analytics, in turn, is a set of quantitative and qualitative methods used to identify patterns in these arrays and is a direct tool for substantiating management decisions. The impact of these parameters on management processes in the field of financial and economic security, namely their essence and role in decision-making, is discussed in more detail in Table 1.

**Table 1.** The role of Big Data characteristics in making economic decisions regarding business security.

| Characteristics | Contents  | Role in obtaining scientific results and making economic decisions  |
|-----------------|---|---|
| Volume          | Large data sets that exceed the capabilities of standard databases.   | Performs comprehensive and in-depth analysis of all transactions, rather than selective auditing, which forms the basis for forecasting.  |
| Velocity        | High speed of data generation, collection, and processing in real time.   | Provides operational liquidity management, real-time risk monitoring, and instant decision-making.  |
| Variety         | Data heterogeneity – from structured statistical reports to unstructured texts, voice recordings, social networks, log files. | Integrates qualitative (textual) data on market behavior and reputation with quantitative (economic) indicators, improving the accuracy of investment decisions in the stock market and projects in the real sector of the economy. |
| Veracity        | The need to verify data for quality,  | Important for trust in economic models. Requires  |

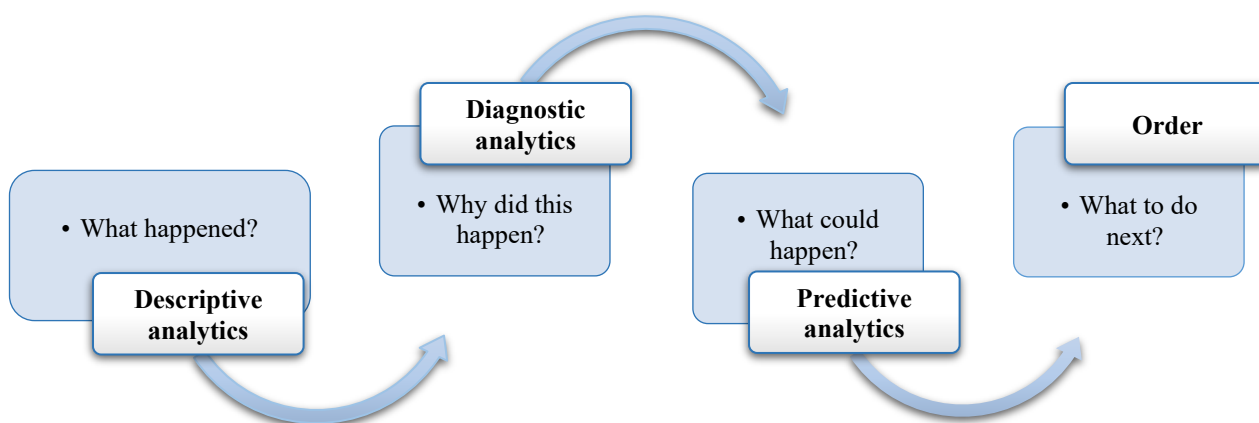
|       |   |  |
|-------|---|--|
|       | accuracy, and bias, as data sources may be unreliable.  | special methods of cleaning and verifying data before it can be used for decision-making.  |
| Value | The ability to transform raw data into useful, practical knowledge and insights that can predict economic benefits. | It directly influences strategic planning, allowing you to optimize government cash flows, business capital structure, and make effective decisions. |

Source: compiled by the author based on data from [7-8]

Big Data refers to large data sets, while data analytics refers to tools that enable in-depth analysis of this financial information. This combination significantly improves the accuracy of management decisions, enabling a transition from traditional, reactive analysis to proactive, predictive modeling.

For a deeper understanding of the role of Big Data in decision-making, it is necessary to realize its inextricable link with analytical processes. Management innovations, as evidenced by the experience of using Big Data tools to improve decision-making efficiency [9-10], directly depend on the ability of an enterprise to effectively transform raw data into knowledge. This transformation process is reflected in the classification of types of data analytics.

Contemporary scientific literature distinguishes four types of data analysis that form a sequential value chain for management decisions (Figure 3).



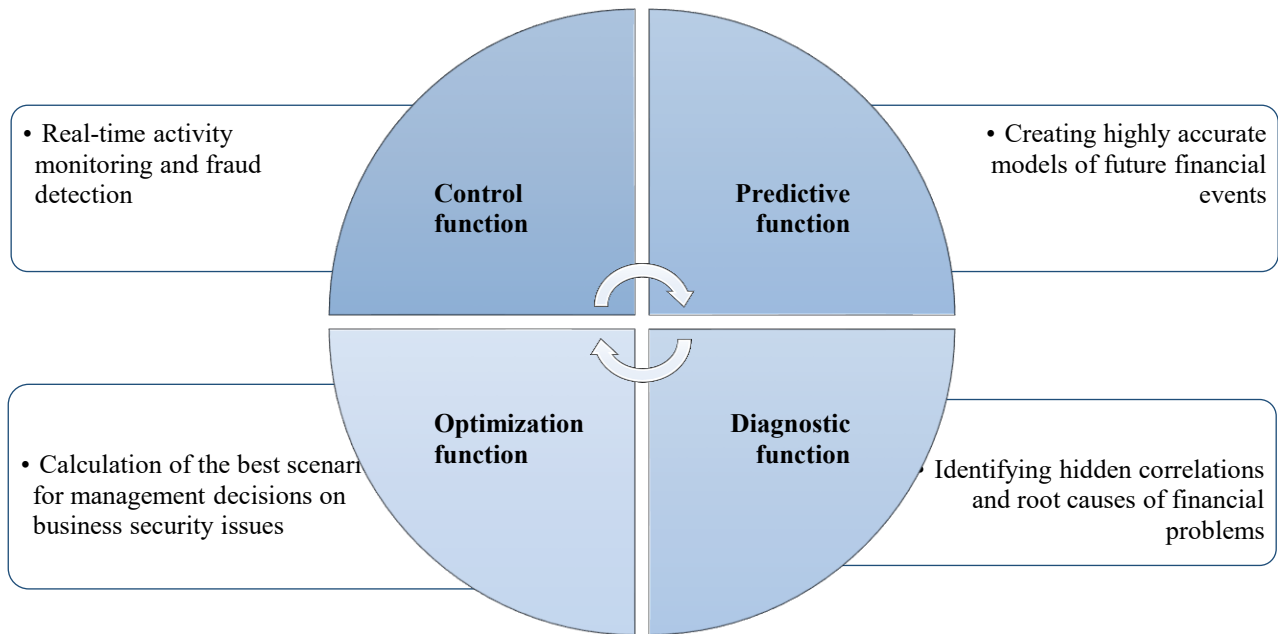
**Figure 3. Classification of data analytics and its value for management decision-making**

Source: compiled by the author based on data from [11]

1. Descriptive Analytics – a fundamental level of analysis, including simple reports, summaries, and graphs that show the company's current or past performance. In finance, it is used to prepare traditional reporting, auditing, and monitoring of key performance indicators.
2. Diagnostic Analytics – uses in-depth study methods, correlation analysis, and root cause analysis to help understand the reasons for certain deviations in performance indicators.
3. Predictive Analytics – based on the use of statistical modeling, machine learning, and artificial intelligence to predict future trends. In financial and economic security, this type of analysis is important for modeling financial risks, forecasting cash flows, assessing customer creditworthiness, and determining optimal investment portfolios.

4. Prescriptive Analytics is the most complex and valuable level of analysis, offering specific recommendations for action based on data, including complex optimization algorithms.

The functional approach allows us to systematize the role of Big Data not only as a technology, but also as a management tool. Researchers identify a number of functions that Big Data performs in the financial and economic system of an enterprise. Visualization of these functions allows us to better understand their integrative role in the management process (Figure 4).



**Figure 4.** Functions of Big Data in the management decision-making system.

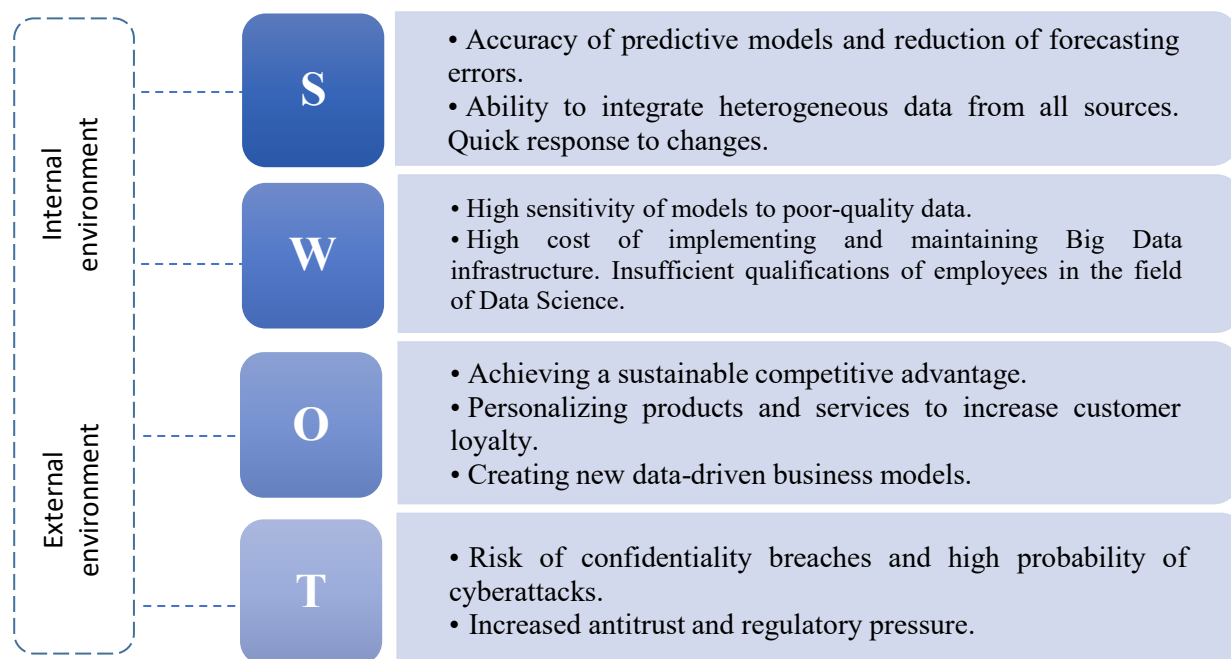
Source: compiled by the author based on data [12]

The effectiveness of these functions depends on adherence to a number of principles for using Big Data in economic security decision-making:

1. The principle of value orientation – any implementation of Big Data must be economically justified and aimed at creating measurable financial value (increasing profits, reducing risks).
2. The principle of data integrity – guaranteeing the quality, accuracy, and completeness of data at all stages of the life cycle, which is the basis for trust in analytical models.
3. The principle of integration – the need to combine external and internal data into a single analytical ecosystem to obtain comprehensive insights.
4. The principle of adaptability – the ability of analytical models to quickly adapt to dynamic changes in the market environment.

The role of Big Data and data analytics in financial decision-making is not limited to technical information processing; it shapes a new paradigm of financial management. Researchers in their works on the digital economy confirm that digitization and the use of complex analytical models are necessary conditions for ensuring the financial stability of an enterprise in the face of global challenges and threats.

The introduction of Big Data analytics into the financial and economic security management system of an enterprise is a process that opens up unprecedented opportunities for improving the effectiveness of decisions, but at the same time creates a number of challenges. Awareness of balance is a prerequisite for successful digital transformation. A comprehensive assessment of the potential of Big Data analytics requires a structured analytical approach that helps identify both internal and external influencing factors. SWOT analysis is used for a systematic critical analysis of opportunities and problems, which allows determining the strategic position of the enterprise. At the current stage of development, the balance of Big Data analytics is determined by the conflict between the high cost of the information it provides and the growing problem of its reliability. Management decisions based on Big Data offer unprecedented speed and accuracy, but this is only possible if the quality, protection, and interpretation of data sets are controlled. Integrating Big Data into a company's economy requires not only technical investments, but also the formation of a data management culture. Therefore, strategic management requires the implementation of risk management mechanisms, which are the basis for the successful use of Big Data in making management decisions on the financial and economic security of the business. SWOT analysis is a fundamental strategic management tool used to examine the strengths and weaknesses of the internal environment, as well as the opportunities and threats of the external environment that are relevant to the application of Big Data analytics. It serves to transform identified threats into controllable factors, ensuring system stability. The application of this method provides the systematic vision necessary for making informed management decisions regarding investments in Big Data. The classic structure of SWOT analysis, which is the basis for further analysis, is presented in Figure 5.



**Figure 5.** Classic SWOT analysis matrix.

Source: compiled by the author based on data from [10, 13-15]

The systematic use of Big Data and data analytics provides businesses with significant internal advantages and opens up new strategic opportunities. According to N. Geseleva and A. Yaroslavtseva [10], the use of Big Data increases the effectiveness of decision-making in complex economic systems, which is a direct strength. This is achieved by enhancing the predictive power of security decisions, where analytics, instead of assessing risk based solely on limited historical reporting, integrates macroeconomic indicators, market sentiment, and social factors [13].

An external opportunity opened up by Big Data analytics is capital management optimization. Through simulation modeling based on a set of internal and external data, it is possible to more accurately determine the optimal ratio of equity and debt capital, minimizing the weighted average cost of capital and increasing the market value of the business. As noted by Yu. Smolyak [14] and A. Kvitka [15], in-depth knowledge of the market allows a company to respond more quickly to global challenges and make more informed investment decisions.

Despite its significant advantages, the implementation of Big Data is accompanied by internal weaknesses and external threats that can negate the positive effects of digitalization.

The most critical internal weakness is the issue of data quality and reliability. Big data is often unstructured, incomplete, or biased, which can lead to false conclusions and, as a result, incorrect financial decisions [16]. The uncontrolled flow of data requires significant internal resources for cleaning and validation, which creates high analysis costs.

Another internal challenge is staffing and infrastructure constraints. Working with Big Data requires specialized IT infrastructure and highly qualified specialists (data scientists). R. Tsigan and co-authors [17] emphasize that insufficient investment in Data Science in Ukrainian companies creates a significant gap between technological potential and the opportunities for its implementation.

The most serious external threat is the increased risk of cyberattacks and data breaches. Storing large amounts of financial and commercial information on unified Big Data platforms makes a company an attractive target [18]. There are also issues with antitrust regulation of Big Data, which creates legal risks.

Analysis of the SWOT matrix results shows that the internal strengths of Big Data should be used to realize external opportunities – primarily to optimize capital management and gain a competitive advantage. At the same time, the company must actively minimize the impact of internal weaknesses, which will allow it to counter external threats such as cyber risks and regulatory pressure.

A logical conclusion to the analysis of opportunities and challenges is a critical review of scientific developments and the identification of unresolved issues. Although Big Data analytics offers significant advantages, its practical implementation faces a number of unresolved issues. As noted, most scientific works [13, 20] focus on general technological aspects, which creates a gap between the high theoretical assessment of the potential of Big Data and the practical development of specialized methodological tools for financial and economic security.

Critical analysis shows that the most heated discussions among representatives of domestic and foreign economic schools revolve around three groups of unresolved issues: methodological, applied, and regulatory-ethical (Table 2).

**Table 2.** Systematization of unresolved aspects of Big Data analytics in the field of economic security.

| Problem group          | Content of the aspect  | Relevance  |
|------------------------|--|--|
| 2                      | 3  | 4  |
| Methodological         | Lack of a unified methodology for assessing the economic impact of implementing Big Data in financial management. Insufficient development of methods for dealing with biases in indicators. | It complicates the justification of investments in digitalization and distorts the results of predictive models.           |
| Applied                | Insufficient use of prescriptive analytics to optimize the capital structure of the enterprise.  | Limits the ability to obtain recommendations on the best economic security strategy, reducing analysis to forecasts alone. |
| Regulatory and ethical | Uncertainty in the legal field regarding the use of AI algorithms and Big Data protection in the context of accelerated digital transformation.  | Creates legal risks, complicates the verification of decisions made by algorithms, which is unacceptable for auditing.     |

It should be emphasized that the strategic effectiveness of Big Data analytics in making decisions on business economic security depends on the ability of the enterprise to transform identified internal advantages in response to external opportunities and threats. Big Data provides tools for accurate forecasting and capital optimization, but success requires overcoming weaknesses. This confirms that in the context of digital transformation, the priority for top management is not data collection, but the development and implementation of specialized methodological tools that address identified unresolved issues.

Thus, critical analysis shows that the theoretical foundations of Big Data analytics are sound, but its practical implementation in strategic financial management and the solution of specific management tasks remains an unresolved issue and requires further research and justification.

Research into tools that enable the conversion of Big Data arrays into management decisions is a necessary stage of analysis. Successful implementation of Big Data analytics in economic security issues requires the creation of an integrated system that combines high-performance hardware infrastructure (platforms), specialized software (tools), and analytical models (AI/ML). It is the technological base that determines how effectively an enterprise can implement the principles of speed and diversity, ensuring the transition to predictive analytics.

The implementation of Big Data requires an architectural approach that differs significantly from traditional data warehouses. The main goal of such architecture is the efficient processing of large volumes of high-speed data.

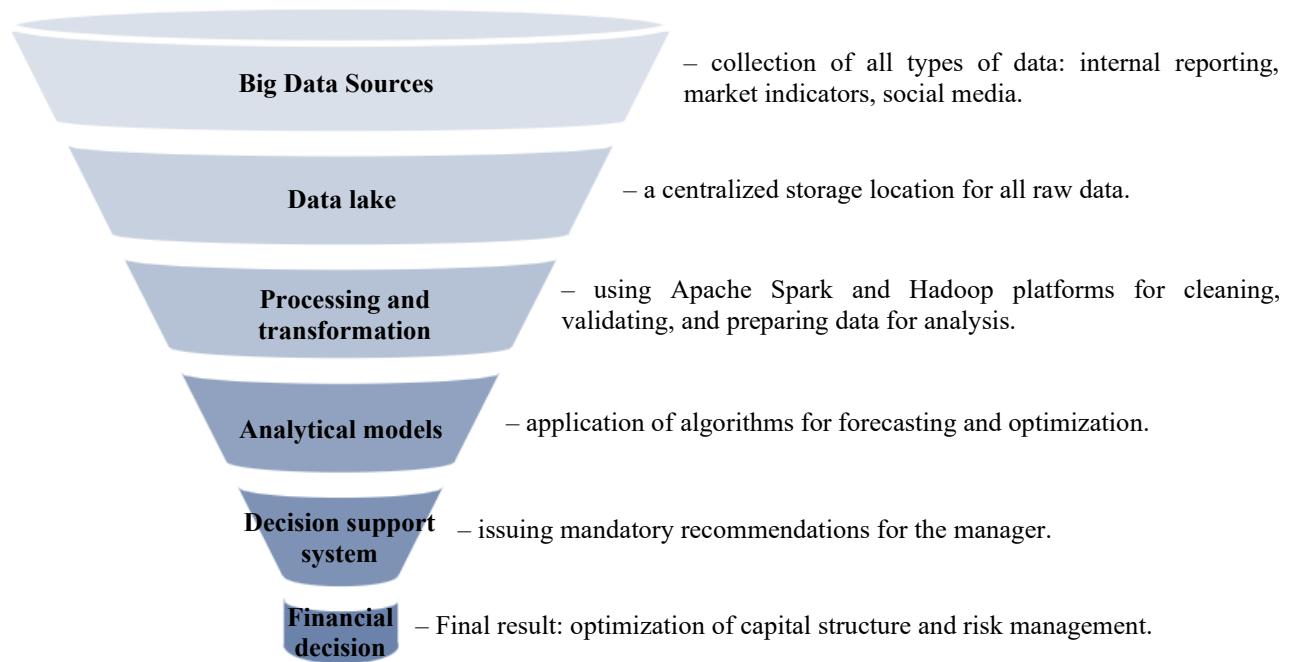
The most fundamental basis for the architecture is the Data Lake, which is a centralized repository capable of storing huge amounts of raw data in its original format (structured, semi-structured, and unstructured).

Among the technological platforms that provide data processing, the following key systems are distinguished:

1. Apache Hadoop is one of the fundamental platforms for distributed storage and processing of large amounts of data.
2. Apache Spark, unlike Hadoop, is a fast and versatile framework. It significantly increases processing speed because it can work with data in real time, making it ideal for financial tasks that require real-time analysis;

3. Cloud Services – AWS, GCP, and Microsoft Azure platforms provide scalable and flexible tools. European trends in innovative entrepreneurship clearly indicate a transition to cloud infrastructures, allowing businesses to scale resources without significant capital investments in their own data centers.

The creation of a complex infrastructure allows Big Data to be transformed into a manageable resource that serves management models, as schematically shown in Fig. 6.



**Figure 6.** Diagram of Big Data integration architecture into the financial system of an enterprise  
Source: compiled by the author based on data from [10, 14]

The effectiveness of Big Data is only revealed when advanced analytical models capable of identifying nonlinear relationships and making predictions are applied. Artificial intelligence and machine learning play a role in this context.

Artificial intelligence (AI) in economics is the ability of computer systems to perform tasks that normally require human intelligence, such as diagnostics, forecasting, and decision-making. Machine learning is a subfield of AI that allows systems to learn from data without being explicitly programmed. Analytical models allow managers not only to see trends, but also to understand how they are formed.

As noted by N. Lishchuk and co-authors [21], the application of AI in Ukraine's digital business environment allows companies to gain competitive advantages through automation and increased accuracy. In addition, the integration of smart technologies and AI into financial and economic security management is an aspect of the digital revolution that affects management control.

The use of machine learning models is the basis for implementing predictive and prescriptive analytics, allowing businesses to actively shape future strategies. In this context, to systematize the role of artificial intelligence and machine learning in the management decision-making system, we will summarize the model classes in Table 3.

**Table 3.** Systematization of machine learning model classes in decision-making on economic security issues.

| Model class                      | The function  | Application in management decisions   |
|----------------------------------|---|---|
| 2                                | 3   | 4   |
| Models of regression             | Quantitative forecasting                                      | Estimation of future income, forecasting interest rate or currency exchange rate dynamics. Big Data allows hundreds of factors to be taken into account simultaneously. |
| Classification Models            | Making Binary or Multi-Class Decisions                        | Credit risk assessment, classification of fraudulent transactions, assessment of investment project success.  |
| Neural Network and Deep Learning | Working with unstructured data and highly complex forecasting | Analysis of news and social media sentiment to assess reputational risk, complex time series forecasting.   |

Source: compiled by the author based on data from [10, 12, 13, 21, 22]

The use of tools allows moving from predictive to prescriptive analytics, where the system recommends the optimal solution for financing or restructuring.

The specific practical application of Big Data and AI models in economic security management covers most functional areas that affect the cost of capital and the stability of the enterprise.

Optimizing internal audit with big data analytics allows you to automatically detect anomalies and fraudulent schemes in transactions, increasing the reliability of internal activity, which is the basis for further management decisions.

Artificial learning models, including Big Data-based simulation modeling, can analyze thousands of scenarios of the impact of different capital structures and the market value of a company to form an effective strategy based on prescriptive recommendations that are a direct response to risks, threats, and unresolved issues.

Streaming data analysis (reliability) allows for accurate forecasting of cash gaps and the probability of non-payment of receivables by specific counterparties. Based on these forecasts, credit limits can be automatically adjusted or other risk management mechanisms can be applied.

To systematize the role of artificial intelligence and machine learning in the management decision-making system, let us summarize the practical application of models in various functional areas in Table 4.

**Table 4.** Systematization of artificial intelligence models in management decision-making.

| The task of economic decision-making  | Models of AI and machine learning                   | The role of Big Data analytics   |
|---------------------------------------|---|--|
| 2                                     | 3   | 4  |
| Cash flow forecasting                 | Artificial neural networks, time series regression. | Processing streaming data to improve liquidity forecasting accuracy and risk management. |
| Assessment of credit risk and scoring | Logistic regression, decision trees.                | Integration Of Alternative, Non-Financial Data For Accurate Default Probability.         |

Source: compiled by the author based on data from [10, 12, 13, 21, 22]

Analysis of Table 4 shows that artificial intelligence and machine learning models are not only automation tools, but also the basis for prescriptive analytics, which is the highest value of Big Data. Regression models and neural networks based on streaming data arrays enable managers to manage liquidity in real time and respond instantly to market shocks, risks, and threats. The use of models allows for effective risk management, which significantly reduces the need for traditional analysis. Big Data digital tools transform the financial and economic security department into a center of predictive expertise that responds to unresolved issues, risks, and threats.

Modern digital tools, including Big Data platforms and advanced artificial intelligence models, are the technological basis for implementing prescriptive analytics. Using these tools allows companies not only to obtain but also to quickly use in-depth insights from data arrays for strategic capital optimization, risk management, and improving the overall effectiveness of timely threat detection and appropriate management decisions.

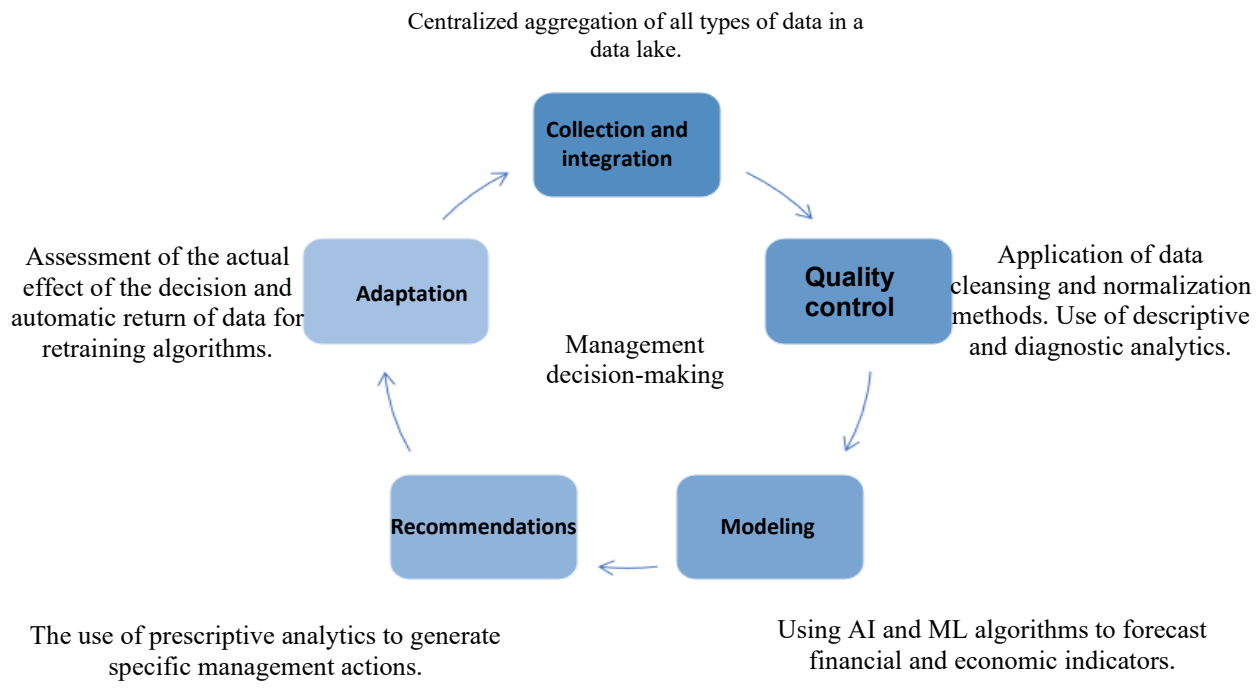
Thus, the integration of Big Data and advanced analytics shifts management into proactive modeling mode, forming a new paradigm for decision-making.

The results of a comprehensive analysis of the theoretical foundations and tools of Big Data allow us to argue that big data is not just a set of technologies, but a new management paradigm that transforms the process of creating economic value in an enterprise and allows for effective influence on business security. This transformation consists of a transition from reactive historical data accounting to proactive, holistic risk and capital management based on continuous predictive modeling.

In addition, Big Data is a central element of the financial value management system of a business. In this system, it is not the volume of data that is of paramount importance, but its value, which can only be revealed through a full range of prescriptive analytics. From strategic reorientation management from traditional control to data architecture and the formation of a continuously operating mechanism for improving artificial intelligence algorithms.

Data is the most direct and effective tool for overcoming methodological and applied unresolved issues. In particular, this applies to eliminating the fundamental limitations of traditional econometric models, which are unable to cope with the non-linearity and high volatility of the modern market environment. Only the integration of external (unstructured) data reflecting market sentiment and macroeconomic indicators allows management decisions to be not only highly accurate but also strategically resistant to external shocks.

The practical implementation of Big Data analytics in security management should be structured as a dynamic model of continuous optimization that ensures a constant process of learning and improving management decisions. The model functions as a closed management loop that continuously verifies hypotheses and promptly adjusts the company's strategies. The main stages of this model's operation, reflecting the full cycle of transforming raw data into insights and management actions, are presented in Figure 7.

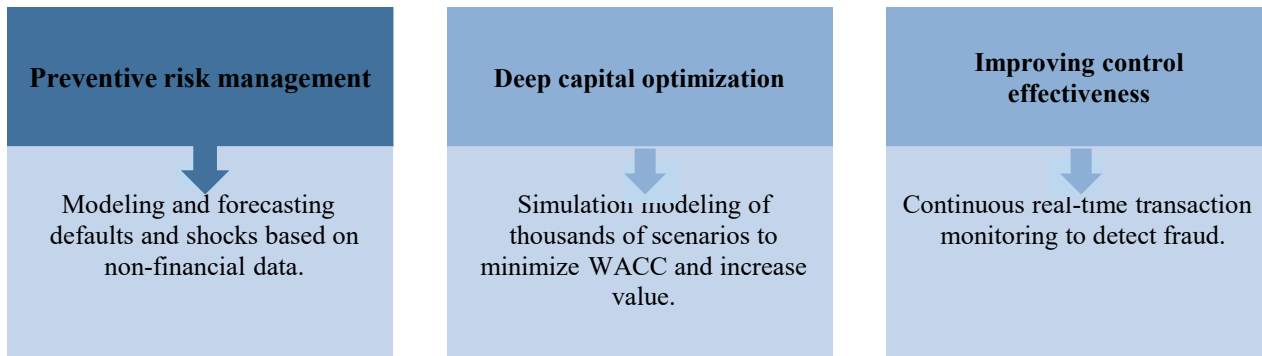


**Figure 7.** Dynamic model of continuous optimization of management decisions based on Big Data analytics.

Source: developed by the author

Operating in such a closed management loop ensures compliance with the principle of adaptability, as the system demonstrates the ability to self-learn from the results of its own management decisions, which is impossible in a static model of traditional business management. The SWOT analysis allowed us to identify the main internal and external factors of influence. However, to fully realize the strategic potential of Big Data, it is necessary to detail the advantages and propose specific strategies for minimizing disadvantages and managing threats using advanced analytical tools.

The strategic advantages of implementing Big Data in management can be systematized according to three main vectors that reflect the transition from control to modeling. The visualization of functional advantages that form the competitive advantage of an enterprise is presented in Figure 8.



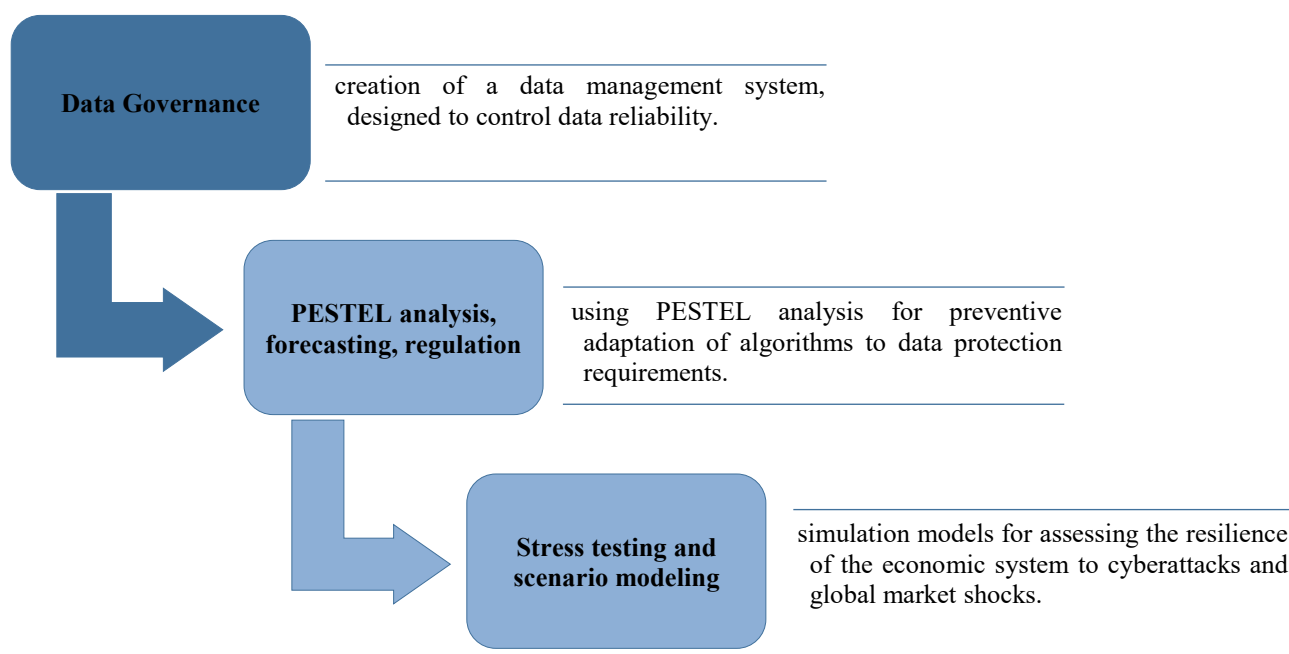
**Figure 8.** Advantages of Big Data analytics in enterprise management.

Source: developed by the author.

The effectiveness of Big Data depends on the enterprise's ability not only to generate value, but also to actively mitigate identified weaknesses and external threats. Strategic risk management in the context of big data requires the use of specialized methodological tools that cover data quality, regulation, and system stability. The main tools aimed at overcoming the internal and external challenges of Big Data are presented in Figure 9.

Critical analysis has revealed that a methodological unresolved issue is the lack of a unified methodology for quantitatively assessing the economic effect (ROI) of implementing Big Data in enterprise management. This shortcoming is an obstacle to justifying significant capital investments in digital transformation, as top management needs clear metrics to verify the value of technologies.

In this context, there is a need to move from traditional ROI assessment to an integrated concept of economic value assessment. The concept should cover not only direct benefits, but also the effect of risk avoidance and increased long-term sustainability.



**Figure 9.** Strategy for minimizing shortcomings and threats when implementing Big Data analytics.

Source: developed by the author.

The assessment of the value of Big Data analytics should be differentiated according to three main integrated vectors, which are systematized in Table 5.

The transition to a comprehensive assessment of economic value requires the development of specialized methodological tools capable of dealing with the uncertainty and dynamism of investments in Big Data.

Real options modeling justifies investment flexibility. Unlike the static net present value (NPV) method, real options evaluate investment in a Big Data platform not as a fixed capital expenditure, but as a strategic opportunity (option).

Specialized evaluation systems ensure confidence in forecasts and reliability. An evaluation system covering the quality of input data and the accuracy of output algorithms needs to be developed. Creating tools for quantitative assessment of data quality is a prerequisite for data reliability in management decision-making. At the same time, it is necessary to apply machine learning-specific algorithm accuracy assessments (F1-Score, AUC – Area Under the Curve), which demonstrate how effectively AI models can predict economic events.

**Table 5.** Systematization of the concept of assessing the economic value of Big Data.

| Cost vector                             | Contents  | Examples of quantitative assessment   |
|---|---|---|
| 2                                       | 3   | 4   |
| Direct quantitative value               | Assessment of measurable cash flows generated by prescriptive analytics. Focus on revenue growth and cost savings.                                  | Reduction in weighted average cost of capital; increase in net profit from optimization; cost savings.        |
| The value gained from risk minimization | Monetization of losses and prevention of capital outflow. Focus on risk management.   | Reduced need for provisions for doubtful accounts receivable; reduced losses from fraud and financial crises. |
| Strategic or indirect value             | Assessment of indirect benefits that increase the competitiveness and sustainability of the system. Focus on flexibility and quality of management. | Faster decision-making; increased market capitalization thanks to improved reputation.                        |

Comparative analysis of digital maturity assesses competitive position and justifies the urgent need for investment. It involves the use of industry indices to compare the level of implementation of Big Data technologies, data management culture, and available human resources at the enterprise.

Development of an internal risk monetization methodology. The method consists of creating clear mechanisms for translating risk forecasts into monetary terms. This approach transforms the risk management function from a cost center into a value generation center, as successful preventive actions (prescriptive analytics) become a quantifiable economic asset.

Thus, the integration of Big Data and analytics forms a new architecture for managing the financial and economic security of a business, based on proactive modeling and continuous optimization. The proposed integrated concept of economic value assessment requires specialized methodological tools, including real options modeling and assessment systems. Ultimately, the effective use of Big Data transforms business management into a center of strategic foresight, which is a key condition for ensuring the economic and financial stability of an enterprise.

The study shows that Big Data is a new management paradigm that radically transforms the process of creating economic value. The essence of this phenomenon is defined by five attributes, known as the “5Vs” – volume, variety, velocity, veracity, and value, which together enable the transition from classical analysis to modeling.

The main tool for unlocking the value of Big Data is analytics, where the strategic priority is shifting to predictive and prescriptive analytics. Artificial intelligence and machine learning models generate automated recommendations for optimizing capital structure, liquidity, and risk management, forming a closed management loop of continuous optimization aimed at ensuring economic security.

Implementing this architecture brings significant strategic advantages, such as preventive financial risk management, in-depth capital cost optimization, and improved internal control efficiency. Success depends on overcoming challenges, including data quality issues, staffing constraints, and external threats.

Ultimately, Big Data and advanced analytics are essential for ensuring the financial stability of an enterprise. Big Data is a driver and assistant in managing the financial and economic security of a business, as it allows management activities to be organized on the basis of consistency and

openness and to satisfy the economic interests of all stakeholders to the maximum extent possible. This has a positive effect on motivation, the human factor, interaction, and coordination of all business responsibility centers.

Effective use of tools transforms management from an accounting function into a center of strategic foresight, and further research should be directed toward the practical development of methods for quantitatively substantiating its economic feasibility.

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$$f(x) = a_0 + \sum_{n=1}^{\infty} \left( a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right) \quad (1)$$

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**Table 1:** Summary of formatting requirement for submitting paper in this journal.  
(Times New Roman, 12)

|               |  |  |  |                                   |                            |
|---------------|--|--|--|-----------------------------------|----------------------------|
| Layout        | Size                                   | Margin (Normal)                                | Header                                     | Footer                            |                            |
| Single column | A4 (8.27" X 11.69")                    | Top=1"<br>Bottom=1"<br><br>Left=1"<br>Right=1" | Do not add anything in the header          | So not add anything in the footer |                            |
| Font          | <b>Article Title</b>                   | <b>Headings</b>                                | <b>Subheadings</b>                         | <b>Reference list</b>             | <b>Text</b>                |
|               | Times New Roman, 16 pt, Bold, centred  | Times New Roman, 11 pt, Bold, Left aligned     | Times New Roman, 10 pt, Bold, Left aligned | Times New Roman, 8 pt, Justified  | Garamond, 11 pt, Justified |
| Line Spacing  | 1.15                                   | 1.15   | 1.15                                       | 1.15                              | 1.15                       |
| Page number   | We will format and assign page numbers |  |  |                                   |                            |



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**Website:**

**E-mail:** gulustanbssjar@gmail.com, sc.mediagroup2017@gmail.com

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