

ISSN 2789-3308

ECONOMIC REVIEW

National Bank of the Republic of Kazakhstan

No. 4, 2023



NATIONAL BANK OF KAZAKHSTAN

ECONOMIC REVIEW
National Bank of the Republic of Kazakhstan

Published by: National Bank of the Republic of Kazakhstan

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ISSN 2789-3308

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Using Machine Learning and Artificial Intelligence by a Monetary Regulator

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The paper describes the constituent models that form the basis of most machine learning methods and provides an algorithm for how the models work. An overview of international experience of countries, central banks and regulators that are the most advanced in this area using machine learning methods in forecasting and analytics in order to support financial stability, regulation and risk-based supervision, and cybersecurity is presented. The first steps of the National Bank of the Republic of Kazakhstan in applying machine learning methods are described. Possible risks associated with the use of artificial intelligence tools are reflected.

Key Words: machine learning, artificial intelligence, linear regression, decision tree.

JEL-classification: C45, C61, O23.

1. Preamble

In the field of artificial intelligence, machine learning is an advanced science that focuses on creating algorithms and statistical models and giving computers the ability to learn and make predictions or judgments without explicit programming. Machine learning includes a variety of methods and approaches that use computation and data to iteratively improve the performance of a specific activity.

In other words, machine learning refers to the ability of computers to automatically recognize patterns, extract useful features, and generate accurate predictions or judgments based on observed data. Iterative analysis of huge volumes of data allows improving models and gradually improve their performance. Machine learning models can use a variety of data formats: text, image, audio, categories, numbers, and others.

The ability of a machine learning model to perform depends on the availability of representative, high-quality training data. The model can generalize existing patterns to make accurate predictions from the data, using algorithms designed to find relationships in a data set. Machine learning models can vary greatly in complexity and interpretability: some models prioritize speed and efficiency; others focus on interpretability and explainability.

Finance, healthcare, retail and transportation are just a few of the many industries that use machine learning. Examples include tasks such as self-driving cars, diagnosing diseases, creating customized advertising, and credit scoring. Machine learning is expected to play a more important role in the activities of central banks of countries in the future, as the amount of data available in digital format continues to grow exponentially along with the growth of computing capacities.

This paper discusses the experience in applying various machine learning algorithms used in central banks today.

2. Constituent Models

The following two algorithms are the bedrocks of any machine learning programs: supervised learning and unsupervised learning.

In the first case, the algorithm learns from labeled data, assuming that the target data is already known; in the second, unsupervised learning, the target data is unknown.

Supervised Learning

Linear regression is the simplest and most popular machine learning model. The main goal of this algorithm is to find the best linear equation that can predict the value of the dependent

variable based on independent variables. The slope of the line itself shows how much the dependent variable Y will change when the independent variable X changes by one unit.

Let's assume that X is the employee's length of service and the dependent variable Y is salary. To find the most appropriate salary level for a new employee, the model will calculate the following equation:

$$\hat{Y} = \theta_1 + \theta_2 X \text{ or } \hat{y}_i = \theta_1 + \theta_2 x_i,$$

where

$y_i \in Y (i = 1, 2, \dots, n)$ – labelled data (a known in advance wage scale);

$x_i \in X (i = 1, 2, \dots, n)$ – input data (years of experience);

$\hat{y}_i \in \hat{Y} (i = 1, 2, \dots, n)$ – projected data (position salary).

The model finds the most appropriate wage by optimizing θ_1 (intercept) and θ_2 (input coefficient). Once the potential salary range has been determined based on the candidate's experience, the difference between the actual and projected values will be calculated. This procedure is called a cost function or loss function, and its general formula looks as follows:

$$\text{Cost function}(J) = \frac{1}{n} \sum_n^i (\hat{y}_i - y_i)^2$$

The predicted data will be usable if the value of the cost function is minimal. To achieve this minimum, the model must be trained using an optimization algorithm called gradient descent. The idea of the algorithm is to start with random values θ_1 and θ_2 and iteratively update them to achieve a line of best fit (Figure 1).

Decision tree is a powerful and popular supervised machine learning algorithm primarily used for classification and regression tasks. The essence of the algorithm is to create a tree model of decisions and their possible consequences. Each internal decision node of the tree represents a decision based on a particular feature, and each leaf node represents the result or final decision (Figure 2).

Figure 1

Illustration of the Cost Function for a Linear Regression

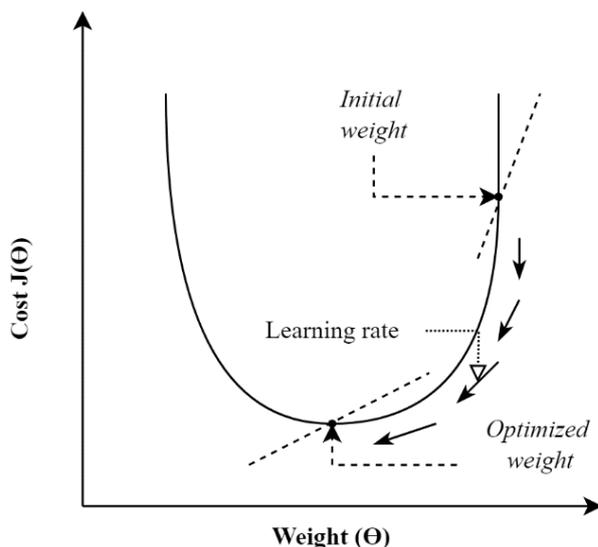
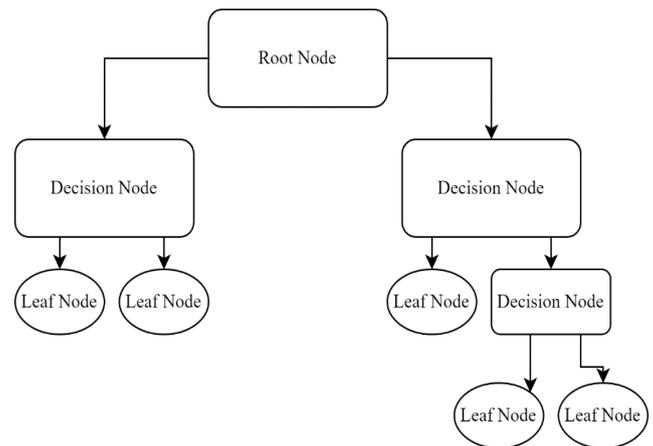


Figure 2

Illustration of the Decision Tree



Partitioning the data based on functions that contribute to the obtaining of maximum information or to the reduction of impurities¹ is the first step in creating a decision tree. The goal

¹ Impurity – measuring the homogeneity of a target variable in a subset of data, a randomly selected element from a data set that is incorrectly labeled according to the distribution of labels in the subset (geeksforgeeks.org).

of each partitioning is to identify subgroups that are as homogeneous as possible to create a tree reflecting the decision-making process.

To illustrate, let us consider a simple example. Suppose there is a data set of emails that need to be classified as spam or non-spam based on their characteristics. The decision tree algorithm will start by analyzing the entire data set as the root node. A feature (e.g., word frequency, sender information) is then selected and split into a dataset based on the values of that feature. In the first split, based on word frequency, for example, the decision tree forms an internal node in which the data is divided into two branches: low and high word frequency. The algorithm will continue to partition the data at each subsequent node based on other informative features until it reaches the final nodes, where the final classification is made.

Several metrics can be used to select the optimal split feature, including Gini impurity² or entropy³. These metrics help select the most informative feature for separation by measuring the level of impurity or randomness within a particular group.

The interpretability of decision trees is one of their key advantages. This concept is easy to describe with a clear visual depiction of how decisions are made at each node. Decision trees not only handle numerical and categorical data, but also do not require extensive data preparation for simulations.

However, when a tree becomes too deep or complex, it is prone to a phenomenon known as overfitting, which is a tree that does a good job of explaining the data in the training set but may not be accurate when dealing with unobserved data. Techniques such as pruning or limiting the depth of the tree are used to mitigate this effect.

Unsupervised Learning.

Unsupervised learning is a type of machine learning algorithm that looks for patterns in a data set without predefined labels. As the name suggests, this type of machine learning is unsupervised and requires no prep work. Because unsupervised learning does not rely on labels to identify patterns, the results tend to be less biased than other forms of artificial intelligence.

Unsupervised learning models use the following approaches:

- clustering: the process of finding similarities between unlabeled data and grouping them;
- association: searching for relationships between data in a given data set;
- dimensionality reduction: when there are a large number of objects in the data set, reducing the input data to a more manageable size while maintaining data integrity.

Unsupervised machine learning is used in cases where you don't have data about the desired outcome. For example, identifying the target market for a new product or service that the company has never sold before.

Unsupervised learning cannot be directly applied to regression or classification problems because, unlike a supervised learning model, this type of model does not specify a specific list of relevant outputs.

In general, supervised and unsupervised learning differ in the training approach and the data the model learns from as well as in their end application due to their inherent advantages. Supervised machine learning models are commonly used to predict outcomes based on unseen data, such as predicting fluctuations in housing prices. Unsupervised machine learning methods are commonly used to understand patterns and trends in unlabeled data. This approach is useful for clustering data, identifying underlying patterns in data sets, or detecting anomalies and outliers.

3. International Review

Machine learning models are becoming increasingly popular worldwide, including among central banks and regulators.

² Gini Impurity is an indicator that evaluates the accuracy of partitioning between classified groups. The range of impurity estimates ranges from 0 to 1, where 0 is when all observations belong to the same class and 1 is a completely random distribution (geeksforgeeks.org).

³ Entropy is a measure of the degree of randomness or uncertainty in a set of data (geeksforgeeks.org).

The US Federal Reserve publishes information on the use of machine learning methods such as SVM, Random Forest, XGBoost, LightGBM, which are used to identify financial crises, study Treasury maturity spreads and other financial market and macroeconomic variables, forecast recessions, measure aggregate housing wealth, measure job losses during the pandemic recession in real time, estimate the probability of default for publicly traded non-financial firms, and to estimate global trade flows [4, 12, 15, 18, 19, 20, 25].

It is noteworthy that Federal Reserve experts in a study [5] determined that neural networks as part of large language models (PaLM) more accurately predict inflation dynamics than economists. The results of the study showed that PaLM generate conditional inflation forecasts with lower root mean square errors than traditional forecasting methods.

The official information resource of the Bank of Canada publishes information on forecasting short-term macroeconomic indicators, such as the forecast of gross domestic product, retail and wholesale trade in Canada, based on payment data using machine learning models (SVM, Random Forest, Gradient Boosting) and artificial neural networks with direct communication. The papers reveal the capabilities of machine learning models in terms of reducing forecast errors compared to linear reference models, and also provide a solution to the problem of interpreting and refitting machine learning models to improve their performance [14].

In a policy brief published in February 2019, “Liquidity Management of Canadian Corporate Bond Mutual Funds: A Machine Learning Approach” [3], Bank of Canada analysts provide information on a machine learning approach that gives greater flexibility in describing relationships than linear models using liquidity data of Canadian corporate bond funds as an example..

In September 2023, the Bank of Canada published a study [2] that examined whether machine learning algorithms could outperform a linear model in predicting monthly house price growth. It was concluded that support vector regression and multilayer perceptron can perform better than the linear model and also produce slightly lower standard deviations than the linear model. However, the improvement in forecast accuracy is not always statistically significant; in addition, machine learning models are much more complex, and the economic interpretation of results is less clear. The study authors suggest that machine learning methods can significantly outperform linear regression in making predictions using non-traditional datasets (i.e. unstructured, high-frequency or sentiment data).

In the analysis of the sphere of cash circulation, double machine learning methods [10] are also used to study the pattern of distribution of banknotes and the duration of their circulation.

Artificial intelligence is also widely used in the field of cybersecurity. In November 2019, the Bank of Canada announced [23] that it had begun collaborating with external partners to test the potential of using machine learning as a way to detect anomalies in the central bank’s infrastructure and reduce the risk of cyber incidents.

In 2018, the Bank of Canada announced [1] a collaboration with the Creative Destruction Lab (CDL) to deepen its knowledge of cutting-edge technologies. The Bank of Canada’s partnership with CDL has allowed it to stay abreast of developments in artificial intelligence, machine learning, crypto asset technologies and quantum computing.

The most widespread activity in the field of application of artificial intelligence tools is sanctified by the Central Bank of Brazil. Being the leading monetary institution in the South American region, it is actively developing areas in which learning technologies play a large role. At the end of 2022, the World Bank recognized Brazil as the second country with the highest level of digital government development (GovTech Maturity Index) among 198 countries. The country moved up five positions compared to the 2021 ranking. In 2024, the Central Bank of Brazil plans to launch a pilot project for a national digital currency (CBDC). The Central Bank of Brazil has developed an instant payment platform called Pix. As of November 2021, it was reported that 6 billion transactions were made using the system, totaling approximately US\$682 billion.

Obviously, as part of full-scale digitalization, the country’s regulator is also striving to introduce modern technologies using artificial intelligence tools. In May 2018, the Central Bank

of Brazil launched a project called the Laboratory of Financial and Technological Innovation (LIFT) [24], a program aimed at promoting technological innovation in financial activities in order to reduce the cost of credit and make the national financial system more efficient. The LIFT program selected 18 of the 79 submitted collaborations between the Central Bank of Brazil and project teams from academia and the financial market that included blockchain technology, artificial intelligence, cybersecurity tools, and new models for using established technologies. Through this, the central bank was able to assess the impact of its regulation on innovation, identify barriers to the use of technological innovation, including the current regulatory framework, and identify areas for potential improvement in financial regulation. Information about the results of work in these areas was not published on the official page, although it was announced.

At the same time, scientific works on the results of using machine learning tools in the field of forecast estimates, financial services, and supervisory activities of the regulator were published on the official website of the Central Bank of Brazil. In particular, to monitor the phases of the business cycle, a model was built using the TensorFlow method and the transfer learning capabilities of artificial neural networks, which combine deep neural networks with transfer learning to determine the phases of the business cycle subject to limited data, were investigated [17]. The approach has demonstrated good empirical performance on data from the USA, Europe and Brazil, becoming a potential complementary tool for governments and the private sector, taking into account national and international economic conditions.

To forecast inflation in Brazil, tools based on a regression tree (Random forest, Quantile regression forest, XGBoost) were used [13]. According to analysts, the use of these tools over long horizons showed better results compared to traditional linear forecasting methods.

In addition, analysts at the Central Bank of Brazil published an article [16], which says that machine learning methods can be applied to evaluate information extracted from the Federal Open Market Committee statements on forecasting macroeconomic and financial variables. The results of the study showed that this approach is viable, can be scalable in other domains, and is easily applicable to datasets containing many more documents and words.

In January 2019, the Central Bank of Brazil launched the Din web application [9], a communication channel designed to make it easier for people to access information about their current relationships with financial institutions. According to the regulator, the Din chatbot, built on artificial intelligence and machine learning technology, helps Brazilian citizens to analyze reports on their debts, foreign exchange transactions, accounts and other financial assets and liabilities.

In the 2021 annual report [6], the regulator announced the gradual development of supervisory tools to automate procedures for checking and assessing credit fintech companies. The automation is based on two tools: ADAM (Portuguese acronym for sample-driven machine learning) and EVE. ADAM is a system whose purpose is to find credit transactions for which expected losses have not been properly recognized by financial institutions. The system uses a training dataset of more than ten thousand reviews performed by inspectors over recent years. ADAM processing speed is more than three million credit transactions in one day. To carry out the same work would require the work of ten highly effective inspectors of the Central Bank of Brazil for more than seventy years. EVE is designed to automatically perform end-to-end formal performance activities. In addition to the analysis typically performed when auditing financial institutions, the tool prepares reports and draft letters to send to respondents. The current version checks credit risk, but in the future it is planned to expand the functionality in such areas as checking treasury transactions and the financial and economic situation. It has been estimated that the program can perform 80-90% of typical tasks usually performed manually. The automation was initially used as a pilot project in the lending fintech segment, but according to the Central Bank of Brazil, the methodology has great potential to be extended to other segments.

Many central banks have begun to use machine learning algorithms to create new data review procedures to carefully assess data quality and adjust data more efficiently. One of the latest examples is the European Central Bank's recent attempt to strengthen data quality checks

when producing information on short-term euro interest rates. The data comes from money market statistical reporting, which includes 47 institutions in 10 countries and covers a total of about 50,000 daily transactions [11]. This dataset provides information about individual transactions observed in money markets.

In its study “Machine Learning in Central Banking,” the Irving Fisher Committee on Central Bank Statistics noted that machine learning tools are being used by many central banks, sometimes in combination with traditional methods, to develop new data verification processes and more efficient data adjustments. An example is the European Central Bank’s anomaly detection project to support data quality checks in the compilation of short-term euro interest rate statistics. Issues related particularly to the presence of non-numeric variables, skewed distributions, and the need to quickly check data quality have been addressed using machine learning techniques to convert categorical variables to numeric ones and exploit observed correlations and anomaly detection using various models/algorithms [11].

In addition to simplifying the management of large numbers of data series, the use of machine learning approaches can help address the vulnerability of macroeconomic time series to sharp and unexpected shocks (for example, the Covid-19 epidemic). These modifications mean that data quality monitoring processes will be reviewed regularly over time. To solve this problem, a method developed jointly by the Bank of England and the European Central Bank is based on a clustering procedure and uses an updated database to automatically identify anomalies. This is achieved by analyzing correlations between data, which in this case includes 6,638 individual time series from 31 countries [11]. The procedure includes data standardization, smoothing the series using a specific filter (LOWESS algorithm), identifying specific clusters using a special ML (Affinity Propagation AP) algorithm [34] and detecting potential anomalies in each cluster using an algorithm for grouping similar observations applying the density-based spatial clustering of applications with noise (DBSCAN) based on spline. This strategy is data-driven, appears more resilient to systemic shocks, and is highly automated.

In general, machine learning-based models seem particularly well suited to sifting through many candidate variables to find explanatory functions. One recent example is BIZMAP, a Bank of France project to help small and medium-sized enterprises by analyzing the wealth of available and open information to identify regions of the European Union suitable for export or direct investment. The intelligence of the tool is programmed as follows: missing data is filled using machine learning tools, relevant variables are selected to explain exports and foreign direct investment, and a gravity trade model is estimated using least absolute reduction and selection (Lasso) methodologies – a regression analysis method to select more accurate explanatory variables [33].

Another interesting use of machine learning is to identify fintech organizations with technological innovations used to support or provide financial services (IFC (2020b)). To detect and track these organizations, the Bank of France has developed an additional tool based on machine learning. The goal was to overcome the lack of information about them due to their rapid development and closure. Using publicly available data (covering 84 features) and an isolated forest outlier identification algorithm [35], the program classified whether enterprises were potential fintech companies. 10,000 individual non-fintech companies were audited, allowing subject matter experts to identify 350 organizations that have the potential to become a fintech company.

The Deutsche Bundesbank (German Central Bank), like the Bank of France, has a built-in tool for finding fintech companies. The tool created by the Deutsche Bundesbank, unlike the Bank of France model, only needs a preliminary list of websites as input for training and validation. The tool scrapes these websites to create a graphical database with businesses, named entities (people, organizations, and locations), and keywords as nodes. In this scenario, 515,000 web pages containing 1.1 million named objects were processed to generate the graph [11]. A neural network algorithm determines whether a new unclassified company is a fintech company based on its location on the graph.

Deutsche Bundesbank also uses machine learning algorithms, particularly unsupervised machine learning, to identify outliers in a variety of large financial data sets, including interest rates, money market statistics, industry securities, and mutual fund holdings, that vary widely in their timing, characteristics, and outlier densities. This method uses various machine learning algorithms to categorize data into discrete clusters, evaluate differences, compress data for analysis (reducing the amount of input data that can later be reconstructed in more detail using self-supervised machine learning tools such as autoencoders), and explain based on developed judgments or forecasts.

Macrostatistical analysis can be made more efficient using machine learning by improving the quality of the data analyzed. For example, the Bank of Spain and the Institute of Knowledge Engineering have created a machine learning-based tool that interpolates missing data and also identifies anomalies in the accounting records of non-financial businesses. The tool made it easier to fix 0.5 million reports with poor data quality and 6.2 million reports with missing data. The isolated forest option was chosen among several approaches used to find outliers, including principal component analysis, Mahalanobis distance⁴ and the KNN. Information missing for one variable in a firm's report can be approximated from the values of other variables using the missing values that were imputed using regression analysis. Overall, this study showed how important it is to properly select model features, consider domain expertise, and the impact of computational costs throughout the training phase.

The Central Bank of Malaysia has demonstrated the usefulness of using machine learning algorithms to extract sentiment indicators from news content, which can improve the accuracy of forecasting important macroeconomic indicators such as GDP growth and its demand side component. The method is based on constructing a corpus of more than 720,000 business and financial news from 16 sources [22]. Good forecasts received before the pandemic largely turned out to be reality after the shock. However, evaluations have also shown that machine learning-based predictions may not always outperform other models because they may vary depending on the variable at hand.

Indonesia's regulator also analyzes media and news data to improve its forecast of the labor market. The method involves creating a statistical employment vulnerability index based on NLP methods using a corpus of approximately 27,000 monthly news items over 23 years [7]. This allows us to predict labor market vulnerabilities and assess the risks of unemployment over a certain period of time and in specific industries.

Bank Indonesia has developed a machine learning-based method to better capture the impact of foreign investor behavior on exchange rate changes and monetary policy choices [7]. The project involved studying more than 2,000 factors obtained from private data providers, as well as collecting regulatory data on government bond transactions. To begin with, tree classification algorithms such as Decision tree, Random Forest and XGBoost were used to determine the most significant variables and forecasting lags. In the second stage, using logistic regressions (SVM, KNN, Decision tree, Random Forest, XGBoost and LSTM), significant variables and fitted lags, the daily investment amounts of individual investors were predicted. The LIME algorithm was used to explain the predictions and validate the results. Bond yields have been found to be a key indicator of inward investment flows depending on the investor profile.

The Bank of Japan uses credit scoring models using machine learning methods. The bank's research division assessed the predictive accuracy of machine learning and the good descriptiveness of logistic regression. The Bank of Japan used explainable artificial intelligence techniques to measure the significance of variables, unlike European Union banks. The results indicate significant improvements in forecast accuracy due to the improved ability of machine learning algorithms to capture the nonlinear relationship between financial performance and credit

⁴ The Mahalanobis distance is an effective multivariate distance metric that measures the distance between a point and a distribution. This is an extremely useful metric that is great for detecting multivariate anomalies, classifying highly imbalanced data sets, and single class classification (<https://www.machinelearningplus.com/statistics/mahalanobis-distance/>).

ratings [8]. However, the Bank of Japan does not yet consider the use of machine learning in other areas, such as monetary policy and other areas.

Among the CIS countries, the Central Bank of Russia actively highlights its activities on the use of machine learning tools on its official Internet resource. The report of analysts of the Central Bank of Russia [30], published in March 2022, assesses the quality of forecasting regional inflation using machine learning, which was calculated by three methods with L1-, L2-regularization (lasso regression, ridge regression, elastic network) and two ensemble methods (Random Forest, Decision tree, Gradient Boosting). The analysis showed that the quality of inflation forecasts using machine learning methods is comparable to traditional econometric methods, with a preliminary assessment of the forecast quality and the feasibility of their use. For periods of more than a year, machine learning methods show better quality than benchmarks, in contrast to forecasts for up to a year, while forecasting based on combined machine learning models is in most cases preferable to any one.

Machine learning methods can be used to improve models used to ensure financial stability by including additional sources of information: the CBRF developed machine learning algorithms (logistic regression in combination with Random Forest), which, in addition to annual accounting data, used transaction data from the Bank of Russia's payment system. The results of the study showed that additional data added to accounting data improves forecasting performance. In addition, the models showed that using only additional data, although inferior to models based on traditional data, allows obtaining estimates of the probability of default earlier, which can be especially important [38].

In addition, machine learning techniques (Random Forest, Extremely Randomized Trees, Gradient Boosting, XGboost) have been used in a new approach to identify news that can have the greatest impact on shaping public price perception, this can be used in a predictive model of the probability of default of companies using data from social media [27].

In its 2022 annual report, the Central Bank of Russia noted a strategically significant result in identifying and assessing the risk of suspicious transactions [29]. The "Know Your Client" platform service is implemented on the basis of an automated risk assessment model using artificial intelligence tools, which makes it possible to identify high-risk clients, as well as monitor the entire banking sector.

The information about the use of machine learning methods by regulators in other CIS countries has been underserved.

In the Strategy of the Central Bank of Armenia for 2021, digital transformation is defined as a strategic priority for the development of the financial system. To solve this problem, a new approach to regulation was presented by coordinating legislation with machine learning and artificial intelligence technologies. The purpose of the transition to new technologies was to reduce the load of the Central Bank for the collection of these financial institutions and the formation of reporting systems, optimization of work processes and reduce temporary costs related to compliance with regulatory requirements of supervisory authorities. In the annual report of the Central Bank for 2021, the transition to new management models based on new technologies, machine learning and artificial intelligence was also defined as the most important call. At the same time, in January 2022, [31] information was published about the statement of the Central Bank of Armenia on the use of artificial intelligence to control the financial system. In particular, we are talking about a program that allows you to consider millions of bank transactions at high speed and determine the risks and cases of fraud at online banking.

The Central Bank of Georgia has developed a provision on risk management for statistical models using artificial intelligence and machine learning [36]. According to the document, all statistical models of the financial market entities under the supervision of the National Bank of Georgia, built on artificial intelligence and machine learning, should be implemented in accordance with the requirements of the mentioned document.

4. Using Machine Learning at the National Bank of the Republic of Kazakhstan: Present-Day Situation and Prospects

The practice of applying the artificial intelligence methods at the National Bank of the Republic of Kazakhstan is only gathering its momentum. Thus, machine learning methods are used to predict the level of problem loans in the banking sector when macroeconomic shocks occur. As part of the development of the National Bank's macro stress testing methodology, Bayesian Model Averaging (BMA) and Bayesian Additive Regression Trees (BART) are used. These methods show the greatest efficiency when there is uncertainty in choosing the best variables to build a model, when working with complex and non-linear relationships, compared to traditional regression methods.

In 2020, the National Bank Economic Review published a paper on the use of machine learning models Random forest, XGBoost, and Recurrent neural network in forecasting inflation [28]. Based on the results obtained, it was concluded that the use of machine learning models can improve the accuracy of inflation forecasts. All machine learning models considered in the work demonstrated better predictive power compared to the reference model. The limiting factors for the widespread use of machine learning models are the need to have forecasts of all explanatory variables, as well as the lack of ability to interpret the resulting forecasts.

In 2021, the National Bank conducted a risk analysis of consumer loan growth using machine learning algorithms [26]. To assess the creditworthiness of individuals, linear (logistic regression, stochastic gradient descent) and nonlinear (neural networks, KNN, Decision tree, Random Forest, XGBoost, Naïve Bayes) models were used. Based on the results of the study, it was concluded that models based on regulatory data could become an adequate basis for assessing credit risk for consumer loans issued by second-tier banks, and could also help the central bank predict potential systemic risks.

The development of the digital asset industry and global trends in digital currencies of central banks did not bypass the National Bank of Kazakhstan. At the end of 2022, a decision was made on the need to introduce the digital tenge. For the digital tenge, a hybrid technology of centralized issuance based on a token is used – the digital tenge integrates the monetary properties of fiat money and the payment capabilities of cryptocurrencies. In 2023, two contours of the digital tenge platform were created: pilot industrial and scientific research. As part of the pilot operation, basic scenarios for using the digital tenge as a means of payment are being implemented, integration with financial market participants and financial infrastructure providers is being carried out, and a mechanism for programmable payments using smart contracts is being introduced. As part of the research framework, cross-border settlements in digital currencies of central banks are tested, interaction with participants in the digital asset market is carried out, and the possibilities of using the digital tenge as a settlement infrastructure for tokenized assets are considered. [37].

On November 15, 2023, the digital tenge platform was launched in a limited environment and with real users. The digital tenge is planned to be introduced before the end of 2025.

In the field of information security, systems with connected machine learning modules Next Generation Firewall – Check Point and Endpoint Detection and Response – Trend Micro are used. The main principle of operation of machine learning modules in information security systems is the empirical study of user behavior patterns to make decisions based on available historical data and conclusions. If user actions deviate from “normal” behavior, the information security system performs, for example, automatic blocking of requests or informs the operator about a possible cyber-attack. However, the intervention of the security operator is still required to make the necessary corrections and adjustments based on the results of machine learning. In addition, Privilege Access Management is used to identify unusual behavior of the administrator account. At the moment, the artificial intelligence database is being filled for the specified information security purposes.

Today, artificial intelligence techniques are most actively used to analyze data and create scoring models in the Python programming language, which provides the flexibility and efficiency

of tools for implementing these technologies. Python libraries and extensions are used to process data and create models: Scikit-learn, NumPy, SciPy, Matplotlib and Seaborn, Pandas.

And scoring models also use decision tree algorithms with gradient boosting: LightGBM, XGBoost, Catboost.

Currently, it is planned to use machine learning methods to implement mechanisms for collecting, storing and processing all operated data; analytical services will be implemented to support the decision-making based on transaction data for the financial market participants. As part of the technical implementation of analytics tools, it is planned to use machine learning methods to identify deep relationships in transactional activity.

5. Risks and Challenges

The use of machine learning in central banks can have a number of benefits, including improved forecasting accuracy, improved decision analysis and evaluation, and improved decision-making efficiency. However, there are also a number of possible technology-related threats that central banks may face when applying machine learning solutions.

1. Data quality and bias. To make reliable predictions, machine learning algorithms rely heavily on huge amounts of high-quality data. It can be difficult for central banks to obtain and manage the necessary data, especially if it is fragmented or missing. Additionally, if historical data is skewed or misses important aspects, machine learning models can produce skewed results, leading to poor policy choices.

2. Interpretability and explainability. Because of their opacity, machine learning models, especially complex ones such as deep neural networks, are often called “black boxes.” Unlike typical econometric models, the inner workings of these algorithms are difficult to understand, making it difficult to understand the underlying variables that influence the forecasts. For policymakers and other stakeholders to evaluate and have confidence in decisions made using machine learning, central banks must strike a balance between accuracy and interpretability.

3. Algorithmic stability and reliability. Machine learning models can be sensitive to changes in input data, resulting in instability and inconsistent predictions. Central banks need to regularly monitor and update models to ensure their reliability over time. Problems arise when there are sudden changes in economic conditions, policy changes, or unexpected events, as these can significantly affect the accuracy and reliability of machine learning algorithms.

4. Cyber security and data confidentiality. The confidential and sensitive information stored at central banks makes them a desirable target for hackers. For machine learning algorithms to work properly, they require a large amount of data, particularly financial or personal data. To prevent data breaches and maintain the trust of stakeholders, it is critical to maintain strong cybersecurity measures and ensure compliance with data privacy laws.

5. Risk of dependence on technology and creation of monopolies. Technologies in the field of artificial intelligence and machine learning are products of large vendors, which, as a rule, are monopolists in this area. This fact can create dependence on their activities, and, therefore, any change in the terms of delivery of services, the emergence of various types of system vulnerabilities can critically affect the work of the organization. At the same time, the scope of activity of software product developers goes beyond financial regulation.

However, at present there are no software product developers in the Kazakh market that could compete with foreign suppliers.

6. Human-machine collaboration. While machine learning can automate and optimize many processes, human oversight and intervention is essential. Central banks must ensure that machine learning systems are aligned with regulatory and policy goals while avoiding over-reliance on automated decision-making. Additionally, personnel must be trained and understand the limitations and potential biases of machine learning algorithms to effectively mitigate risks.

By the way, in a recent interview with the Financial Times, the Chairman of the US Securities and Exchange Commission said [34] that without rapid intervention, artificial intelligence will “almost inevitably” lead to a financial crisis within a decade. Concerns include

the potential for predictive models to be used without human oversight, the lack of transparency and explainability of models, and the fact that artificial intelligence technologies are created by companies outside the Commission's remit.

6. Conclusion

Machine learning mechanisms are rapidly gaining momentum. The demand for them from the financial market participants will only grow. Moreover, technological modernization and digitalization of the economy are designated as a priority area of development in the message of the Head of State to the people of Kazakhstan and are reflected in conceptual documents on digital transformation, development of the information and communication technology industry and cybersecurity. As a result, it is planned to make the work of the public sector transparent, efficient and of high quality, which will significantly reduce the time and money in the interaction of a government authority with the population, financial organizations, as well as in work between government authorities. Thus, the use of developed technologies in all sectors of the economy, the transition to a digital state is what the funds and efforts of both the state and the business environment of Kazakhstan will be directed towards.

The areas where machine learning technologies are applied at the National Bank can be very extensive: in the field of monetary policy – improving forecasting models for preparing decisions on the base rate and inflation; in the field of regulation and risk-based supervision – transaction monitoring (detection of fraudulent schemes and anti-money laundering), identification of affiliates of financial organizations; in the field of statistics and reporting – improving the quality of reports submitted (collection of more detailed information, minimizing manual data processing); in the field of ensuring financial stability – constructing financial risk forecasts, conducting stress testing.

In conclusion, it is worth mentioning that the implementation of machine learning in central banks comes with a number of risks and challenges that need to be addressed for its successful implementation. However, with careful planning, application of accurate data, measures to improve interpretability, reliability testing, adherence to cybersecurity protocols and human-machine collaboration, such risks can be effectively managed, allowing central banks to harness the full potential of machine learning for more informed and effective decision-making.

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List of Machine Learning Models

No.	Name	Description
1.	Support vector machine (SVM)	The support vector machines, one of the most popular teaching methods that is used to solve the problems of classification and regression. The main idea of the method is to build hyperplane that separates the objects of sample in the optimal way. The algorithm works with the assumption that the greater the distance (clearance) between the separating hyperplane and the objects of the separated classes, the less the average classifier error. The most common models are an elastic net (Zou and Hastie, 2005), support vectors (Smola and Scholkopf, 2004), an algorithm for supervised learning used to predict discrete values (Boser et al (1992))
2.	Decision tree	A decision tree as a means of supporting the decision-making, applied in machine learning, data analysis and statistics, is widely used in intellectual data analysis. The goal is to create a model that predicts the value of the target variable based on several variables at the input
3.	Random Forest	The random forest method is a machine learning algorithm, consisting in the use of the decision tree ensemble. The algorithm combines two main ideas: the Breiman's bagging method and the random subspace method. The algorithm is used for the tasks of classification, regression and clustering. The main idea is to use a large ensemble of decision trees, each of which in itself gives a very low quality of the classification, but due to their large number, the result is good
4.	Extremely Randomized Trees (Extra Trees)	The ensemble algorithm of machine learning based on decision trees. Forecasts are made by averaging the predictions of decisions in the case of regression or using the majority of votes in case of classification
5.	Gradient Boosting	A machine learning technique for regression and classification tasks that produces a predictive model in the form of an ensemble of weak prediction algorithms, typically decision trees. The most commonly used models include gradient boosting (Friedman, 2001)
6.	Bayesian Additive Regression Trees (BART)	Bayesian additive regression trees, a tree-based machine learning method that is used to solve regression and classification tasks
7.	eXtreme Gradient Boosting (XGBoost)	A library used in machine learning that provides functionality for solving problems related to gradient boosting regularization. The library is supported by C++, Java, Python R, Julia, Perl and Scala programming languages
8.	LightGBM	The gradient boosting machine learning library uses a technique called one-way gradient boosting to filter the data and find the cutoff point between the data.
9.	Large Language Models	Large language models, neural networks models that use machine learning algorithms to generalize, predict, and

		generate human languages based on large sets of text data. The operating principle of such models is based on determining the probabilistic combination of words and their meanings in a given context using certain calculation algorithms. The most famous LLMs include: GPT-3 (OpenAI), LaMDA (Google), BERT (Google), BLOOM (BigScience)
10.	Pathways Language Model (PaLM)	A machine learning technique developed by Google AI Research, similar to the GPT-3 model, can analyze natural language and generate text in response
11.	Neural networks with direct connection (Bengio, 2009)	An artificial neural network in which connections between nodes do not form a loop and form the basis of many important neural networks
12.	Double machine learning (DML)	A statistical method used to estimate cause-and-effect relationships in econometrics and other fields. The approach combines two machine learning models to eliminate the potential confounding effect of covariates or other variables that may affect the outcome being studied
13.	TensorFlow	Library for machine learning, a group of technologies that allow one to train artificial intelligence to solve various tasks. The library was originally developed by Google for Python and is most often used with it
14.	Quantile regression	Quantile regression, a statistical technique used to model the relationship between a dependent variable and one or more independent variables by estimating conditional quantiles of the dependent variable. Unlike traditional linear regression, which models the conditional mean of the dependent variable, a quantile regression simulates the conditional distribution of the dependent variable
15.	k Nearest Neighbours (KNN)	A supervised machine learning algorithm, a method for solving classification and regression tasks, based on searching for the nearest objects with known values of the target variable
16.	Long Short Term Memory (LSTM)	Long short-term memory networks, which are typically able to recognize long-term dependencies, are well suited to learning from time series classification, processing, and forecasting tasks where important events are separated by time lags of uncertain duration and boundaries
17.	Local Interpretable Model-agnostic Explanations (LIME)	A method that allows evaluating the usefulness of various machine learning models and increase the level of confidence in them by examining their performance on specific examples from an existing sample
18.	LOWESS	A general and flexible approach for approximating 2D data
19.	Affinity Propagation (AP; Frey and Dueck (2007)).	A versatile clustering algorithm that stands out for its unique approach to discovering hidden patterns in data
20.	Density-based spatial clustering of applications with noise (DBSCAN)	An unsupervised learning method used to build machine learning models and algorithms for clustering

21.	L1-, L2-regularization	Two closely related techniques that are used in machine learning algorithms to reduce the degree of model overfitting. Eliminating overfitting leads to the generation of a model that provides better forecasting
22.	Bayesian Model Averaging	A machine learning technique that uses multiple trained algorithms to obtain better predictive performance than could be obtained from each algorithm individually. Unlike a statistical ensemble in statistical mechanics, which is usually infinite, an ensemble of models in machine learning consists of a specific finite set of alternative models, but usually allows for significantly more flexible structures
23.	Recurrent neural network	Recurrent neural networks, where connections between elements form a directional sequence. This enables to process series of events in time or sequential spatial chains
24.	Naive Bayes	A simple probabilistic classifier based on the application of Bayes' theorem with strict (naive) independence assumptions. The advantage of a naive Bayes classifier is the small amount of data required for training, parameter estimation and classification
25.	Next Generation Firewall	Built-in network security platform that combines a traditional firewall with other network device filtering features. NGFW performs deep packet inspection that goes beyond ports and protocols
26.	Endpoint Detection and Response (EDR)	A class of solutions for detecting and studying malicious activity on endpoints: network-connected workstations, servers, Internet devices, and so on. Unlike antiviruses, whose task is to combat standard and widespread threats, EDR solutions are focused on identifying targeted attacks and complex threats
27.	Privilege access management (PAM)	Information security solution that monitors, detects and prevents unauthorized privileged access to critical resources, helping protect organizations from cyber threats
28.	Catboost	A machine learning library developed by Yandex, whereby one can effectively train models on heterogeneous data, including those that are difficult to represent in the form of numbers (for example, types of clouds or product categories)

Analysis of International Experience in Improving the Investment Attractiveness of the Country. Investor Insight into the Investment Climate

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“Over the past few years, Kazakhstan has made significant progress in improving its investment regime and business environment,” the OECD notes. This view was echoed by the US State Department in its 2018 Investment Climate Statement, which called Kazakhstan “the best investment climate in the region” and noted its “substantial progress” towards creating a market economy.

The paper provides an informational overview of the international context in the field of investment implementation, as well as information on the results of international research to identify factors influencing the level of foreign investment. The author has prepared a brief overview of the external sector statistics of the Republic of Kazakhstan in terms of foreign direct investment (FDI) and measures taken by the Republic of Kazakhstan to develop and promote foreign investments in the Republic of Kazakhstan.

Particular attention is paid to conducting a comparative analysis of investment performance of countries using qualitative methods, based on their results additional factors influencing the investment climate are identified using the example of countries that have indicators similar to the Republic of Kazakhstan in the global innovation index (Azerbaijan, Argentina, Bulgaria, Georgia, Kyrgyzstan, Tajikistan, Mexico, Uzbekistan). The analysis also provides data on reforms and experience of foreign countries in attracting FDI, including Mexico and Argentina – on measures to stimulate FDI, Bulgaria, Azerbaijan, the Kyrgyz Republic, Georgia, Uzbekistan, Mexico, and Tajikistan – on ensuring price stability.

The paper is supplemented with a selection of risks that negatively affect investment demand, according to large country investors. The paper also provides recommendations from international organizations to improve the investment climate (NC Kazakh Invest JSC, World Bank, International Monetary Fund, US State Department, Ernst & Young, OECD, Bloomberg, German investors).

Key Words: foreign direct investment, investment climate, global innovation index, reforms and stimulation of foreign direct investments, investment risks, external sector statistics, investment potential, investment attractiveness.

JEL-classification: E22, F21, G11, F01, F63.

I. Preamble

According to UNCTAD⁵ [1], after a sharp drop in 2020 and a strong rise in 2021, global foreign direct investments (FDI) at the end of 2022 fell to US\$1.3 trillion (-12%) due to a reduction in the volume of financial flows and transactions in developed countries to US\$378 billion (-37%). International project finance and cross-border mergers and acquisitions have been particularly affected by deteriorating financing conditions, rising interest rates and uncertainty in capital markets.

In 2023, the business environment for international business development and cross-border investment remained challenging, also due to geopolitical tensions. UNCTAD expects downward trends in global FDI to continue.

The dynamics of real investment were more positive: in most regions and industries there was an increase in the number of announcements of new investment projects. FDI to developing

⁵ United Nations Conference on Trade and Development is an inter-governmental organization with the UN Secretariat

countries has increased modestly and unevenly, with a focus on emerging market economies. FDI inflows to least developed countries have declined.

Industry trends show an increase in projects in infrastructure and industries under pressure from supply chain restructuring, including electronics, automotive and engineering. Investment in digital economy sectors has slowed after strong growth in 2020 and 2021. The number of investment projects in the energy sector remained stable, easing concerns about a possible decline in investment in fossil fuels due to the energy crisis.

Thus, in developing countries, FDI volume amounted to US\$916 billion (+4%), or more than 70% of the global volume, which is a record figure. The number of greenfield investment project announcements in developing countries increased by 37%, and international project finance deals by 5%, which is a positive sign for investment in industry and infrastructure.

In both developed and developing countries, investment promotion activities are important. Most measures taken by developing countries are aimed at simplifying procedures and opening up new sectors or activities. For the first time since the pandemic, the number of investment-friendly measures has also increased significantly in developed countries. These include initiatives to stimulate the development of renewable energy and climate-related investment. Developing countries often use tax incentives that do not require an initial outlay of scarce public funds, while developed countries prefer financial incentives and more complex instruments such as feed-in tariffs.

II. An Overview of Factors Affecting the Level of Investments

The indicators that determine investment attractiveness include market size, population, economic openness, macroeconomic and political stability, and the development of economic and political institutions. According to analysts of the World Economic Forum (WEF) [2], factors influencing the FDI inflow also include: a stable and developed financial system and infrastructure, and the availability of a qualified workforce.

In turn, according to the Global Competitiveness Report [2], relatively low volumes of attraction of foreign investment may be a consequence of low qualifications of university graduates, poor quality of infrastructure (average impact), difficulties in finding qualified workers (above average impact), low efficiency of border control (below average), low indicators of political and economic freedom (Belarus, Kazakhstan, Kyrgyzstan and the Russian Federation are assessed as moderately free countries, Armenia is assessed as a free country).

A review of FDI determinants by S. Tokar [3] shows that market size and availability of infrastructure have a positive impact on foreign investment, while wage levels, corruption, corporate tax rates and political risks have a negative impact on FDI inflows.

Based on the results of econometric calculations in the long term, P. Jaiblai and V. Shenai [4] identified a statistically significant positive effect of inflation and infrastructure, an insignificant but positive effect of the exchange rate and economic openness, as well as a negative effect of income level and market size in sub-Saharan countries.

A. Ridzuan et al. [5], using the example of ASEAN-5 countries, constructed an equation for the dependence of FDI on the rate of economic growth, domestic investment, foreign trade turnover, spending on final consumption of goods and services, and the level of development of the financial sector.

G. O'Meara [6] analyzed the dependence of FDI based on the example of 99 countries according to the following indicators: GDP per capita, income tax, volume of exports of goods and services, education, household spending on final consumption as an indicator of aggregate demand, etc. As a result of econometric analysis, the author concluded that population size, GDP per capita, household spending on final consumption and national broadband coverage are statistically significant for FDI, while education and corporate tax rate are insignificant.

K. Dellis et al. [7], studying FDI flows in the EU countries, focused on the quality of institutions, considering this factor not only as a key factor for investors, but also as a factor influencing a number of other indicators of economic development that attract potential investors.

The authors' research was aimed at studying the influence of political institutions, labor market regulation, the goods and services market, as well as a number of other regulatory mechanisms on the FDI inflow, for which the Global Competitiveness Index (GCI), the Heritage Economic Freedom Index, and the Fraser Institute Economic Freedom Index were used. To assess the quality of institutions, an indicator of performance of public administration was used⁶. In addition, the FDI dependence equation included such indicators as the volume of nominal GDP as well as the percentage of state tax revenues and the volume of foreign trade turnover in relation to GDP. The authors' research confirmed the importance of quality political and economic institutions in attracting FDI.

J. Günther, M. Kristalova [8] point to the importance of having effectively functioning institutions of economic regulation, especially for countries with economies in transition, and also note the priority of such factors as market size, labor costs, and the degree of integration into the world economy. According to the authors, the institutions of Central and Eastern Europe remain underdeveloped.

The effect of institutional development on FDI inflow was also looked into by Sabir S., Rafique A., Abbas K., Makhmood N. et al. [9], emphasizing that its role in some cases is no less important than a number of macroeconomic factors. Sajilan S. et al. [10] included in the list of independent variables such factors as government stability, transparency of democracy, corruption, and the quality of bureaucratic procedures. Some experts cite the availability of natural resources as a factor in investment attractiveness, which contradicts the view of others [11] that resource-poor countries attract more FDI than resource-rich economies.

In turn, Loewendahl H. [12] emphasizes the need to promote investments by creating a country brand, increasing awareness and positive perception of the country by potential investors. The Fourth Industrial Revolution, driven by the rapid development and implementation of digital technologies, involves a rethink of the process of creating and distributing value, the effectiveness of which largely depends on the ability of enterprises to adopt and implement digital technologies. The digital economy leads to the need to define new rules and adapt existing regulations to them, and also creates new business opportunities: the transformation of all sectors of the economy can lead to improved quality of production of goods and services at lower costs.

Transport costs for digital products are close to zero, which ensures high geographic mobility of digital products compared to traditional industrial goods. Thus, digital technologies become a more significant factor of production compared to labor, land and the availability of natural resources. In such conditions, the country's potential for the introduction, use and development of information and communication technologies (ICT) becomes another factor that significantly influences the decisions of foreign investors.

WEF analysts also recognize the role of digital technologies and their diffusion in shaping the competitiveness of the economy, as reflected in the Global Competitiveness Report. Based on the indicators included in the report, a number of new factors of investment attractiveness can be identified: technology management, ICT implementation, digital skills of the active population.

Thus, the following factors influencing the FDI level are identified:

- GDP, GDP per capita at purchasing power parity (PPP), inflation rate, economic growth rate, economic freedom, economic openness, foreign trade turnover, availability of natural resources, infrastructure;
- the level of financial sector development, market size, exchange rate stability;
- macroeconomic and political stability, corruption index, quality of public administration, stability of governance, democratic transparency, maturity of economic and political institutions;
- population size and its growth rate, unemployment rate, availability of qualified labor force, percentage of population with access to the Internet, digital skills of active population,

⁶ [WGI 2022 Interactive > Home \(worldbank.org\)](https://www.worldbank.org/wgi/2022-interactive)

physical and human capital to the number of the employed, household spending on final consumption;

- the development level of ICTs and internal investments.

In addition, factors influencing the level of FDI include the ease of doing business and the average number of days required to open a company, the average number of days to pay taxes, global innovation index (GII), the knowledge intensity of GDP, protection of minority shareholders, the share of government debt to GDP, adjusted spread based on Moody's long-term default credit rating, country risk premium, refinancing rate, share of adult population using credit, credit availability.

III. An Overview of Investments in Kazakhstan

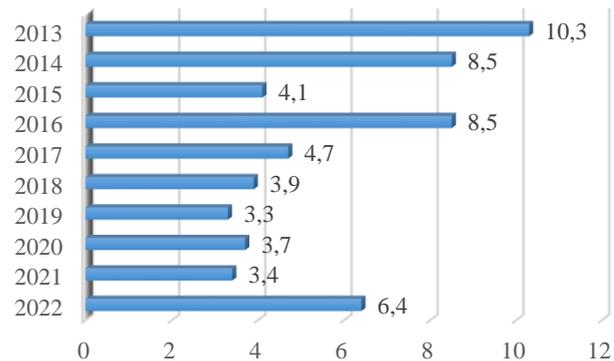
According to UNCTAD, the net inflow of FDI into the Republic of Kazakhstan in the period from 2005 to 2022 amounted to US\$142.2 billion, which significantly exceeds the cumulative volume of FDI of other countries in the Central Asian region (Table 1). At the same time, during this period, US\$17.9 billion were invested by Kazakhstan in other countries.

At the end of 2022, the net inflow of FDI into Kazakhstan [13] amounted to US\$6.4 billion. A significant increase in additional investments by international companies was directed to oil production, trade and the financial sector of the Republic of Kazakhstan.

Table 1
Statistics on FDI, by Central Asian Countries, for 2005–2022, US\$ bln.

Economy	FDI	FDI Outflow
Kazakhstan	142.2	17.9
Kyrgyz Republic	5.6	(0.5)
Tajikistan	5.3	0.4
Turkmenistan	39.2	n/a
Uzbekistan	22.1	0.06

Figure 1
Net FDI Inflows into Kazakhstan, US\$ bln.



Note: According to UNCTAD. Net FDI inflow/outflow

According to the National Bank of Kazakhstan

According to the Ministry of Foreign Affairs of the Republic of Kazakhstan, in 2022, 199 investment projects were commissioned in key sectors of the economy worth 2.3 trillion tenge (US\$5.1 billion). In 2023, it was planned to launch another 281 projects worth 1.9 trillion tenge (US\$4.2 billion). At the same time, the indicator of the consequences of attracting investments – gross national income per capita in the Republic of Kazakhstan amounted to US\$9,470 in 2022 (world average – US\$12,804, Kyrgyz Republic – US\$1,410, Tajikistan – US\$1,210, Uzbekistan – US\$2,190, and the Russian Federation – US\$12,830).

For the purposes of further analysis, the gross value of FDI inflow and its growth (year-on-year) is used as an initial factor reflecting the degree of interest and readiness of foreign countries to invest in the Republic of Kazakhstan, taking into account the increase in equity instruments, reinvested income and the increase in debt instruments.

The leader in terms of investment volume in the Republic of Kazakhstan is the Netherlands – US\$8.33 billion in 2022 (+19.7%). In addition to the fact that the Netherlands is the largest investor, this country is one of the five largest trading partners of the Republic of Kazakhstan. There are more than 900 companies with Dutch capital operating in Kazakhstan. In February 2023, a Kazakhstan-Dutch investment roundtable was held at the World Horti Center in Naaldwijk with the participation of officials and representatives of the business community. As a result, bilateral

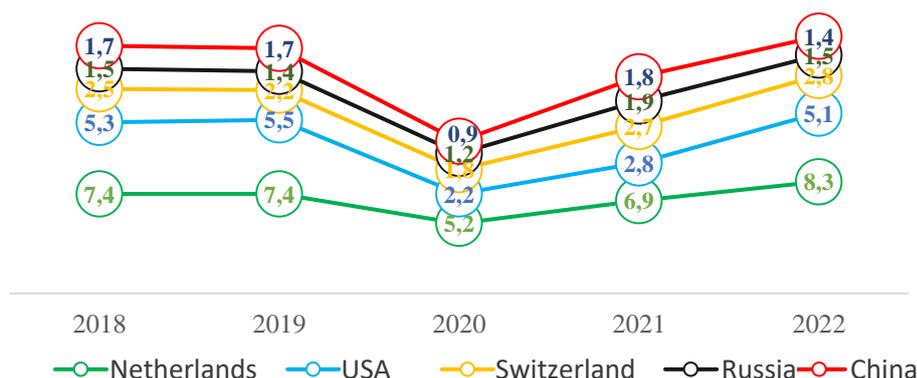
documents were signed, the parties also agreed to formulate a list of investment projects with the participation of Dutch companies to finance their exports and project financing from the Government of the Netherlands.

The United States follows with US\$5.1 billion in 2022 (+81.9%). It is expected that high-level visits, which have taken place, including the US Secretary of State E. Blinken and the visit of President K.K. Tokayev to New York in September 2022, where he met with top U.S. CEOs, will lead to increased trade and investment with American partners.

Major investors also include Switzerland – US\$2.76 billion (+2.4%), Belgium – US\$1.56 billion, Russia – US\$1.52 billion, South Korea – US\$1.48 billion, China – US\$1.43 billion, France – US\$770.2 million, UK – US\$661 million and Germany – US\$469.5 million. The PRC is one of the largest investors in the economy of Kazakhstan; the total investment volume exceeds US\$23 billion. Moreover, almost a half out of US\$350 billion in FDI attracted to Kazakhstan over the past 30 years is of European origin. The EU is Kazakhstan's largest trading partner, accounting for more than 40% of the country's foreign trade. More than 3,000 companies with the participation of European capital operate in the Republic of Kazakhstan (including Shell, Eni, Total, Air Liquide, Alstom, Siemens).

Figure 2

Gross FDI Inflow from Kazakhstan's Key Foreign Investors, US\$ bln.



According to the Bureau of National Statistics of the Republic of Kazakhstan [14], as of January 1, 2023, there were 36,500 foreign companies in Kazakhstan. The increase in the representation of foreign enterprises in Kazakhstan (by 45% compared to January 1, 2022) is explained by the relocation of companies from the Russian Federation and Belarus due to the imposed sanctions. According to the U.S. Department of State [15], international financial institutions view the Republic of Kazakhstan as a relatively attractive place to operate, and international firms have opened regional headquarters in the Republic of Kazakhstan. In the current conditions, Kazakhstan can claim to the role of a center of economic activity in Central Asia.

Economic activities related to the raw materials sector of the Republic of Kazakhstan, given the rise in prices for raw materials, especially energy, continue to attract the largest amount of foreign capital. The Republic of Kazakhstan has strategic mineral reserves: the largest producer of uranium in the world, 2nd place in the world in reserves of chromium, lead and zinc, 3rd place in the world in reserves of manganese, 5th place in the world in reserves of copper, is top 10th in the world in terms of coal, iron and gold reserves. Currently, almost 72% of all foreign investment is concentrated in a few large oil and gas projects.

It is noteworthy that nowadays an important role is played by investments in processing and technologies for reducing CO₂ emissions. The leading industries in terms of investment also include the production and processing of metals and manufacturing. Other important industries for foreign investors include food, beverages and tobacco, rubber and plastics, chemicals and oil

refining. Renewable energy sources are also a promising area of investment, including hydrogen, which in a matter of months has become the desired energy carrier of the future.

In order to create conditions for foreign investment, the Republic of Kazakhstan joined the OECD Declaration on International Investment and Multinational Enterprises in 2017, which means accepting obligations to comply with investment standards, including promoting responsible business conduct.

The Republic of Kazakhstan is also a member of the Multilateral Investment Guarantee Agency, part of the World Bank (WB) group, which provides political risk insurance for foreign investments in developing countries.

In July 2022, the Investment Policy Concept until 2026 was approved in the Republic of Kazakhstan; it is aimed at creating a new investment cycle and revising the investment attraction policy taking into account new trends, including those based on the criteria of ESG (environmental, social, and corporate governance) standards, whose non-compliance could lead to the closure of capital markets for entire countries and individual companies. The document provides for bringing the level of investment in fixed assets to 25.1% of GDP and increasing FDI inflows to US\$25.5 billion by 2026.

The government maintains an active dialogue with foreign investors through the Foreign Investors Council chaired by the President and the Council for Improving the Investment Climate chaired by the Prime Minister. In September 2020, the President of the Republic of Kazakhstan K.K. Tokayev announced the “New Economic Deal” – a reform program that, if implemented, will be aimed at improving the investment climate.

In the World Bank Doing Business Index ranking for 2020, Kazakhstan took the 25th place (improved by 3 positions) out of 190 countries in the “Ease of Doing Business” category and the 22nd place out of 190 in the “Starting a Business” category. The reasons for improving the position of the Republic of Kazakhstan are reforms of the existing legislation, improvement of the licensing system, simplification of procedures for starting a business, optimization of public control and supervision, and development of the business climate. In addition, a comprehensive program for privatization of more than 900 state-owned enterprises should be implemented in the coming years.

In 2021, the Government introduced a special tax (3%) on retail trade for 114 types of small and medium-sized businesses. Companies can switch to the new regime voluntarily. An investment tax credit has also been introduced, allowing entrepreneurs to get a deferral in paying taxes for up to 3 years. Under the new economic policy, bringing entrepreneurs to justice or tax audits is possible only after a corresponding decision has been made by the tax court.

In 2020, the Government approved new measures designed to make it easier for investors to do business and help the Republic of Kazakhstan to attract up to US\$30 billion in additional FDI by 2025.

The Republic of Kazakhstan is constantly moving forward along the path of digitalization. The multi-platform model for digital provision of public services is constantly expanding: from the execution of a car purchase and sale agreement in digital form, including digital registration, to the prompt verification of tax obligations. To date, more than 90% of public services in the Republic of Kazakhstan are available digitally, and they are used by about 11 million people.

The e-government development index of the Republic of Kazakhstan was 0.86 points (the highest value among the CIS countries and Central Asia). In addition, in 2022, the Republic of Kazakhstan took the 15th place in the e-participation index.

According to the study, “Electronic Government 2022” conducted by the UN⁷, Kazakhstan ranks 28th in terms of digitalization. The country is in the 11th place in terms of the development of e-government systems and the quality of online services.

Another direction of the digital economy in the Republic of Kazakhstan is the development of the cryptocurrency industry. Kazakhstan ranks 3rd in the world after the USA and China in

⁷ Is conducted once in two years and assesses 193 UN member states – is one of the most important indicators of development of the information-oriented society

bitcoin production. According to the University of Cambridge [16], the Republic of Kazakhstan accounts for 13.22% of the entire Bitcoin network.

According to the 2022 data, Kazakhstan's position in the Corruption Perceptions Index corresponds to a score of 36 out of 100 and a rank of 101 out of 180. The Corruption Perceptions Index, a research product of Transparency International, has become the world's leading indicator of corruption in the public sector since 1995. The index gives an idea of the comparative degree of corruption of countries and territories. A country's score is the perceived level of corruption in the public sector on a scale of 0-100, where 0 means high corruption and 100 means very low. Each country's score is a combination of at least 3 data sources drawn from 13 different corruption studies and assessments. Data is collected by various reputable organizations, including the World Bank and the World Economic Forum. Rank is the position of a country in relation to other countries in the index. Ranks can only change if the number of countries in the index changes.

IV. Comparative Study of Investment Performance

For the purposes of this review, a selection of countries was made that have similar indicators under the Global Innovation Index (GII). The GII, since 2007, has been an important reference index for countries interested in developing new innovation and economic policies, as well as a tool for improving innovation benchmarks.

The GII is an indicator of a country's ability to innovate, based on the fact that innovation is the driving force behind a country's economic growth and prosperity. The UN General Assembly, in its 2019 and 2021 resolutions on the use of scientific, technological advances and innovation for sustainable development, recognized the GII as an authoritative benchmark for assessing innovation.

Table 2

Kazakhstan's Rating and Country Sample in GII-2022 by Key GII Components [17]

Rating in GII	Country	Institutions	Human Capital and Research	Level of Market Development	Level of Business Development	Performance in the Field of Know-How and Technology
93	Azerbaijan	46	87	80	77	117
69	Argentina	96	69	95	52	77
35	Bulgaria	67	68	62	40	30
74	Georgia	30	70	72	64	75
83	Kazakhstan	52	60	90	68	81
94	Kyrgyzstan	113	63	51	107	92
104	Tajikistan	91	85	94	128	84
58	Mexico	93	58	54	76	58
82	Uzbekistan	63	65	60	74	80

It is worth mentioning that Kazakhstan's position in the GII for 2022 has worsened: a descent from the 79th place (2021) to the 83rd. The gap from the leader of the rating, Switzerland, is 39.9 points; among the economies of Central and South Asia, Kazakhstan is the 4th place, behind India, Iran and Uzbekistan. The deterioration of the innovative activity of Kazakhstan is observed in 3 performance indicators: institutional conditions (45th place in 2021), the level of development of the domestic market (80th place in 2021) and the effectiveness of creative activity (110th place in 2021). At the same time, there are also minor improvements among indicators such as human capital and science (66th place in 2021), the level of business development (78th place in 2021) and the development of technology and the knowledge economy (86th place in 2021 year).

In order to improve the indicators of innovation activity, which would also contribute to improving the investment climate, it is important to strengthen efforts to develop the internal market, institutions, business environment and increase the potential of human resources.

In order to study the experience of foreign countries in creating a favorable investment climate, the current analysis considers the following criteria: GDP per capita, inflation rate, population growth rate, unemployment rate, FDI, GII.

Table 3

**An Overview of Factors Influencing the Investment Climate
(based on the data at end-2022)**

Economy	GDP per Capita, Current Prices	Inflation Rate (in annual terms, %)	Population Growth Rate (% , an annual change)	Unemployment Rate (% of the total labor force, October 2022)	FDI (1990-2022), US\$ mln	Scores under GII
Azerbaijan	7 736.7 (5)	13.9 (5)	1.2 (3)	5.9% (3)	28 518.2 (5)	21.5
Argentina	13 686.0 (2)	94.8 (8)	1.0 (4)	6.9% (4)	243 536.9 (2)	28.6
Bulgaria	13 772.5 (1)	15.3 (6)	(0.6) (6)	12.7% (8)	71 722.6 (4)	39.5
Georgia	6 627.7 (6)	11.9 (4)	(0.3) (7)	18.7% (9)	25 289.7 (6)	27.9
Kazakhstan	11 243.7 (3)	20.3 (7)	1.2 (3)	4.9% (2)	163 195.4 (3)	24.7
Kyrgyzstan	1 606.7 (8)	13.9 (5)	2.1 (1)	9.0% (6)	6 266.6 (8)	21.1
Tajikistan	1 054.2 (9)	4.2 (1)	1.9 (2)	7.8% (5)	5 737.3 (9)	18.8
Mexico	11 091.3 (4)	7.9 (2)	0.9 (5)	3.4% (1)	745 975.4 (1)	31.0
Uzbekistan	2 255.2 (7)	11.4 (3)	2.1 (1)	10% (7)	23 229.2 (7)	25.3

According to the IMF [18] ([Report for Selected Countries and Subjects \(imf.org\)](#)), UNCTAD, BNS ASPR, WB ([Inflation, consumer prices \(annual %\) - Azerbaijan | Data \(worldbank.org\)](#)), [Tajikistan - unemployment rate 2004-2022 | Statista](#)

Table 3 presents the data on selected indicators for a sample of countries ranked higher and lower in the 2022 GII rankings. The ranking number of the country within the table is indicated in parentheses. Considering that in the sample of countries such countries as Uzbekistan, Mexico, Georgia, Bulgaria, Argentina are ahead of Kazakhstan, it is proposed to compare the indicators of factors influencing the investment climate of these countries in order to identify the most advanced in these factors and study their experience.

In terms of FDI volume during 1990-2022, the Republic of Kazakhstan ranks third as an indicator of investment demand after Mexico (9th largest FDI recipient in the world, 2nd largest recipient in Central America) and Argentina. In terms of unemployment rate in 2022, Kazakhstan ranks 2nd after Mexico. The Republic of Kazakhstan occupies 3rd position, behind Tajikistan and the Kyrgyz Republic, in terms of the population growth rates. In terms of annual inflation in 2022, Kazakhstan ranks 7th after Bulgaria, Azerbaijan, the Kyrgyz Republic, Georgia, Uzbekistan, Mexico, and Tajikistan. In terms of GDP per capita, the Republic of Kazakhstan is in the third position, behind Bulgaria and Argentina.

Below we propose to analyze the experience of Mexico and Argentina on FDI incentive measures, as well as the experience of Bulgaria, Azerbaijan, the Kyrgyz Republic, Georgia, Uzbekistan, Mexico, and Tajikistan in ensuring price stability.

Table 4

**Summarized Data on Reforms an Experience of Foreign Countries in Attracting
FDIs [19, 20]**

MEASURES TO STIMULATE AND SUPPORT FDI	
Mexico	As a member of the USMCA, OECD, G20 and Pacific Alliance, Mexico is very well integrated into the global economic order, making it an attractive country for FDI. Mexico has a strategic location, a large domestic market, diverse natural resources, a relatively highly skilled workforce and a diversified economy. The cost of labor (young and numerous) is not very high, however, its qualifications are relatively high.

The country ranks 7th in the world in terms of the number of tourists and in parallel has a large and important industrial base.

Incentives typically include land subsidies, tax credits, and funding for technology, innovation, and workforce development. Other measures to stimulate foreign investment include:

- special economic zones in economically underdeveloped areas of the southern states of the country. Companies creating SEZs receive various privileges, trade benefits, duty-free customs benefits, prerogatives for infrastructure development and are subject to simplified regulatory processes;
- free trade zones, where goods channeled to foreign markets can be exported from Mexico on a duty free basis;
- refund of import duty paid on final import of raw materials or finished products if exported within 12 months of import;
- the IMMEX program allows foreign manufacturers to import raw materials and components into Mexico duty-free, provided that 100% of all finished products leave Mexico within the government-set deadlines;
- the New Certified Company Program allows companies to import and export goods from Mexico quickly and with less paperwork;
- real estate investment trusts (REITs);
- investors are entitled to compensation for victims of expropriation for public purposes. Expropriation is governed by international law and requires forced compensation at fair market value;
- 13 agreements on free trade zones were signed with 50 countries and 32 agreements on mutual promotion and protection of investments with 33 countries;
- Mexico is a member of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership, there are 31 bilateral investment treaties in force. Mexico is a member of the OECD's Inclusive Framework on Base Erosion and Profit Shifting and a member of the Comprehensive Two-Pillar Solution Framework to address tax challenges arising from digitalization of the economy;
- Double taxation avoidance agreements have been concluded with 55 countries.

Argentina

The Argentinian government is actively seeking to attract FDI, but economic instability and periodic crises hinder this goal. The overall level of openness to foreign investment is below average: restrictions have been introduced on FDI in the agricultural sector, important for the country's food security, and recent measures (restrictive property laws and nationalization in the energy sector affecting Spanish oil giant Repsol) are deterring potential investors. However, Argentina has certain advantages: significant natural resources (copper, gas, oil) and a highly qualified and competitive workforce. Measures are being taken to attract investors:

- introduction of a preferential tax regime for the automotive sector, which contributed to the development of regional automobile production chains among countries in the region;
 - lifting exchange controls, cutting taxes, and working with the IMF to improve the reliability of the country's economic data;
 - the government is actively working to increase the transparency of administrative and regulatory processes;
 - organizing regular events with the participation of foreign trade delegations. Promising investment opportunities promoted by the government include expanding internet access, particularly through the development of a
-

fiber optic network. There are also programs to encourage existing investments, ranging from VAT refunds to industry incentives;

- the National Directorate for Investment Promotion was created, subordinate to the Deputy Minister for Trade and Investment Promotion;

- bilateral investment agreements have been signed with more than 60 countries, Argentina is a member of the ICCWBO – International Chamber of Commerce, ICSID – International Center for Settlement of Investment Disputes, member of the Multilateral Investment Guarantee Agency;

- 18 agreements on the avoidance of double taxation have been signed, and there are also customs agreements with many countries. Argentina is a party to a number of bilateral and multilateral treaties and conventions on the enforcement and recognition of foreign judgments, which provide requirements for the enforcement of foreign judgments in Argentina;

- foreign private companies can establish and own commercial enterprises and engage in all types of income-generating activities in almost all industries under the same conditions as local companies. Foreigners can own the entire shareholding, with the exception of airlines and media (maximum 49% and 30%, respectively).

- foreign investors can invest in all sectors of the economy on an equal basis with national investors; the existing investment regime is liberal;

- foreign investments do not require any permits or declarations, regardless of their volume or intended activity, full foreign participation in the equity of Argentinian enterprises is in most cases not limited;

- assistance in investment development is provided in the form of tax credits covering the theoretical fiscal cost of the project;

- other forms of investment assistance: tax incentives, special import regimes, accelerated depreciation of machinery, equipment and infrastructure;

- export duties have been canceled for some enterprises and industries: for the export of cars and auto parts in volumes over 2020, the export of IT services by companies participating in the regime for stimulating the knowledge economy. Incentives were also introduced to stimulate investment in key export sectors such as agriculture, forestry, hydrocarbons, manufacturing and mining.

After a three-year recession (2018-2020), the economy has recovered, growing by 10.3% in 2021. However, the government has not eased capital controls introduced in September 2019 to slow foreign exchange outflows, maintaining capital controls imposed by the central bank that prohibit transfers and payments. The government maintains trade restrictions, price controls, taxes, and high spending. Lacking access to international capital markets (despite a private debt restructuring in 2020) and having a shallow domestic market, the government relied on central bank money printing to finance deficits. Excess liquidity has led to high inflation (50.9% in 2021) and deteriorating social conditions, with poverty rates exceeding 40%.

MEASURES TO ENSURE PRICE STABILITY

Azerbaijan

The inflation rate fell from 13.9% in 2022 to 12% in the first six months of 2023. The main factors restraining inflation are the relative decrease in weighted average inflation in partner countries and the decline in prices in global commodity markets. Compared to countries in the South Caucasus and Central Asia region, inflation in Azerbaijan is close to average.

The causes of double-digit inflation are grouped into 3 blocks – real economic conditions, fiscal policy and monetary policy. In this regard, it is planned to reduce the cost of competitive supply by increasing labor

productivity in the real sector of the economy, to think through mechanisms to make government spending more conducive to economic growth, and to achieve easing conditions for financing the economy.

De-dollarization measures have been taken, including a limit on open foreign exchange positions, an increase in insurance premiums on deposits in foreign currency and a ban on lending in foreign currency. The rapid growth in the volume of manat deposits in 2022 made it possible to reduce the level of dollarization of deposits to 50.8% from 54% in 2021.

The budget package of the state-run “Great Return” program increased spending on defense, national security, and social services, which stimulates aggregate supply and demand to create conditions for achieving an equilibrium level of inflation.

Monetary policy controls inflation through the exchange rate and interest rate channels.

It is planned to increase labor productivity, which is possible with serious structural reforms.

Reforms are being carried out in the field of governance in accordance with the “Strategy for the Socio-Economic Development of the Republic of Azerbaijan for 2022-2026”: fiscal expansion, reforms to improve the efficiency and targeting of the public sector and government spending.

The Central Bank sets interest rates in the interbank money market within the corridor using available instruments. The average interest rate on 1-3-day operations in the interbank unsecured money market has increased by 2.67 percentage points since September 2022, and by 1.72 percentage points since the beginning of 2023, responding to changes in the interest rate corridor. AZIR (Azerbaijan Interbank Rate), reflecting the average interest rate of transactions between banks concluded in the national currency on the Bloomberg trading platform, has also increased by 0.68 percentage points since the beginning of 2023. This entails changes in other interest rates, including on deposits and loans.

The Central Bank limits the growth of consumer lending.

Institutional and structural reforms in the financial and banking sectors are on the way and are aimed at optimizing the spread between the Central Bank discount rate and market interest rates on loans. Ensuring financial inclusion on favorable terms serves to reduce inflation.

The improvement of the monetary policy continues in accordance with the Action Plan of the “Strategy for the Socio-Economic Development of the Republic of Azerbaijan for 2022-2026” as part of the formation of basic conditions for transition to the inflation targeting regime. Diversification of supply channels in the country’s foreign exchange market, increasing the depth of the financial sector, limiting the shadow economy and strengthening the effectiveness of macroeconomic coordination will create conditions for the transition to the inflation targeting regime.

The stimulation of overall economic growth is continued through fiscal expansion accompanied by reforms to improve the efficiency and targeting of the public sector and government spending.

Bulgaria

In the autumn of 2022, Bulgaria reached its highest price level since 1998. In 2023, price growth is expected to slow down, which will subsequently lead to deceleration in inflation. Strong price pressures in 2022 undermined the purchasing power of private households as well as the investment of private corporations. The measures of the National Bank of Bulgaria to limit lending and curb inflation are as follows.

By decision of the National Bank, the minimum required reserves of banks have more than doubled. The decision provided for an increase in reserves in two stages: from June 1, 2023, banks will contribute not 5%, but 10% of the minimum required reserves for attracted funds from individuals who are not citizens of Bulgaria; from July 1, banks form 12% of the minimum reserves for funds raised from both residents and non-residents.

Since the lev is kept being pegged to the euro (1.96 levs per euro (+/- 15%)), the National Bank of Bulgaria mirrors the policies of European central banks. Until September 2022, the National Bank of Bulgaria could keep the policy interest rate at 0% (its level since 2016); however, later it had to increase the rate. Since the ECB had already carried out four rate hikes totaling 250 bp in 2022 and is expected to increase the rate to 3.5-4.0% by the end of 2023, the National Bank of Bulgaria should gradually follow the same path, usually with a lag of several months, which will lead to a sharp increase in the cost of borrowing and will therefore have a negative impact on investment and consumption.

In 2022, the government approved measures to cushion the impact of soaring energy prices on households and companies with a support package worth BGN 3.5 billion (2.7% of GDP). These measures have been extended until the end of 2023 and mainly involve lower electricity prices.

Kyrgyzstan

Inflation in Kyrgyzstan slowed to 10.5% YoY in June 2023. The May acceleration in consumer price growth was caused by one-time reasons. The key pro-inflationary factor – pressure from global food markets and trading partner countries – continued to weaken in June. In the fall, inflation is expected to slow down, whereby the National Bank of the Kyrgyz Republic may begin a round of interest rate cuts.

The current monetary policy stance is still aimed at reducing the inflation rate to 5-7% in the medium term.

In order to limit inflationary pressure, the National Bank is pursuing the monetary policy aimed at containing the monetary component of inflation and minimizing the impact of external economic factors. Along with the change in the discount rate, the boundaries of the interest rate corridor established by the National Bank are adjusted.

The level of excess liquidity in the banking system was regulated through open market operations and the placement of free resources of commercial banks on overnight deposits with the National Bank. Systematic actions made it possible to increase the population's propensity to save, increasing the attractiveness of financial assets in the national currency.

The adopted monetary decisions led to an increase in interest rates on some deposits, which allowed the banking system to increase the resource base, as well as level out the possible flow of free funds of the population to the foreign exchange market, thereby mitigating the pressure on the exchange rate.

Georgia

Annual inflation in Georgia amounted to 8.4% (YoYy) with a target of 3%.

The Economic Council of the Government of Georgia expects that the country's inflation rate in 2023 will be lower than predicted.

Levan Davitashvili – the Minister of Economy and Sustainable Development – believes that the reduction of inflation in 2023 in Georgia is due to the correct monetary policy and the government's steps towards macroeconomic policy and encouraging competition.

In Georgia, measures have been taken to ensure competition in the market, which was reflected in prices. In February 2023, compared to January 2023, the inflation rate was -0.3%, reports the National Statistics Service "Sakstat".

On May 10, 2023, the monetary policy committee of the National Bank of Georgia decided to reduce the refinancing rate by 0.5%. The refinancing rate is 10.50%.

Deceleration of inflation is largely driven by lower prices for imported products. Prices in international commodity markets have gradually declined since mid-2022, and international shipping costs have approached pre-pandemic levels. These trends, together with the strengthening of the currency exchange rate, are gradually transmitted to the local market and reduce imported inflation.

Uzbekistan

At the end of 2022, inflation in Uzbekistan amounted to **12.3%**. The government has implemented a policy of stabilizing food prices, in particular, exemption from taxes and customs duties on essential products until the end of 2022. In 2023, using all economic mechanisms, it was planned to reduce this figure to below 10%.

There is an intention to increase the production volume of consumer goods, including food, reduce the costs of their logistics “from field to table” and ensure their affordability. The population has been allocated 200 thousand hectares of land to increase agricultural production. For the systematic organization of these events, the task was set to develop separate “road maps” for each district and town based on the potential of the regions.

Work is underway to create favorable conditions for increasing income of the population. In order to increase income of the population, it is important to attract their free funds to the financial market. The volume of bank deposits of the population has doubled over the past 3 years.

Since the beginning of 2020, the Central Bank has switched to the inflation targeting regime. Short-term monetary policy instruments of the Central Bank were used (unlimited volume of overnight repo transactions, currency swaps and deposit transactions carried out within the upper and lower boundaries of the interest rate corridor). This ensures that interest rates on deposits in the interbank money market are within the Central Bank’s interest rate corridor. Commercial banks have the opportunity to effectively manage liquidity, and activity in the money market is growing.

Measures are being taken to develop the domestic foreign exchange market and implement a freely formulated exchange rate policy based on market principles. It is planned to implement a number of measures to further improve the domestic foreign exchange market in order to increase the exchange rate flexibility to internal and external factors.

Mexico

On October 3, 2022, the Office of the President of Mexico announced an Agreement between the Government of Mexico and 15 private companies aimed at combating food price inflation. The agreement included an 8% reduction in prices for 24 essential goods (mostly food); a temporary exemption from import requirements for food and food packaging; a ban on exports from Mexico of white corn, beans, sardines and some food packaging materials, as well as the suspension in drafting of new regulations that could impede trade or increase the cost of food imports.

Mexican President Andrés Manuel López Obrador said that together with the governments of other Latin American countries, he is expected to implement an anti-inflationary plan for mutual assistance and growth, economic and trade exchanges between Latin American countries and join forces as part of a plan aimed at eliminating tariffs to reduce food prices.

Mexico’s central bank began raising its policy rate in June 2021 in an attempt to keep inflation at manageable levels: from January to June 2021,

inflation rose from 3.5% to 5.9%. At the same time, over the year the interest rate in Mexico changed from 4.0 to 7.0%.

The Mexican government has also initiated an anti-inflation program aimed at stimulating grain production and supporting its distribution, eliminating import tariffs on certain types of raw materials and concluding agreements with enterprises to reduce product prices. The government expects these measures to have a positive impact on the prices of 24 major goods (22 food and two essential goods), which account for 13.03% of overall inflation. This policy complements actions already implemented in the energy sector: fiscal stimulus in response to rising gasoline prices.

In 2022, the Mexican government introduced measures to subsidize fuel prices. Due to the additional increase in global oil prices, the subsidy has also been increased and no special tax on gasoline will be levied from the beginning of March 2023.

Tajikistan

In June 2023, inflation in Tajikistan amounted to 2.4% YoY. Consumer price growth in the country remains the lowest since mid-2018; inflation is expected to move towards the National Bank target levels (6±2%) in August–September, and by the end of 2023 and early 2024, it may be close to the upper bound or above this interval.

The stability of the exchange rate contributed to the strengthening of the real exchange rate of the Tajik currency, which is one of the main factors of low inflation and the growth of the country's trade deficit in the first half of 2023. It is expected that the return of the somoni to a path of gradual weakening in the second half of 2023 and in 2024 will help strengthen the balance of payments of Tajikistan's economy, and will also contribute to the return of inflation within the limits of the National Bank's targets.

The International Monetary Fund notes that in order to curb the rising inflation and maintain inflation expectations, central banks need to normalize balance sheets and raise real interest rates above their neutral level quickly and for a long time. Fiscal policy should also support monetary policy to soften the demand in countries with excess aggregate demand and overheated labor markets.

It is important to consider that efforts to stimulate supply can support the monetary policy in reducing inflation. In a supply-constrained environment, increasing government spending or cutting taxes will only push inflation higher. Consequently, price instability could jeopardize all efforts to increase the economic growth. In formulating the policies aimed at protecting vulnerable populations it is important to consider that broad price caps or subsidies for food and energy should be avoided, as they increase the demand while reducing or eliminating supply incentives.

V. Investment Risks

According to Bloomberg [21], after Kazakhstan joined the WTO in 2015, large-scale reforms in the field of trade, tariffs and FDI regulation enabled to significantly increase GDP and improve the country's performance on the FDI Regulatory Restrictiveness Index as calculated by the OECD.

The FDI Regulatory Restrictiveness Index measures regulatory restrictions on FDI in 22 economic sectors in 69 countries, including all OECD and G20 countries. The index determines the degree of restrictions on FDI in a country in terms of 4 main types of restrictions:

- foreign capital restrictions;
- verification or approval mechanisms;
- restrictions as to the use of non-residents as the key personnel;
- operating restrictions to the establishment of branches, repatriation of capital or land ownership.

At the same time, German investors point out the following risks of investing in the Republic of Kazakhstan: Law enforcement practice: changes in tax legislation and the lack of consistent legal practice can lead to additional tax risks. The inflow of qualified labor from the Russian Federation and Belarus can only partially compensate for the shortage of qualified personnel. At the same time, investment in the training of young people abroad helps increase the potential of human capital in Kazakhstan. Despite constant development of transport infrastructure in Kazakhstan, investors note the length of logistics routes in the ninth largest country in the world.

According to the U.S. Department of State, despite institutional and legal reforms, concerns about bureaucracy, lax enforcement, and limited access to skilled labor in some regions remain. The trend towards strengthening the regulatory role of the state in relations with investors, the preference for import substitution policies, and opposition to the use of foreign labor continue to cause concern among investors.

Foreign companies note the need to improve law and order, increase investment in human capital, improve transport and logistics infrastructure, implement a more open and flexible trade policy, and a favorable regime for issuing work permits.

Despite significant investments in the energy sector of the Republic of Kazakhstan, foreign companies remain concerned about the risk that the government may legislate or otherwise introduce preferences for domestic companies and create mechanisms for government intervention in operations of foreign enterprises, especially when making purchasing decisions. In particular, in 2020, there were cases of significant reductions and complete abolition of work permits for certain categories of foreign labor.

At the same time, during a meeting with representatives of international oil companies in March 2021, the President of the Republic of Kazakhstan called on the Government to ensure legal protection and stability of investments and investment preferences. The Investor Relations Front Office is also tasked with resolving investor concerns and bringing them to the attention of the Council for Improving Investment Climate. In addition, the Republic of Kazakhstan supported the petition of oil companies to cancel the discriminatory approach to fines imposed on them for gas flaring.

As part of the investment policy review, the OECD Investment Committee recommended to Kazakhstan [22] to carry out corporate governance reforms at state-owned enterprises, introducing a more efficient tax system, continue to liberalize trade policy, and introduce the principles and standards of responsible business conduct. The OECD Investment Committee monitors implementation of the privatization program aimed at reducing the government's share in the economy.

In 2019, the OECD and the Government of the country launched a two-year project to improve the legal environment for business in the Republic of Kazakhstan.

Foreign investors often complain about contract delays and cumbersome licensing practices. Problems associated with the decriminalization of tax errors have not yet been resolved, in their opinion⁸, despite the corresponding order of the Prosecutor General's Office that was passed in January 2020. The controversial taxation of dividends to non-residents, which came into force in January 2021, has also caused concern among investors.

Regarding rulemaking activities, the U.S. Department of State notes that despite the fact that draft laws of the Republic of Kazakhstan are available for public comments on the www.egov.kz website in the "Open Government" section, the duration of their consideration and the possibility of providing comments is ten days, while the process takes place without widespread notification. Some draft laws are not allowed for public comment, and the regulatory process, including for foreign investment, remains non-transparent.

According to investors, even if investment disputes are resolved in accordance with contractual terms, the resolution process can be slow and require significant spending of time and resources. Therefore, many investors prefer to resolve investment disputes privately, out of court.

⁸ [Kazakhstan - United States Department of State](https://www.eis.gov.kz)

Despite the progress of the Republic of Kazakhstan in meeting the WTO requirements and OECD standards, foreign companies believe that measures are necessary to ensure the protection of intellectual property rights, and it is also necessary to expand the experience and competence of judicial and customs authorities in the field of intellectual property rights.

According to the World Bank [23], a slowdown in the economic growth, rising inequality, and weak institutions reflect the shortcomings of the resource-based and state-based growth model and increase the risk of a “middle income trap.”

When studying the risks of investing in the Republic of Kazakhstan, according to investors, it is also important to take into account the results of the study of investment attractiveness of Central Asian states for 2019-2021 conducted by Ernst & Young, whereunder Kazakhstan took a leading position. The study of the investment climate in the Republic of Kazakhstan and other Central Asian countries was carried out by Ernst & Young experts [24] through sociological surveys. First of all, respondents – investors from different countries – assessed investment activity in the region (71% of respondents invested their money in Kazakhstan and are already working in the country).

Over 3 years, the number of new investment projects in Central Asian countries decreased by 2.5 times, and the volume of capital investments in projects showed a four-fold reduction. The largest investors during this time were the Russian Federation, the USA, China and Türkiye. The main industries for FDI were renewable energy, oil industry, and IT.

According to 26% of potential investors, their decision to invest in Kazakhstan can be influenced by investment incentives, 24% of respondents believe that conscious consumption, quality of life and culture are important factors, and 23% of respondents consider labor productivity, industry support, and public infrastructure to be important.

When answering questions about the future, executives of foreign companies named the most attractive industries for investment. These predictably included energy and utility services (57% of respondents), the consumer sector (53%) and the digital economy (40%). The last two categories, according to investors, have great potential for development. With urbanization and rising income in cities, the competition of retail chains for these markets is intensifying, and the agro-industrial complex is also growing.

Among the risks affecting the investment attractiveness of Central Asian countries in 2022–2025 are political instability (45% of respondents), low levels of digital regulation and information security (48%). Representatives of foreign companies are skeptical about uncertainty in tariff and trade policies (35%), high volatility in capital markets (35%), limited innovative potential (24%), and lack of qualified personnel (21%).

According to investors, in order to improve the investment climate in the next 3 years, it is important to increase the flexibility of labor legislation for qualified foreign personnel (54%), improve the systematic implementation of political reforms (45%), ensure independence of the judicial system (37%), promote transparent and predictable regulatory environment, stimulating the development of entrepreneurship and innovation (25%).

VI. Recommendations on Improving the Investment Climate

The first is the development of an investment reform map and/or FDI strategy, including an analysis and logic for determining the scope and quality of FDI, as well as a package of policy and regulatory approaches and prioritization to develop a coherent program of investment policy reforms and investment incentives. Thus, in order to maintain demand for FDI in the United States, the Inflation Reduction Act was passed on August 16, 2022, designed to shrink the budget deficit and reduce inflation, while increasing investment in the domestic energy sector and reducing the cost of medications. The legislation allows Medicare to negotiate lower prescription medication prices and extends the expanded Affordable Care Act program through 2025. In addition, the Act is expected to improve the U.S. climate and energy environment, lower energy costs, increase clean energy production, and reduce carbon dioxide emissions by 40% by 2030, raising US\$737 billion (of which US\$222 billion will be obtained through the introduction of a minimum income

tax of 15%). The Act will require investments totaling US\$437 billion and will reduce the deficit by more than US\$300 billion. The law establishes policies aimed at developing and supporting domestic projects in the field of energy and electricity transmission. The purpose of the Act is to bring down consumer costs and help the United States to achieve long-term emissions reduction goals, helping to reduce inflation.

The second is to improve the effectiveness of policies aimed at attracting and facilitating FDI inflows. Institutional investors, pension funds and sovereign wealth funds are ideally positioned to finance sustainable energy. However, they often do not have access to investment opportunities in developing countries because they are prohibited from investing in projects that do not have investment status. It is recommended that measures be introduced to transform non-fiduciary investment opportunities in developing countries into fiduciary investment assets through international support for risk reduction activities. Measures are also needed to strengthen investment promotion capacity, including competitive proposals to promote investment in priority sectors and capacity-building for advocacy and facilitation. Since 2017, thanks to the WB support in stimulating investments in Mali, EthioFDI, India (Assam), Tunisia, Bosnia and Herzegovina, the total volume of FDI amounted to US\$608 million.

It is necessary to reform investment admission regimes by introducing a non-discriminatory approach to investors, reducing sectoral restrictions and efficiency requirements, and streamlining procedures to achieve development goals. In Myanmar, the lifting of entry restrictions through the introduction of a new exemption list opening up 70 sectors to full foreign ownership, and the reduction of FDI scrutiny through the adoption of a unified investment law, led to a six-fold increase in FDI project approvals between 2013 and 2016, from 1.4 to 9.5 billion US dollars.

Third, promoting best practices in improving the effectiveness of investment incentives, i.e. determining the effectiveness of existing incentives in generating FDI inflows and achieving goals such as creating additional jobs, increasing competencies, empowering, sustainable development.

Fourth, building investor confidence to scale FDI. To do this, first, it is necessary to modernize the regulatory framework to reduce political risks. Sri Lanka passed a new Inland Revenue Act in 2017, which increased tax transparency and administration, and eliminated all tax holidays in favor of performance-based investment incentives. Second, it is necessary to develop and implement investor support programs that contribute to the preservation, expansion and diversification of production, as well as deepening ties with local suppliers. Ethiopia opened 6 new sectors for FDI, and within two years of the reform, the volume of FDI increased to US\$96 million. Between 2015 and 2018, Jordan, Iraq, Ethiopia, Pakistan, Bosnia and Herzegovina, Armenia, Tajikistan, Moldova and the Kyrgyz Republic published comprehensive lists of targeted and pinpoint investment incentives that met standard criteria of transparency, accessibility, comprehensiveness and sustainability, thereby increasing investor confidence.

Fifth, preventing disputes between investors and the state by creating mechanisms for redressing investor complaints, introducing clear provisions on access to international arbitration, and to accomplish this, promoting best practices for monitoring and resolving issues related to the implementation of regulations through managing investor complaints to preserve and scale investments. The EthioFDI Investment Commission has established a mechanism to handle investor complaints before they escalate into international disputes. Thanks to this, investments worth US\$5.4 million have been saved to date. In Iraq, the establishment of an investor grievance redressal mechanism within the Basra Investment Commission saved US\$220 million in FDI that was previously at risk of being seized.

Sixth, maximizing the linkages and positive impacts of FDI on the host economy. This requires the development of a strategic action plan to establish connections between the Ministry of National Economy of the Republic of Kazakhstan and local companies, aimed at eliminating negative factors, modernizing local companies and attracting foreign suppliers. In Georgia, after the establishment of an investment ombudsman position, US\$80 million worth of risky FDI was

saved. In Guinea, an online supplier marketplace platform was created to address the low participation of local suppliers in the mining sector. 883 domestic companies have registered on the platform. 77% of posted collaboration requests were received by SMEs registered on the platform. The first phase of the supplier development program in Vietnam led to a 70% increase in SME capacity through the application of new standards and management tools, a 50% increase in profits and turnover, 42% of suppliers established new relationships with buyers, of which 9% became official suppliers of multinational corporations.

Seventh, increasing efficiency of the public sector and state-owned enterprises, strengthening competition and developing human capital. According to the World Bank, Kazakhstan should begin reforms in the field of carbon and energy pricing, strengthen social protection and invest in adaptation measures to climate change.

Since Kazakhstan's economy is highly dependent on oil-related revenues, and given the global shift towards decarbonization, it is recommended to focus on economic diversification. To ensure a sustainable and viable economic future, it is important to accelerate progress towards renewable energy sources. Investment in renewable energy, a carbon tax and reform of electricity tariffs could be key measures to achieve this goal. It is worth noting that the use of auctions and tenders for renewable energy projects as general tools for attracting investments in renewable energy is gaining momentum in all groups of countries.

Eighth – strengthening the protection of property rights, developing procedures for investors to obtain permits, optimizing export customs duties and tariffs applicable to foreign investors, as well as taxation of investors. According to the Managing Director of NC KAZAKH INVEST JSC A. Kozhanov, measures to strengthen protection of property rights and demonopolization will help attract investment. It is important to go on with the effort to optimize procedures for obtaining exploration licenses and converting exploration licenses into production licenses.

Ninth is the development of law enforcement processes and procedures in accordance with the best foreign practices. Investors note the importance of lawful application of laws and regulations, ensuring consistency of current industry standards and preventing corruption in host economies to ensure long-term and stable investment inflows. Attention is also drawn to the need to increase public transparency of the enforcement process, to prevent harassment by tax authorities in the form of surprise audits and inspections in some developing countries. Non-transparent enforcement of laws remains a major obstacle to expanding trade and investment.

Thus, among the important factors for investing in the country, investors mention macroeconomic stability, ease of doing business in the country, innovative development, quality of management, level of compliance with the rule of law, protection of property rights, quality and depth of the financial system, and availability of local sources of financing.

Another important aspect in increasing investment attractiveness is a predictable and transparent tax policy. A new Tax Code is being developed in the Republic of Kazakhstan, providing for digitalization of tax control, transition to differentiated rates, stimulation of technological modernization, and simplification of special tax regimes.

VII. Conclusion

The purpose of this paper was to analyze international experience in improving the investment attractiveness of countries receiving foreign investment, and to form an overview of the vision of investment climate of the Republic of Kazakhstan by foreign investors.

The paper provides an overview information and statistical data on the external sector of Kazakhstan, the position of and other countries in the 2022 global innovation index (GII), and points to deterioration in the indicators of the Republic of Kazakhstan in the GII in 2022: a descent from the 79th place in 2021 to the 83rd place. The gap from the leader of the rating, Switzerland, is 39.9 points; among the economies of Central and South Asia, Kazakhstan is only in the 4th place, behind India, Iran and Uzbekistan.

In accordance with the GII, a deterioration in the innovation activities in Kazakhstan is observed under 3 indicators: institutional conditions, the level of development of the domestic market and effectiveness of creative activity. At the same time, there are also minor improvements among indicators such as human capital and science, the level of business development, the development of technology and the knowledge economy.

Based on the results of analysis, the following main factors influencing the level of FDI in the countries-recipients of FDI were identified:

- GDP, GDP per capita at purchasing power parity (PPP), inflation rate, economic growth rate, economic freedom, economic openness, foreign trade turnover, availability of natural resources, infrastructure;
 - the level of financial sector development, market size, exchange rate stability;
 - macroeconomic and political stability, corruption index, quality of public administration, stability of governance, democratic transparency, maturity of economic and political institutions;
 - population size and its growth rate, unemployment rate, availability of qualified labor force, percentage of population with access to the Internet, digital skills of active population, physical and human capital to the number of the employed, household spending on final consumption;
- the development level of ICTs and internal investments.

As part of the study of the experience of foreign countries in creating a favorable investment climate, the current analysis looks into the following criteria: GDP per capita (1), inflation rate (2), population growth rate (3), unemployment rate (4), FDI (5), GII (6). The selection of countries was carried out based on similarity of their positions in international ratings and investment attractiveness indices with the Republic of Kazakhstan (countries for which there was an improvement in positions in the indices); countries were ranked according to GII indicators in 2022. In a sample of countries:

- 1) Kazakhstan ranks third, behind Bulgaria and Argentina, in terms of GDP per capita;
- 2) In terms of inflation rate (in annual terms) Kazakhstan occupies the 7th position after Bulgaria, Azerbaijan, Kyrgyz Republic, Georgia, Uzbekistan, Mexico, Tajikistan;
- 3) Kazakhstan ranks third staying behind Tajikistan and the Kyrgyz Republic in terms of population growth rates;
- 4) Kazakhstan stands the second after Mexico in terms of the unemployment rate;
- 5) In terms of FDI volume, in 1990-2022 Kazakhstan has been ranking third in respect of investment demand following Mexico (9th largest FDI recipient in the world, and the second largest recipient in Central America in terms of size) and Argentina;
- 6) As for GII, Uzbekistan, Mexico, Georgia, Bulgaria, and Argentina outpace Kazakhstan.

Taking into account the criteria for the impact on FDI inflows selected for the purposes of this analysis, the paper analyzes the experience of Mexico and Argentina in measures to stimulate FDI, as well as the experience of Bulgaria, Azerbaijan, the Kyrgyz Republic, Georgia, Uzbekistan, Mexico, Tajikistan in ensuring price stability.

As regards the investment climate in Kazakhstan, investors from Germany, USA and other international financial organizations point to the following investment risks in Kazakhstan:

- 1) law enforcement practice;
- 2) a limited access to the qualified workforce in some regions;
- 3) insufficient development of transport and logistics infrastructure and logistics routes;
- 4) the need to pursue a more open and flexible trade policy, a favorable regime of work permit issuance;
- 5) shortcomings of corporate governance at state-owned enterprises, insufficient efficiency of the tax system, insufficient liberalization of trade policy;
- 6) insufficient duration of consideration and the possibility of providing comments on draft laws of the Republic of Kazakhstan on www.egov.kz in the “Open Government” section (the process takes place without widespread notification);

7) insufficient efficiency of the process of resolving investment disputes, measures to ensure the protection of intellectual property rights;

8) risks of political instability in the region, low level of digital regulation and information security, uncertainty of tariff and trade policies, high volatility in capital markets.

The review also presents general recommendations for investors to improve the investment climate in the short term and information on the experience of individual countries in implementing the proposed measures:

1) improving the consistency of political reforms, ensuring a transparent and predictable regulatory environment, modernizing it to reduce political risks, increasing public transparency of the enforcement process, developing a consistent program of reforms in the field of investment policy and stimulating investment in priority sectors;

2) strengthening the protection of property rights, developing procedures for investors to obtain permits;

3) optimizing export customs duties and tariffs applicable to foreign investors, ensuring a predictable and transparent tax policy of the Republic of Kazakhstan, proceeding with the effort on digitalization of tax control, transition to differentiated rates, stimulation of technological modernization, simplification of special tax regimes;

4) ensuring consistency of current industry standards and preventing corruption, preventing pursuits by tax authorities in the form of surprise audits and inspections;

5) preventing disputes between investors and the state by creating mechanisms for resolving investor complaints, introducing clear provisions on access to international arbitration;

6) preservation, expansion and diversification of production;

7) increasing the flexibility of labor legislation for qualified foreign personnel, reforming investment admission regimes by introducing a non-discriminatory approach to investors;

8) continuing to maintain macroeconomic stability, ease of doing business, innovative development, quality of management, ensuring the quality and depth of the financial system, availability of local sources of financing.

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Analysis of Trends in Learning and Development in International Organizations

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This research investigates the current changes in Learning and Development (L&D) within international companies. Using existing data, the study highlights the growing importance of L&D in today's fast-changing work world. The approach involves a detailed review of recent materials to get a full picture of L&D's direction. While the findings are mostly based on this data, they give a clear view of where L&D stands now and where it might go in the future.

Keywords: Learning and Development, international organizations, skills, L&D tools and methods, L&D priorities and challenges.

JEL-classification: M12, M54, N30, O15, O32.

Introduction

In today's dynamic global environment, organizations are constantly evolving to keep pace with emerging trends and challenges. Workplaces around the world are changing fast. Major factors like competition, the move to digital, and a complex global landscape are causing these shifts (McKinsey, 2019).

Environmental, technology and economic trends will be the reason for the largest job creation and destruction effects (World Economic Forum, 2023). The pandemic has brought challenges like skill gaps, finding the right talent, and global uncertainties. McKinsey research estimates that as many as 800 million jobs could be displaced by automation by 2030. Employee roles are expected to continue evolving, and many people will need to learn new skills to remain employable. Also, a significant number of organizations are concerned about employee retention. According to LinkedIn report (2023) since 2015, the skill requirements for jobs have shifted by approximately 25%. It's anticipated that this figure will increase twofold by 2027. The report also points out that most important factors that people consider when pursuing new jobs reflect their desire to stretch, grow, and develop new skills. Younger employees tend to prioritize opportunities for career advancement, learning, and skill enhancement. Thus, engagement in learning is associated with feelings of progression, elevation, and flexibility.

Among these challenges, the role of L&D has become increasingly significant, acting as a key player in helping organizations adapt and grow. Given the growing importance of L&D, it is imperative to conduct this research, aiming to highlight the current trends in L&D and show how it's meeting the needs of workers in the 21st century.

Methodology

The foundation of this research is built upon a thorough examination of comprehensive industry reports and research findings on L&D trends. Industry reports utilized in this research contain the analysis of large number of respondents around the globe. An initial screening was conducted to select the most recent and relevant materials. The chosen data underwent content analysis to identify key L&D trends and patterns. These findings were then synthesized to present a cohesive picture of the current state of L&D. It's worth noting that the trends described in the paper do not reflect instantaneous shifts and the most recent trends, because the data provided here is based on the most utilized practices. The insights garnered herein provide a valuable snapshot of the current state and potential future of L&D in global settings.

Strategic role of L&D

According to McKinsey (2019) the role of L&D has evolved, taking on a strategic significance that covers attracting and retaining talent, enhancing individual capabilities, fostering

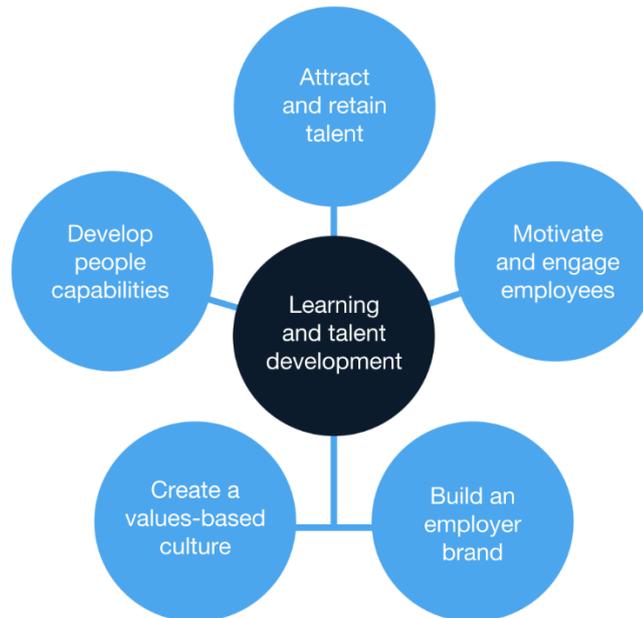
a culture rooted in values, establishing a strong employer brand, and ensuring employee motivation and engagement.

Picture 1

Talent Development Key Areas. Source: McKinsey & Company

The learning function of an organization has a strategic role in five areas.

The 5 key areas of talent development



Source: Adapted from Nick van Dam, *25 Best Practices in Learning & Talent Development*, second edition, Raleigh, NC: Lulu Press, 2008

McKinsey&Company

As years have passed, there's been a notable increase in collaboration between L&D experts and organizational leaders. Prime method organizations employ to boost retention is by providing ample learning opportunities (LinkedIn, 2023). Companies are keen on equipping their teams with employees who possess a blend of both technical and interpersonal skills essential for success in today's world. For this, they largely rely on workplace L&D (SHRM, 2022). L&D goes beyond just offering training; at its core, it's about instilling a culture of ongoing learning that prioritizes aspects like coaching, feedback, leadership, and a sense of responsibility (Baele, 2022). Given the increasing importance of L&D, the 2023 budget forecast indicates that international organizations are planning to allocate more funds to this area (LinkedIn, 2023).

Skills outlook

Strong ties exist between elevated skill proficiency and economic progress markers such as human capital potential and innovative capacity. Europe stands out in global skill rankings, especially in the realm of business skills. In contrast, Latin America and the Caribbean are frontrunners in technology and data science expertise. However, strengths manifest diversely across different regions and nations. To illustrate, Botswana's learners showcase a commendable proficiency in business skills, while those in Kazakhstan stand out for their acumen in technology (Coursera, 2023).

Per the LinkedIn Workplace Learning Report (2023), human skills continue to be of paramount importance for international organizations, particularly in the era of widespread hybrid work. Key among these skills are Management, Communication, Leadership, and Teamwork.

Based on the Future of Jobs report by the World Economic Forum (2023), analytical thinking emerges as the top-valued skill, endorsed by more companies than any other (Table 1). Creative thinking, another cognitive ability, secures the second spot. This is followed by a trio of self-efficacy skills – resilience, flexibility, and agility; along with motivation and self-awareness; and then curiosity paired with a commitment to lifelong learning. These rankings underscore the significance of employees' adaptability in the face of evolving workplaces. Trailing in seventh place is dependability and attention to detail, positioned behind technological literacy.

Core skills for employees in 2023 and Reskilling and Upskilling priorities of organizations in the next 5 years according to World Economic Forum, Future of Jobs Survey 2023. As can be seen from priorities AI and Big Data skills will be more prevalent in the near 5 years. Among the top valued skill will be analytical thinking, creative thinking, and leadership and social influence.

Table 1

Core skills

Rank	Core skills in 2023	Reskilling and Upskilling, 2023-2027
1	Analytical Thinking	Analytical Thinking
2	Creative Thinking	Creative Thinking
3	Resilience, flexibility, and agility	AI and Big Data
4	Motivation and self-awareness	Leadership and social influence
5	Curiosity and lifelong learning	Resilience, flexibility, and agility
6	Technological literacy	Curiosity and lifelong learning
7	Dependability and attention to detail	Technological literacy
8	Empathy and active listening	Design and user experience
9	Leadership and social influence	Motivation and self-awareness
10	Quality control	Empathy and active listening

L&D tools and methods

The evolution of L&D is closely tied to the tools and methods employed by organizations. Over the years, there has been a noticeable shift from traditional classroom-based training to more dynamic, technology-driven approaches (CIPD, 2023). The data provided in this section offer a snapshot of this evolution, showcasing the top tools currently in use.

Blended Learning: A combination of online digital media with traditional classroom methods. It requires the physical presence of both teacher and student, with some element of student control over time, place, path, or pace. It offers many advantages for learners like producing a sense of community or belonging (Tayebnik, M, Puteh, M, 2013)

E-Learning Platforms: Online platforms like Coursera, Udemy, and LinkedIn Learning that offer a range of massive open online courses (MOOCs) across various domains. These courses are one of the most prominent trends in higher education in recent years (Baturay, 2015)

Virtual Reality (VR) and Augmented Reality (AR): Immersive technologies that provide realistic training simulations. For instance, VR can be used for safety training in high-risk industries. AR and VR can be used as a breakthrough in education and a solution to improving the quality of education in the future (Fitria, 2023)

Learning Management Systems (LMS): Software applications for the administration, documentation, tracking, reporting, automation, and delivery of educational courses, training programs, or L&D programs. LMS have become an integral part of many organizations (Turnbell et al, 2020)

Microlearning: Short, focused segments of learning designed to meet a specific learning outcome. It's beneficial for skill-based learning and just-in-time information. The effectiveness of microlearning on imparting knowledge stems from its ability to make learning units easy to understand and memorable for a longer period (Mohammed et al., 2018).

Gamification: Incorporating game elements in learning to increase engagement and motivation. Enhancement of motivation and engagement is the main driver for adopting gamification techniques in L&D (Caponetto et al, 2014)

L&D priorities

According to CIPD, key L&D priorities for organizations in 2023 include addressing skills gaps as the top priority (Table 2), which likely stems from the need to adapt to evolving job roles and industry changes. Following closely, organizations prioritize linking L&D efforts with organizational development, showcasing the growing recognition of L&D as a strategic tool for enhancing overall company performance.

Additionally, the alignment of L&D with performance development reflects the emphasis on continuous improvement and individual growth within the workforce. Improving the induction/onboarding process and identifying changing skills requirements highlight the significance of effectively onboarding new talent and staying ahead of skill shifts. These and other priorities reflect the evolving landscape of workplace L&D, with a strong emphasis on adaptability, technology, and individualization.

Table 2

L&D Priorities

Rank	L&D priorities
1	Addressing skills gaps
2	Linking L&D with organizational development
3	Linking L&D with performance development
4	Improving the induction/onboarding process
5	Identifying changing skills requirements
6	Improving the quality and impact of learning content
7	Increasing self-directed/ self-determined learning
8	More use of short, focused delivery methods
9	Greater use of learning technologies across the organisation
10	Personalising learning programmes to individual needs/context

L&D challenges

L&D faces several challenges, including constraints on time, budget, and learner engagement. The primary obstacles identified by SHRM (2022) include keeping content updated, inadequate training tools, lack of support from leadership, and difficulties in measuring the return on investment (Table 3). On the employee side, challenges revolve around a lack of motivation for training, forgetting materials shortly after training, time constraints, irrelevance of training to their roles, unawareness of available training, outdated content, and technical issues.

Table 3

Challenges

Rank	L&D challenges	Why training fails for employees
1	Lack of time	Lack of motivation for training at work
2	Difficulty keeping content up to date amid workplace change	Materials are soon forgotten afterwards
3	Inadequate training tools	Not enough time at work to complete it
4	Lack of leadership buy-in	Training not relevant to the role
5	Lack of employee buy-in	Don't know about available training
6	Low knowledge retention rate of employees	Training content is out of date
7	Inability to measure return on investment	Technical problems

ACADEMIES Framework by McKinsey

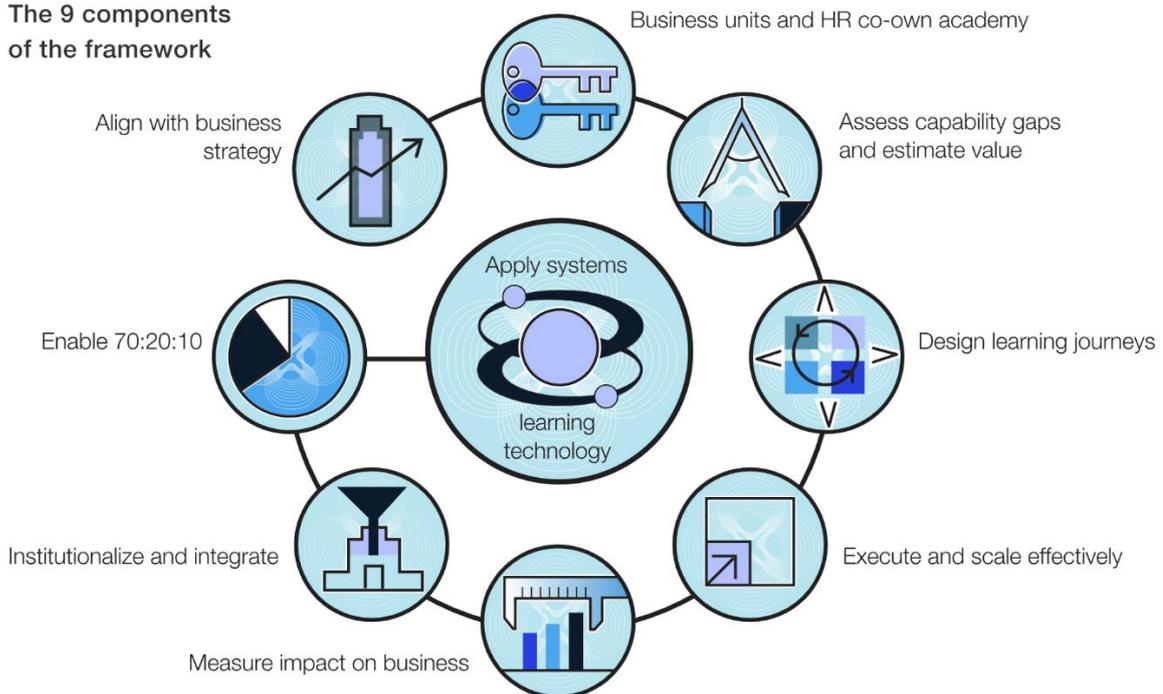
McKinsey (2018) has formulated the ACADEMIES framework after extensive research and testing of nine critical dimensions that define an effective L&D function. This framework encompasses the entire spectrum of L&D activities, from goal setting to evaluating outcomes. While numerous companies have adopted several aspects of this approach, recent findings indicate that only a select few have achieved maturity across all these dimensions (Picture 2).

Picture 2

ACADEMIES Framework. Source: McKinsey & Company

The ACADEMIES framework includes nine components.

The 9 components of the framework



McKinsey&Company

1. **Alignment with Business Strategy:** L&D executives must tailor learning strategies to the company's business and talent goals. This not only fosters professional growth and cost-effective capability building across the firm but also strengthens company culture and values. While L&D is pivotal in executing business strategies, such as driving digital transformation, studies show only 40% of companies align their learning strategies with business aims (Brandon Hall Group, 2018). Reasons for misalignment might include outdated methods or past-focused budgets. For optimal results, L&D should annually reassess which employee skills are crucial for the company's business strategy, ensuring learning agendas mirror strategic goals.

2. **Co-ownership between Business Units and HR:** As companies adapt to new tools and technologies, L&D must swiftly roll out capability-building programs, especially when new business demands or technology training, like cloud tools, arise. A robust partnership between L&D and business leaders can be fostered by a shared governance structure. In this model, leadership from both sides collaboratively determine, prioritize, design, and fund training programs. Key executives, including the company's chief experience officer (CXO) and business-unit leaders, shape the capability agenda and ensure it matches the firm's strategic goals. With top executive involvement, the learning function becomes deeply ingrained in the company culture, ensuring commitment to L&D's long-term vision.

3. **Assessment of Capability Gaps and Value:** To ensure business objectives are met, companies need to confirm their workforce possesses the required skills. However, many firms either overlook capability assessments or conduct them superficially, particularly for senior leaders and managers. Leading companies adopt a systematic approach to identify capability gaps. Central to this is a detailed competency model reflecting the organization's strategic goals. For instance, competency for an e-commerce team might be proficiency in big data and analytics. Once crucial skills for roles are identified, companies should evaluate employee proficiency in these areas, directing L&D initiatives to bridge any identified gaps.

4. **Design of Learning Journeys:** Corporate learning often combines digital formats with in-person sessions. Despite the value of immersive classroom experiences, many leaders, constrained by tight schedules, seek flexible learning options that allow skill development without the fear of public mistakes affecting their careers. Traditional L&D often lacked continuous reinforcement, causing knowledge decay over time. Modern L&D is evolving towards "learning journeys"—ongoing learning processes over extended periods. These journeys encompass diverse L&D methods like fieldwork, digital lessons before and after classroom sessions, social learning, on-the-job coaching, and brief workshops. The goal is to effectively develop competencies and ensure practical application of learned skills on the job.

5. **Execution and Scale-Up:** A robust L&D agenda with strategic initiatives is pivotal to meet business objectives, like fostering high-performing teams or safety training. Timely and budgeted execution of L&D tasks is crucial to earn and retain support from business leaders. Despite often facing resource limitations, L&D must maintain a dialogue with business stakeholders to align priorities and secure resources. Starting with smaller pilots, like an online training for a niche group, can validate the initiative's efficacy. Successful pilots can then be expanded enterprise-wide, reducing per-person costs due to economies of scale.

6. **Measurement of Impact on Business Performance:** Evaluate a learning strategy's execution and impact through key performance indicators (KPIs). Firstly, assess how L&D initiatives align with business priorities (business excellence). Secondly, measure if learning interventions effectively change behaviors and performance (learning excellence). Lastly, evaluate the efficiency of resource use and investments in the learning function (operational excellence). Instead of relying solely on traditional metrics like program satisfaction, prioritize outcome-based metrics, including individual performance impact, employee engagement, team effectiveness, and business process improvement. Measurement should focus on four impact areas:

a. Strategic Alignment: How well does the learning strategy support organizational priorities?

b. Capabilities: Does the L&D improve necessary skills and mindsets? Measure capability gaps against a competency framework.

c. Organizational Health: Assess the learning's contribution to the overall organizational health and DNA.

d. Individual Performance: Measure how L&D aids individuals in maximizing their role impact while balancing work-life.

7. **Integration of L&D Interventions into HR Processes:** For optimal impact, L&D activities should align with both business objectives and the broader HR agenda. Key areas where L&D intersects with HR include recruitment, onboarding, performance management, promotions, and succession.

Though many L&D departments loosely connect to performance reviews, there's an opportunity to embed a more systematic approach. By understanding core HR practices and fostering collaboration with HR teams, L&D can better leverage feedback from performance evaluations to shape learning initiatives.

With the shift from annual reviews to frequent real-time feedback, L&D can aid managers in honing their feedback skills (Brandon Hall Group, 2018). Moreover, in the realm of onboarding, a robust process enhances employee satisfaction and retention (Brandon Hall Group, 2018). Here,

L&D can enhance the onboarding experience by facilitating skill development, introducing digital learning resources, and fostering networking opportunities for new employees.

8. **Enabling of the 70:20:10 Learning Framework:** The “70:20:10” framework suggests that 70% of learning occurs on the job, 20% through interactions, and 10% from formal learning avenues. While these percentages serve as general markers and might differ across sectors and companies, it’s evident that most learning happens informally. Despite L&D’s historical emphasis on formal training, modern L&D leaders are recognizing the value of informal learning. This includes promoting coaching, mentoring, on-the-job training, apprenticeships, shadowing leaders, action-based learning, on-demand digital resources, and interactive sessions like “lunch-and-learn”. The rise of social technologies further boosts informal learning by linking experts and facilitating knowledge exchange.

9. **Systems and Learning-Technology Applications:** Technology platforms are pivotal for on-demand learning. Examples encompass advanced learning-management systems, virtual classrooms, mobile-learning apps, massive open online courses (MOOCs), small private online courses (SPOCs), and many others. The industry’s shift to cloud platforms allows L&D units to harness the latest functionalities without the hurdles of traditional on-site systems.

L&D leaders should ensure their tech tools form a comprehensive architecture covering the entire talent lifecycle: from hiring to rewards. With the Fourth Industrial Revolution blurring the lines between physical and digital realms, the slow adaptability of L&D strategies is a concern. Given the rapid pace of technological progress, the onus is on L&D leaders to swiftly prioritize human capital.

To remain competitive, L&D leadership should craft learning strategies that mirror business goals, pinpointing and leveraging the necessary capabilities for success. The resulting curriculum should incorporate every relevant learning technique and tool. Leading companies will embrace innovative L&D programs, remain adaptable, and nurture talent adept for the digital era. This transformation may involve risks and iterations, but the potential gains are substantial.

Conclusion and recommendations

The research provides an in-depth analysis of the evolving landscape of L&D within international organizations. In the face of rapid global changes, technological advancements, and the challenges brought about by the pandemic, the role of L&D has become increasingly pivotal. Organizations are recognizing the significance of continuous learning, not just as a tool for skill enhancement but as a strategic instrument for talent retention, organizational growth, and adaptation to the ever-changing business environment.

Several key trends have emerged in the realm of L&D. There’s a notable shift from traditional classroom-based training to technology-driven approaches, with tools like Blended Learning, E-Learning Platforms, VR and AR, and Learning Management Systems gaining prominence. The research also underscores the importance of skills such as Analytical Thinking, Creative Thinking, and Leadership in the current work scenario. Furthermore, the ACADEMIES framework by McKinsey offers a comprehensive blueprint for organizations to enhance their L&D functions, aligning them with broader business strategies and ensuring cohesiveness across various HR processes.

However, while the potential of L&D is vast, it is not without challenges. Time constraints, keeping content updated, and measuring the return on investment are some of the hurdle’s organizations face in optimizing their L&D initiatives.

Considering the findings, organizations are recommended to:

1. Prioritize L&D as a strategic function, aligning it with overall business goals.
2. Invest in technology-driven L&D tools and methods to cater to the modern learner.
3. Continuously assess and address skill gaps, ensuring that the workforce is equipped to handle current and future challenges.
4. Foster a culture of continuous learning, emphasizing skills that go beyond the technical, focusing on adaptability, resilience, and lifelong learning.

5. Develop L&D not only for training purposes, but also as a retention and motivation tool.

For future research, it would be beneficial to delve deeper into the effectiveness of various L&D tools, gather insights from employees on their learning preferences, and explore the long-term impact of L&D initiatives on organizational performance.

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