Varvara CHERNENKO,
Kristina BABENKO

DEVELOPMENT OF A DATA-DRIVEN TRENDWATCHING MODEL IN THE EUROPEAN BUSINESS ENVIRONMENT: THE «AGENTIC AI» CASE

Abstract

The article is devoted to addressing the issue of strategic business adaptation within the context of the digital transformation of the European economy. Traditional intuitive forecasting methods are losing effectiveness, necessitating a transition to data-driven approaches for the early detection of market opportunities. The aim of the research is the development and methodological substantiation of an authors' model of integrated trendwatching, which combines web analytics tools with strategic planning methods. The proposed methodology is implemented through a three-tiered algorithm: 1) identification of «weak signals» using an adaptive algorithm for filtering Google Trends data; 2) analytical assessment via a developed business trend matrix that integrates SWOT analysis; 3) strategic modelling of development scenarios (Foresight). The model was tested on the

Chernenko Varvara, PhD in Physics and Mathematics, Associate Professor, Department of Management and IT, Communal Institution of Higher Education «Kremenchuk Humanitarian and Technological Academy» of the Poltava Regional Council, Kremenchuk, Ukraine. ORCID: 0000-0002-2728-6876 Email: chernenko.v@pu.org.ua

Babenko Kristina, Doctor of Science (Economics), Professor, British Academy RaR Fellow, NewCastle University Business School, Newcastle upon Tyne, UK. ORCID: 0000-0001-7227-886X Email: babenko.kristi@gmail.com

emerging technological trend «Agentic AI». A comparative analysis of search interest dynamics was conducted for the period from December 2024 to November 2025 across key European economies (Great Britain, Germany, France), Eastern European countries (Poland, Ukraine), and the USA as a global benchmark. The research results demonstrate that the proposed model allows for not only recording the appearance of an innovation but also assessing the level of regional market readiness. A significant asymmetry in the perception of the trend between EU countries and the USA was revealed, opening specific «windows of opportunity» for European business. The practical value of the work lies in providing a unified toolkit for transforming «raw» data into verified business strategies.

Key Words:

2 figures, 2 tables, 13 references.

Problem Statement

The digital transformation of the European Union's economy poses new challenges for business: the speed of technological change outpaces the ability of companies to adapt to them using classical planning tools. For European small and medium-sized enterprises (SMEs), which form the basis of the region's economy, innovation is ceasing to be an advantage and is becoming a condition for survival amidst strict regulatory policies and competition from technological giants in the USA and Asian countries.

Traditional strategic analysis methods often rely on retrospective data, rendering them ineffective in conditions of high uncertainty. Business requires tools capable of capturing «weak signals» – early indicators of changes that have not yet become mainstream. In this context, trendwatching transforms from an intui-

622

V a r v a r a   C h e r n e n k o ,   K r i s t i n a   B a b e n k o
Development of a data-driven trendwatching model
in the European business environment: The «Agentic AI» case

tive practice into a systemic process based on the processing of large data arrays.

Despite the availability of digital analytics tools (Google Trends, AI agents, social monitoring platforms), there is a methodological gap in their application. Most existing models are oriented towards global corporations with large R&D budgets, whilst the methodology of using Open Data for the strategic needs of European business remains fragmented. The problem of trend validation – how to distinguish short-term informational noise from a sustainable technological trend, such as «Agentic AI», prior to its mass implementation – acquires particular relevance.

Consequently, there is an objective need to develop adaptive data-driven models that allow businesses to integrate quantitative indicators of search activity into qualitative strategic decisions.

Literature Review

Scientific interest in the use of data analytics in strategic management is evolving from descriptive models to predictive systems. The theoretical and methodological basis of the research relies on works revealing the potential of Big Data as a source of competitive advantages. Specifically, Adesina (2024) proves that the integration of machine learning and cloud computing is not merely a technological option but an infrastructural necessity for modern trendwatching. This thesis is developed by Ajah & Nweke (2019), who classify structured and unstructured data as new determinants of strategic planning, emphasising the importance of their validation.

A separate stratum of research focuses on the toolkit for trend detection. Jun et al. (2018), through a network analysis of over 600 publications, demonstrate a shift in scientific focus towards the use of Google Trends as a valid indicator of socio-economic changes. The practical implementation of this approach is described by Raju et al. (2024), who generalise methods for processing «raw» data for business forecasting. Chen et al. (2022) expand the context, pointing to the critical role of operational analytics in conditions of force majeure changes (pandemics, crises), which is particularly relevant for volatile markets.

In the context of the European economy and the development of small and medium-sized enterprises (SMEs), the works of Tawil et al. (2024) and Falahat et al. (2023) are significant. The authors analyse barriers to integrating analytics in SMEs (using the UK and other countries as examples), proving that the main obstacle is not a lack of technology, but a shortage of adaptive methodologies. Asiri et al. (2024) empirically confirm a direct correlation between the use of Big Data Analytics and business performance, reinforcing the argumentation in favour of

data-driven approaches. Ardito et al. (2018) complement the discussion by distinguishing clusters of managerial efficiency in supply chains.

The Ukrainian scientific segment is represented by the works of Dvulit & Maznyk (2024) and Kashchena et al. (2024), where the emphasis is placed on service personalisation and risk management through analytics. At the same time, Filipova (2022) highlights the dependence of BI system quality on the qualification level of analysts, pointing to the personnel component of the problem.

Despite a significant number of publications, a fragmentation of approaches to the systemic assessment of trends based on open data is traceable in the scientific literature. Most models are either oriented towards large corporations or ignore the specifics of detecting «weak signals» at early stages. There is an absence of comprehensive studies combining the quantitative analytics of Google Trends with qualitative strategic planning tools (SWOT, Foresight) into a single model adapted for the needs of European business.

The aim of the research lies in the development and substantiation of an authors' model of integrated trendwatching that considers the peculiarities of the European market and the needs of SMEs. The effectiveness of the model is verified by analysing the dynamics of «Agentic AI», during which «raw» Google Trends data were transformed into substantiated strategic decisions using a business trend matrix.

Methodology

The research is based on a systemic approach implemented through the authors' model of integrated trendwatching. The methodological architecture resolves the gap between the availability of «raw» data and the decision-making process. The research procedure is constructed according to a three-tiered algorithm.

Stage 1. Signal Identification.

Primary data collection was carried out using the Google Trends toolkit. The search term «Agentic AI» was selected as the object of analysis. The time horizon of the study covers the period from December 2024 to November 2025 (12 months), allowing for the recording of trend dynamics at the stage of its active growth. To ensure sample relevance in conditions of low query frequency (characteristic of new trends), an adaptive data filtering algorithm was applied.

According to the methodology of «weak signal» analysis, at the technology inception stage, the use of a rigid filter by the category «Business and Industrial Sector» creates a risk of cutting off a significant part of the sample. Therefore, a

624

V a r v a r a   C h e r n e n k o ,   K r i s t i n a   B a b e n k o
Development of a data-driven trendwatching model
in the European business environment: The «Agentic AI» case

strategy of broad coverage («All categories») was chosen to capture the aggregate interest preceding the commercial implementation stage.

Stage 2. Analytical Assessment.

The obtained quantitative indicators were normalised on a scale from 0 to 100 and exported to the Google Sheets environment for preliminary processing and data visualisation, which allowed for the construction of comparative dynamics graphs.

Data interpretation was carried out through the developed business trend matrix. The left block of the matrix was filled based on a synthesis of SWOT analysis results: growth dynamics were interpreted as an indicator of market opportunity (Opportunities); regional asymmetry was viewed as a potential barrier or weakness (Weaknesses); query volatility served as a marker of external threats (Threats).

Stage 3. Strategic Modelling.

The final stage envisaged the use of scenario planning elements to fill the right block of the Matrix (strategic application). Based on the identified patterns, hypotheses were formulated regarding the commercial potential of «Agentic AI» for European SMEs.

To ensure representativeness and consideration of the European context, a sample was formed from the following three clusters of countries.

1 – USA as the originator country of most AI technologies.

2 – Great Britain, Germany, France as markets with high digital maturity.

3 – Poland, Ukraine as countries with high IT potential but distinct implementation dynamics.

This approach allows for not only stating the fact of query popularity but also detecting time lags in trend propagation between the USA and various regions of Europe.

Research Results

The digital transformation of the economy changes the paradigm of business trend detection, transforming data analytics from a supporting function into the foundation of corporate strategic resilience. The exponential growth of Big Data volumes dictates new methodological requirements for capturing «weak signals» – early indicators of change, the ignoring of which leads to a loss of market positions. A clear drift from expert-intuitive methods to analytical strategies based

on the verification of open digital sources and user behavioural patterns is observed.

The main advantage of the data-driven approach is objectivity and scalability. The digital analytics toolkit (specifically Google Trends, social media monitoring, NLP algorithms) allows for not only the operational detection of trend inception but also the tracking of their spatio-temporal diffusion. This enables the separation of sustainable innovative tendencies from short-term informational noise, and the identification of market leaders and external drivers of influence.

Effective trend analytics require multi-methodology, i.e., the combination of quantitative analysis of data arrays with a qualitative interpretation of context. Such integration minimises forecasting errors. The incorporation of foresight methods into this process allows for the consideration of long-term factors and the modelling of non-linear interconnections between technologies, the regulatory field, and consumer sentiments. According to research (Spaniol, 2024), the synthesis of foresight and Big Data analytics is a prerequisite for developing alternative risk management scenarios.

A separate challenge remains source validation. Open indices such as Google Trends provide operational access to indicators of public interest, yet require cross-verification (cross-analytics) with business news and patent databases to negate algorithmic distortions.

The integration of data analytics into strategic planning processes creates the foundation for forming adaptive business ecosystems capable of anticipatory response. The creation of an authors' model of integrated trendwatching is an important instrumental basis for adapting business strategies (Fig. 1).
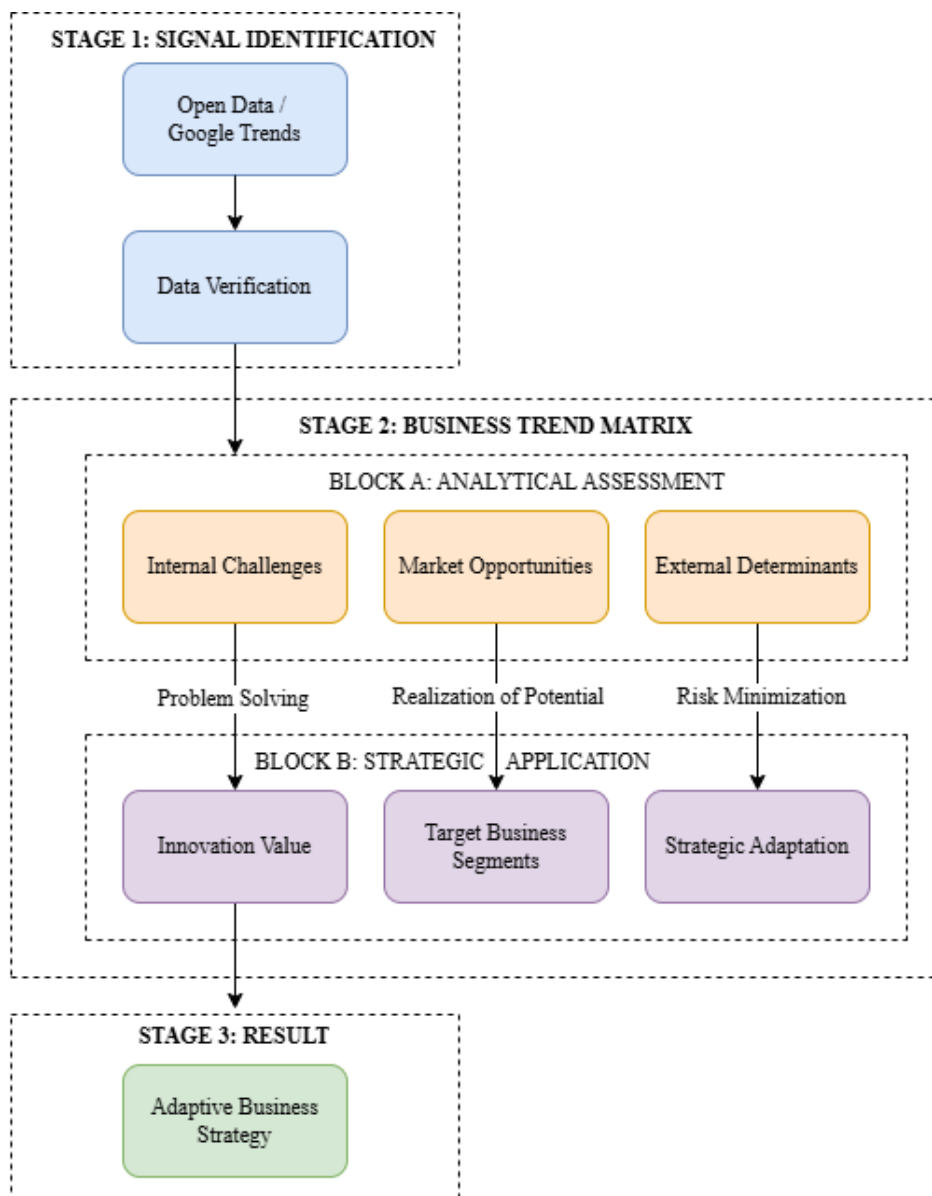
The proposed architecture solves the fundamental problem of data validation by structuring the process of transforming arrays of «raw» signals into verified managerial decisions. Unlike linear approaches limited to a simple statement of search activity facts, the developed model is based on the cyclical interaction of the following three functional modules:

1. Signal Identification Module. Ensures primary filtering of informational noise and the recording of valid market indicators. Its function lies in collecting data from open sources and verifying them by comparing query dynamics in benchmark countries (e.g., USA) and target markets (EU).

2. Analytical Core. The central element of the model, responsible for the semantic and strategic coding of data. It is here that quantitative indicators are transformed into qualitative conclusions through the business trend matrix toolkit.

3. Scenario Modelling Module. Transforms analytical conclusions into variants of concrete business actions, using elements of foresight methodology to predict the future impact of the trend on the company's business model.

626

V a r v a r a   C h e r n e n k o ,   K r i s t i n a   B a b e n k o
Development of a data-driven trendwatching model
in the European business environment: The «Agentic AI» case

Figure 1

Integrated Trendwatching Model

Source: authors' own development.

The construction, following the logic of cross-analysis, of the business trend matrix allows for the integration of classical SWOT analysis into the process of working with digital data (Table 1).

Table 1

Business Trend Matrix

ANALYTICAL ASSESSMENT (SWOT-basis)	STRATEGIC APPLICATION (Foresight-basis)
Internal Challenges Which operational «bottlenecks» does the trend resolve and which business strengths can it enhance?	**Innovative Value** Which products, services, or management practices can be developed or transformed under the influence of the trend?
Market Opportunities Which new client needs or behavioural patterns open a window of opportunity?	**Target Business Segment** Which industries, markets, or types of enterprises are most relevant for implementing the trend?
External Drivers Which technological, regulatory, or competitive factors stimulate or hinder trend development?	**Strategic Adaptation** How must the business adapt its model to minimise risks and utilise external drivers of change?

Source: formed by the authors based on Ajah & Nweke (2019), Adesina (2024), Dvulit & Maznyk (2024).

The structure of the matrix includes three levels of analytical assessment, each corresponding to a specific dimension of the business environment.

Level 1 (Internal Dimension) is based on «Strengths» and «Weaknesses» components of classical SWOT analysis. At this level, it is analysed how a technological trend can solve existing operational problems of the company or, conversely, which internal barriers (personnel qualification, obsolete infrastructure) may hinder its implementation.

Level 2 (Market Dimension) corresponds to the «Opportunities» component of classical SWOT analysis. The analysis focuses on identifying new client needs through search query dynamics, allowing for the identification of free market niches before the appearance of mass competition.

Level 3 (External Dimension) corresponds to the «Threats» component of classical SWOT analysis. Macroeconomic and regulatory factors (determinants)

628 **V a r v a r a   C h e r n e n k o ,   K r i s t i n a   B a b e n k o**
Development of a data-driven trendwatching model
in the European business environment: The «Agentic AI» case

influencing the speed of innovation diffusion (e.g., EU legislative restrictions) are assessed.

This approach allows the trend graph to be transformed into a structured map of strategic decisions.

Practical verification of the proposed model's effectiveness was carried out on the example of the rising trend «Agentic AI» for six countries – the United States of America, Great Britain, France, Germany, Poland, and Ukraine. The analytical sample was formed to ensure the representativeness of the European context, divided into the following three clusters: USA (global benchmark), Great Britain, France, and Germany (leading European economies with high digital maturity), as well as Poland (regional technological hub of Central Europe) and Ukraine (a country with powerful IT potential integrating digital solutions in conditions of post-crisis recovery). Such a selection ensures a complex regional picture, allowing for the detection of both global and local patterns in innovation implementation.

The analysis is based on weekly Google Trends data for the last 12 months (December 2024 – November 2025). Interest values are measured in popularity indices (0–100), where 100 denotes the highest level of search interest for the query in a specific region over the selected period.

1. Signal Identification Stage.

Visualisation and analysis of the obtained empirical data revealed a clear geographical asymmetry of interest (Fig. 2).

During the studied period (December 2024 – November 2025), a steady exponential character of growth in interest towards «Agentic AI» is observed in all studied countries.

The 1st benchmark cluster – USA demonstrates the most stable and high baseline of search activity. The growth curve is smooth, indicating a systemic, professional entry of the term into business and R&D discourse, acting as a standard of trend maturity.

The 2nd cluster of European technology leaders (Germany, France, Great Britain) records intense but volatile dynamics, with peaks that typically follow surges in the USA with a delay (lag) of 1–2 months. High correlation between dynamics in Germany and France confirms the existence of a single European digital space, but with a slower reaction to primary innovation signals.

The 3rd Eastern Europe cluster (Poland, Ukraine) is characterised by the lowest baseline and the sharpest, situational spikes (e.g., the peak in Ukraine at the beginning of November 2025). Such unevenness testifies that the trend is at an early stage, and interest is fuelled mainly by external informational events (conferences, announcements) rather than formed internal market demand.

Figure 2

**Dynamics of popularity for the query «Agentic AI» according
to Google Trends data by country (USA, Great Britain, France, Germany,
Poland, Ukraine) during December 2024 – November 2025**
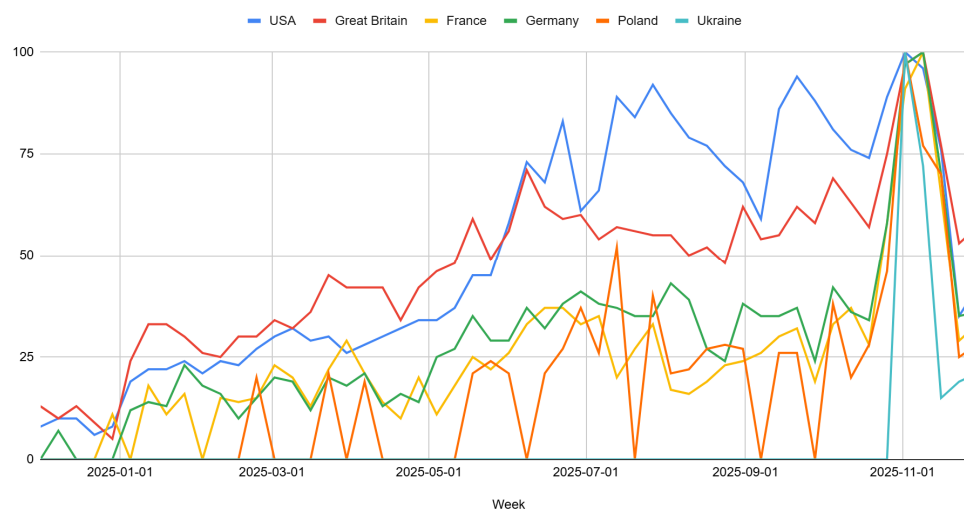
Source: based on the Google Trends, 2025.

2. Business Trend Matrix Application Stage.

The obtained data were implemented into the business trend matrix structure (Table 2).

Analysis of functional interconnections confirms that the business trend matrix acts as a methodological bridge between quantitative analysis and qualitative strategic comprehension. The identification of fundamental business challenges, which lie in personnel shortages and low digital maturity, allowed for a clear formulation of the trend's innovative value – the main advantage of «Agentic AI» lies in the automation of complex cognitive chains. This is a direct response to resource scarcity and ensures an increase in ROI indicators for operational processes.

Furthermore, the recorded growth of B2B queries in global indices serves as a direct indicator of formed demand for the autonomisation of routine tasks. This enabled the precise definition of the target segment – service companies and SMEs for whom scaling without increasing staff is critical. The «Expectation–Segment» link ensures precise marketing targeting.

630

V a r v a r a   C h e r n e n k o ,   K r i s t i n a   B a b e n k o
Development of a data-driven trendwatching model
in the European business environment: The «Agentic AI» case

Table 2

Business Trend Matrix: The «Agentic AI» Case

ANALYTICAL ASSESSMENT (SWOT-basis)	STRATEGIC APPLICATION (Foresight-basis)
Internal Challenges The trend solves the personnel shortage problem but encounters the barrier of low digital maturity	**Innovative Value** Automation of complex cognitive chains, increasing the ROI of operational processes
Market Opportunities Growth of B2B queries for autonomous solutions signals a need for routine optimisation	**Target Business Segment** Service companies and SMEs requiring scaling without increasing staff
External Drivers Regulatory pressure (EU AI Act) creates compliance risks for early adopters	**Strategic Adaptation** «Fast Follower» Strategy – adaptation of tested solutions to local EU requirements

Source: authors' own development.

Finally, the identification of the determinant of change dynamics, specifically regulatory pressure (EU AI Act), revealed an external threat. This threat requires Strategic Adaptation, which lies in adopting the concept of the fast follower. Such a strategy allows business to avoid high costs and legal risks associated with primary compliance, and to implement solutions already tested in benchmark markets. The application of the matrix confirmed its functionality as a methodological tool that translates quantitative user interest data into verified qualitative strategic decisions.

3. Business Strategy Formulation.

Stage based on the results of the business trend matrix, let us consider strategic hypotheses for companies operating in the European market.

1. Scenario A «Leadership Strategy» for markets of the 2nd cluster countries.

Companies are recommended to take the position of an «early adopter», investing in R&D for the rapid adaptation of Agentic AI into niche B2B solutions (e.g., financial compliance or logistics automation).

2. Scenario B «Adaptive Following Strategy» for markets of the 3rd cluster countries.

The optimal strategy is «fast following» or «late follower». This envisages monitoring already ready and regulatory-verified cases in the USA/Great Britain markets with subsequent rapid adaptation to local EU requirements.

The obtained results suggest that «Agentic AI» may become the driver of the next wave of digital transformation, with a potential impact on project management, logistics, digital marketing, automated learning, and cybersecurity. In the long-term perspective, the formation of new business models is probable, where agentic systems will act as autonomous task executors, interacting with users through adaptive interfaces.

Conclusions

Summarising the above, it is worth emphasising that the systemic use of trendwatching methodology acts as a powerful tool for forming strategic landmarks in the sphere of technological entrepreneurship. Constant monitoring of social, economic, and technological trends ensures business structures have timely access to relevant analytical information necessary for making substantiated managerial decisions. This, in turn, contributes to a more precise definition of promising vectors of innovative development, optimisation of business models, and enhancement of company competitiveness. Under the condition of correct interpretation of trend analytics results and their integration into strategic planning, enterprises obtain not only adaptive flexibility but also a substantial improvement in financial indicators in the medium and long-term perspective.

The conducted research confirmed the fundamental transformation of trendwatching from the dominance of intuitive-expert models towards systemic, scientifically substantiated, data-driven approaches. Analysis of the thematic field confirmed the thesis regarding the unconditional priority of data analytics in modelling and verifying market tendencies.

The necessity of transitioning from intuitive and descriptive forecasting methods to data-managed systems based on open source analysis has been substantiated. It has been determined that for European SMEs, such an approach is a critical adaptation tool in conditions of regulatory uncertainty and high competition from global technology leaders.

The authors' model of integrated trendwatching has been developed and structured. The model's architecture ensures the cyclical transformation of quantitative «raw» data into verified strategic decisions through the sequential work of three modules: signal identification, the analytical core, and scenario modelling.

A business trend matrix was created, and the integration of classical SWOT analysis into the matrix was substantiated, allowing for the systematisation of empirical data across three dimensions (internal, market, and external) and ensuring a transparent transition from trend recording to its strategic interpretation.

632

V a r v a r a   C h e r n e n k o ,   K r i s t i n a   B a b e n k o
Development of a data-driven trendwatching model
in the European business environment: The «Agentic AI» case

Empirical validation of the model was conducted using the example of the «Agentic AI» trend across key European markets (Great Britain, Germany, France, Poland, Ukraine) and the USA. Significant geographical asymmetry in interest dynamics was revealed – a noticeable time lag (about 1–2 months) in the reaction of the leading European markets relative to the USA and high demand volatility in Eastern European markets were recorded.

Differentiated adaptive strategies for the European market were formed. Based on the business trend matrix results, two key recommendations were modelled: a leadership strategy (early adopter) for markets with high digital maturity (Great Britain, Germany, France) and an adaptive following strategy (late follower) for markets with higher risks (Poland, Ukraine).

Prospects for further research lie in the development of unified methodologies for integrating data analytics into business processes, and the implementation of ethical frameworks and multidisciplinary teams for a full comprehensive vision of trend processes in Europe's digital economy.

References

Adesina, A. A., Iyelolu, T. V., & Paul, P. O. (2024). Leveraging predictive analytics for strategic decision-making: Enhancing business performance through data-driven insights. *World Journal of Advanced Research and Reviews, 22*(3), 1927–1934. https://doi.org/10.30574/wjarr.2024.22.3.1961

Ajah, I. A., & Nweke, H. F. (2019). Big data and business analytics: Trends, platforms, success factors and applications. *Big Data and Cognitive Computing, 3*(2), Article 32. https://doi.org/10.3390/bdcc3020032

Ardito, L., Scuotto, V., Del Giudice, M., & Petruzzelli, A. M. (2019). A bibliometric analysis of research on Big Data analytics for business and management. *Management Decision, 57*(8), 1993–2009. https://doi.org/10.1108/MD-07-2018-0754

Asiri, A. M., Al-Somali, S. A., & Maghrabi, R. O. (2024). The integration of sustainable technology and big data analytics in Saudi Arabian SMEs: A path to improved business performance. *Sustainability, 16*(8), Article 3209. https://doi.org/10.3390/su16083209

Chen, Y., Li, C., & Wang, H. (2022). Big data and predictive analytics for business intelligence: A bibliographic study (2000–2021). *Forecasting, 4*(4), 767–786. https://doi.org/10.3390/forecast4040042

Dvulit, Z. P., & Maznyk, L. V. (2024). The role of business analytics in the era of big data: New opportunities for managerial decision-making. *Management*

and Entrepreneurship in Ukraine: the stages of formation and problems of development, 6(2), 152–165. https://doi.org/10.23939/smeu2024.02.152

Falahat, M., Cheah, P. K., Jayabalan, J., Lee, C. M. J., & Sia, B. K. (2023). Big data analytics capability ecosystem model for SMEs. *Sustainability, 15*(1), Article 360. https://doi.org/10.3390/su15010360

Filipova, L. (2022). Business intelligence systems: Modern development trends. *Library Science. Record Studies. Informology, 18*(1), 43–48. https://bdi.com.ua/web/uploads/pdf/CaC_№2_2023_Filipova.pdf

Jun, S.-P., Yoo, H. S., & Choi, S. (2018). Ten years of research change using Google Trends: From the perspective of big data utilizations and applications. *Technological Forecasting and Social Change, 130*, 69–87. https://doi.org/10.1016/j.techfore.2017.11.009

Kashchena, N., Ostapenko, R., & Velieva, V. (2024). Business analytics as a data processing tool. *Economy and Society*, (62). https://doi.org/10.32782/2524-0072/2024-62-14

Raju, S., Ravinder, D., & Kumar, N. S. (2024). The role of data analytics in forecasting business trend – A study. *AIP Conference Proceedings, 2971*(1), Article 040041. https://doi.org/10.1063/5.0195754

Spaniol, M. J. (2024). Organizing foresight tools. *World Futures Review, 16*(3), 261–276. https://doi.org/10.1177/19467567241262951

Tawil, A.-R. H., Mohamed, M., Schmoor, X., Vlachos, K., & Haidar, D. (2024). Trends and challenges towards effective data-driven decision making in UK small and medium-sized enterprises: Case studies and lessons learnt from the analysis of 85 small and medium-sized enterprises. *Big Data and Cognitive Computing, 8*(7), Article 79. https://doi.org/10.3390/bdcc8070079