

Reforming Judicial Administration Funding: Public Finance, Digitalisation, and Institutional Independence in Kazakhstan

Dauren MURATBEKOV

<https://orcid.org/0009-0004-3030-3739>

High Judicial Council of the Republic of Kazakhstan, Astana, Republic of Kazakhstan

atyigai@mail.ru

Murat ZHAKSYLYKOV

<https://orcid.org/0009-0007-4563-1235>

Organization of Competitive Selection and Formation of the Personnel Reserve
High Judicial Council of the Republic of Kazakhstan, Astana, Republic of Kazakhstan

zhmb50919@gmail.com

Kuanysh SALIMZHAN

<https://orcid.org/0009-0006-7105-3865>

Department for the Assessment of the Status of Judicial Personnel
High Judicial Council of the Republic of Kazakhstan, Astana, Republic of Kazakhstan

binur2021@mail.ru

Gulazhar BAKYTZHANOVA

<https://orcid.org/0009-0007-6063-7766>

Judicial Panel of the Mangystau Regional Court
Mangystau Regional Court Aktau, Republic of Kazakhstan

gulazhar@mail.ru

Dana SISENOVA

<https://orcid.org/0009-0001-6621-4007>

Department of the Department for the Protection of State, Property Rights
Ministry of Justice of the Republic of Kazakhstan, Astana, Republic of Kazakhstan

sisenova-dana@mail.ru

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Abstract

The modernization of Kazakhstan's judicial system requires improvements in judicial administration funding to enhance institutional capacity, public expenditure efficiency, and the sustainability of judicial governance. This study aims to assess long-term trends in justice-sector financing, evaluate the current funding approach from a public finance perspective, and develop a conceptual framework for reforming judicial administration funding.

The study is based on official statistics of the Bureau of National Statistics of the Republic of Kazakhstan, the Committee on Legal Statistics and Special Records of the Prosecutor General's Office, and materials of the High Judicial Council for the period 2015–2025. The empirical analysis employs comparative analysis, econometric modelling, time-series forecasting, the Mann–Whitney test, the Durbin–Watson statistic, and regression analysis. Due to the limited availability of official long-term data on judicial administration expenditures, the study uses the volume of investigation and security services as a proxy indicator describing the broader financial environment of the justice sector.

The results indicate a significant nominal increase in this indicator from KZT 165.9 billion in 2015 to KZT 785.3 billion in 2025, reflecting expanding public financial resources allocated to justice-related activities. Trend analysis suggests continued growth; however, diagnostic tests reveal residual autocorrelation and structural changes associated with institutional reforms. The findings suggest that increasing financial resources alone may be insufficient to strengthen judicial administration without corresponding improvements in budget allocation mechanisms. Based on the exploratory findings and literature, the study proposes a conceptual framework for judicial funding reform based on workload, digitalisation, performance indicators, and medium-term budget planning.

The results contribute to the literature on public finance, judicial administration, and institutional economics while acknowledging the limitation associated with the use of proxy indicators instead of direct judicial expenditure data.

Keywords: judicial administration, public finance, judicial independence, budgetary autonomy, public expenditure efficiency.

JEL Classification: H50; H61; K40; O38.

Introduction

In the context of increasing demands on the effectiveness of public administration, improving the mechanisms for the formation and distribution of budgetary resources that support the functioning of state institutions is particularly important. The judicial system is a key element of the institutional environment, determining the level of protection of property rights, the country's investment attractiveness, the quality of the business climate, and the sustainability of economic development. Therefore, the effectiveness of judicial financial support is viewed not only as an administrative task but also as an important factor in improving the quality of public administration, reducing institutional risks, and strengthening economic entities' trust in the national legal system.

In modern economic literature, the financial autonomy of the judiciary is considered an integral part of the institutional independence of the state. Insufficient independence of judicial bodies in matters of forming and distributing budgetary resources can reduce the efficiency of public finances, limit the possibility of long-term planning for the development of judicial infrastructure, and create the preconditions for the emergence of institutional risks. In turn, an effective judicial funding model contributes to increased productivity of judicial administration, a reduction in transaction costs, the development of digital justice services, and the strengthening of the institutional resilience of the national economy. International experience shows that reform of judicial funding mechanisms is primarily focused on increasing the financial autonomy of judicial administration bodies, implementing program-based budgeting, medium-term financial planning, and the use of quantitative performance indicators in the allocation of public resources. Such approaches ensure more rational use of budget funds, increase the transparency of financial flows, and minimize the judicial system's dependence on administrative decisions by the executive branch.

Recent studies increasingly consider judicial financing not only as budgetary support for courts but also as a form of long-term institutional investment in judicial administration (Mathis & Mussard, 2025; Mergel et al., 2023). An important component of such investment is the digital transformation of the judiciary, including electronic case management, e-filing systems, online court services, digital document circulation, and intelligent information platforms. These instruments reduce administrative and transaction costs, improve the efficiency of judicial administration, enhance transparency, and expand access to justice. Consequently, expenditures on judicial digitalization should be viewed as an integral part of judicial financing because they directly influence the institutional capacity, operational efficiency, and financial sustainability of the judicial system. Therefore, judicial funding should be evaluated not only by the amount of allocated budgetary resources but also by their contribution to institutional modernization and digital transformation.

The scientific novelty of this study lies in the development of an economically sound conceptual model for reforming the financing of judicial bodies based on the principles of financial autonomy, program-based budgeting, and risk-based allocation of public resources. Unlike existing approaches, the proposed model integrates indicators of judicial workload, digital transformation, and budget efficiency, allowing funding to be viewed as a tool for strengthening the institutional independence of the judiciary and improving public administration performance.

Despite a significant amount of research on judicial independence and judicial budgeting, most studies focus either on the legal aspects of judicial independence or on improving the efficiency of financial resource management. The relationship between the funding model for judicial administration bodies and the level of their institutional independence remains insufficiently studied. Furthermore, there is no unified approach to assessing the effectiveness of various judicial budgeting models in the context of current public administration reforms and the digitalization of justice. This necessitates further research into the funding mechanisms for judicial administration bodies and the development of recommendations for improving their financial autonomy as a crucial element of judicial independence.

The purpose of this study is to economically evaluate the effectiveness of the current financing model for judicial bodies in the Republic of Kazakhstan, identify trends and patterns in changes in the financial support of the judicial system using economic and statistical methods, and develop a conceptual model for reforming the budget mechanism aimed at improving the efficiency of public financial resources and strengthening the institutional independence of the judiciary.

Achieving this goal will enable the development of scientifically sound recommendations for improving the efficiency of budgetary resource use, strengthening the financial autonomy of judicial bodies, and improving the institutional mechanisms for the functioning of the judiciary in the Republic of Kazakhstan.

The following hypotheses were put forward during the study:

- H1: Greater financial autonomy and workload-based resource allocation are associated with more efficient and sustainable judicial administration funding.
- H2: Justice-sector financing in Kazakhstan exhibits a positive but structurally uneven long-term trend.
- H3: Increased financial resources alone are insufficient to strengthen the efficiency and institutional independence of judicial administration.

H4: A performance-based funding model incorporating workload, digitalisation, and performance indicators provides a more responsive framework than traditional budget-based funding.

H5: Increased judicial digitalisation is associated with a growing need for sustained medium-term investment in digital infrastructure, cybersecurity, and related capabilities.

Owing to data limitations, the hypotheses are evaluated indirectly using available justice-sector indicators. Consequently, the empirical analysis should be interpreted as exploratory rather than as a complete verification of institutional independence

1. Research Methods

The methodological basis of the study was made up of methods of economic, statistical and institutional analysis, aimed at assessing the effectiveness of the current model of financing the judicial management body and developing directions for its reform in the context of the digital transformation of public administration. The theoretical basis of the study is the provisions of institutional economics, public sector economics and program-targeted budgeting, which consider financial support as one of the key factors in increasing the efficiency of public administration and strengthening the institutional stability of the judicial system.

A key methodological limitation of this study is the absence of a consistent long-term official statistical series on judicial administration expenditures in the Republic of Kazakhstan. Publicly available budget information does not provide sufficiently detailed and comparable annual data on judicial administration funding, expenditure structure, digital investment, personnel costs, or administrative expenditure over the entire study period (2015–2025). Consequently, direct quantitative evaluation of judicial administration financing is not currently feasible.

To address this limitation, the empirical analysis employs the volume of investigation and security services as a proxy indicator describing the broader financial environment of the justice sector. This indicator does not directly measure judicial administration expenditure or institutional independence. Instead, it reflects long-term changes in the allocation of public financial resources associated with justice-related public services and therefore provides indirect evidence of the financial context within which judicial administration operates. Accordingly, the empirical findings should be interpreted as an assessment of broader justice-sector financing rather than as a direct measurement of judicial funding or institutional independence.

At the first stage of the study, methods of comparative and systemic analysis were used, which made it possible to generalize international experience in organizing the financing of the judiciary, identify the features of budget support for judicial management bodies and determine the main directions for improving the financial mechanism in the Republic of Kazakhstan.

To assess the dynamics of financial support, methods of economic and statistical analysis of time series were used based on official data for 2015–2025. Absolute and relative indicators of dynamics, growth rates and structural changes were calculated, which made it possible to identify the main patterns of changes in the volume of financing in the area under study. To eliminate the influence of inflation on monetary indicators, the time series was additionally analysed in constant prices.

Nominal values were deflated using the annual Consumer Price Index (CPI) published by the Bureau of National Statistics of the Republic of Kazakhstan, with 2015 adopted as the base year (2015 = 100). This procedure made it possible to distinguish nominal changes in financial resources from their real dynamics. The inflation-adjusted series confirmed that the overall upward trend remained, although the rate of real growth was lower than that observed in current prices.

To quantitatively assess funding development trends, a linear regression model was estimated using annual nominal monetary indicators. The quality of the estimated model was evaluated using the coefficient of determination (R^2), the mean absolute percentage error, the Durbin–Watson statistic, and residual analysis. Because a consistent long-term deflator for the selected proxy indicator is unavailable, the regression describes nominal rather than real changes in the broader financial environment of the justice sector. Consequently, the model should be interpreted as an exploratory analysis of long-term trends rather than as evidence of causal relationships. The quality of the resulting model was assessed using the coefficient of determination (R^2), the average error of approximation, the Durbin-Watson test and analysis of residuals, which made it possible to determine the degree of adequacy of the model and identify the presence of structural features of the dynamics of financing.

To test the statistical significance of changes in the amount of funding between individual stages of development of the judicial system, the nonparametric Mann-Whitney test was used, which made it possible to establish the presence of structural differences between the periods under study and confirm the influence of institutional transformations on changes in financial support.

The institutional approach was used for the economic interpretation of the results obtained and to assess the relationship between the budget financing mechanism, the efficiency of use of public financial resources and the institutional conditions for the functioning of the judicial management body. Based on the analysis, a conceptual model for reforming financing has been developed, providing for a transition from traditional budgeting to a program-targeted mechanism for allocating financial resources, taking into account the judicial workload, the level of digitalization and efficiency indicators of judicial administration.

The information base of the study consisted of official data from the Bureau of National Statistics of the Republic of Kazakhstan, the Committee on Legal Statistics and Special Accounts of the General Prosecutor's Office of the Republic of Kazakhstan, materials of the Supreme Judicial Council of the Republic of Kazakhstan, regulatory legal acts of the Republic of Kazakhstan, as well as analytical materials of international organizations and the results of foreign studies on the issues of financing the judiciary, institutional economics and state budget management.

Since official long-term statistical information on judicial administration expenditures is limited, the empirical analysis combines available indicators describing financial resources allocated to justice-related public services with institutional indicators reflecting the modernization of judicial administration. In this context, expenditures associated with digital transformation are interpreted as institutional investments intended to improve judicial efficiency, strengthen administrative capacity, and enhance access to justice. Therefore, the empirical analysis should be interpreted as an assessment of broader justice-sector financing rather than as a direct measurement of judicial independence itself.

2. Literature Review

Judicial funding has become an important research area within institutional economics, public finance, and public administration. Contemporary studies consider the judiciary not only as a legal institution but also as an element of the economic environment that influences property-rights protection, transaction costs, investment confidence, and the sustainability of socioeconomic development. From this perspective, the way financial resources are formed and distributed affects the administrative capacity of courts, the continuity of judicial services, and the institutional conditions under which the judiciary operates.

Financial autonomy is generally regarded as an important condition for judicial independence. Mamak et al. (2022) emphasize the relationship between institutional arrangements, judicial performance, and the quality of justice. Viapiana (2018) demonstrates that budgeting may operate as an indirect mechanism of influence on judges because resource allocation affects staffing, logistical support, and the organization of court activities. Judicial autonomy therefore depends not only on formal constitutional guarantees but also on the structure of the budgetary process.

Viapiana and Fabri (2019) further develop this argument by examining court budgeting as both an independence issue and a managerial problem. Their study highlights the need to balance financial autonomy with accountability for the use of public resources and supports the introduction of program-based budgeting linked to judicial performance. Rosselli (2020) similarly treats judicial budgeting mechanisms as institutional arrangements capable of either supporting or constraining judicial independence.

The practical dimension of judicial funding reform is addressed by the World Bank (2023), which identifies medium-term budget planning, performance-based financing, transparency of resource allocation, and financial accountability as essential conditions for sustainable judicial reform. Godfrey et al. (2022) also show that the resilience of courts during periods of crisis depends on institutional capacity and sufficient resources. Collectively, these studies indicate that judicial financing should be understood not merely as routine budgetary support but as an instrument of institutional development and public-sector effectiveness.

Nevertheless, the literature does not offer a unified framework for assessing how particular judicial funding models affect institutional independence and public expenditure efficiency. Existing studies generally examine financial autonomy, budget management, or judicial performance separately, leaving the relationship between these dimensions insufficiently integrated.

Digital transformation has become a structural component of judicial administration and has changed the composition of resource requirements within the justice sector. Judicial financing increasingly includes expenditure on electronic case-management systems, e-filing, online court services, digital document circulation, cybersecurity, data infrastructure, artificial intelligence, and staff digital competencies. Such expenditure should therefore be considered part of long-term institutional investment rather than solely as a technical IT cost.

Mathis and Mussard (2025) show that information technologies can improve judicial efficiency by supporting case management and reducing administrative burdens. Bosio (2023) likewise emphasizes that technological resources improve access to court documents, judicial administration, and the capacity of courts to respond to growing legal complexity. Di Vaio et al. (2022) and Jiang (2021) place these changes within the broader development of data-driven public administration and smart governance, where digital platforms and analytical tools improve adaptability, transparency, and decision support.

Artificial intelligence applications extend this transformation. Mergel et al. (2023), Sedkaoui and Benaichouba (2024), and Spalević et al. (2024) identify opportunities for improving the efficiency, accessibility, and transparency of public and judicial services. Automated document review, electronic case management, legal research, anonymisation tools, chatbots, natural-language processing, and predictive analytics may reduce routine workloads and provide additional analytical support to legal professionals. Mohamed (2024) notes that these applications differ in scope but share the potential to improve the quality and accessibility of justice.

Razmetaeva and Razmetaev (2021) demonstrate that automation can release professional resources from routine processes, while Quezada-Tavárez and Vogiatzoglou (2021) examine the use of algorithmic tools and digital evidence in legal decision-making. Păvăloaia and Necula (2023), however, characterize artificial intelligence as a potentially disruptive innovation whose implementation may encounter ethical, legal, and organizational resistance. These risks include algorithmic bias, data-protection concerns, cybersecurity threats, and possible tensions with the principles of judicial independence and the rule of law.

Laptev and Feyzrakhmanova (2024) regard digital justice as a strategic direction for increasing public confidence in the judicial system. Schmitz (2019) and Shi et al. (2021) show that digital and automated mechanisms may be especially useful for standardized disputes and routine procedures, thereby allowing judges to devote more attention to complex cases. However, such benefits depend on adequate financing, technological infrastructure, professional competencies, and institutional safeguards.

The COVID-19 pandemic accelerated the introduction of online courts, remote hearings, electronic document management, and videoconferencing. Sourdin et al. (2020) demonstrate that these technologies helped judicial systems maintain access to justice during the crisis. Online services also reduced geographical barriers and improved accessibility for people with disabilities and other groups facing practical obstacles to courtroom participation. Rubin Gomez (2021) places these developments within a wider discussion of demand-side access to justice and the institutional conditions necessary for successful judicial reform.

The literature therefore indicates that digitalisation may improve administrative efficiency and access to justice, but it also creates permanent financing requirements related to infrastructure, cybersecurity, software maintenance, data governance, and human-capital development. Digital transformation should consequently be incorporated into medium-term judicial budgeting rather than financed through isolated or one-time projects.

Alongside institutional and digital approaches, a separate strand of literature uses economic and mathematical methods to evaluate the efficiency of judicial resource use. Data Envelopment Analysis (DEA) and the Directional Distance Function (DDF) are among the most widely applied methods because they permit the simultaneous assessment of several resource inputs and judicial outputs.

Peyrache and Zago (2012, 2016) applied DDF and DEA to Italian courts at the regional level, focusing on court size and economies of scale. Their variable-returns-to-scale specification recognizes that the relationship between resources and outputs may differ across small and large courts. The results show that judicial efficiency cannot be assessed independently of organizational scale and the conditions under which courts use their resources.

Falavigna et al. (2015) employed an output-oriented DEA model to assess the efficiency of Italian tax courts. Their approach treats the duration of court proceedings as an undesirable output, thereby combining the number of resolved cases with the timeliness of justice. The authors used the bootstrap methodology developed by Simar and Wilson (2007) to improve the statistical reliability of the resulting efficiency estimates.

Falavigna and Ippoliti (2021) further examined judicial efficiency under budget constraints and compared models with and without undesirable outputs. Belarouci et al. (2023) extended this approach by differentiating between intermediate procedural outputs and final judicial outcomes. Their analysis demonstrates that court efficiency should reflect not only the volume of completed cases but also the organization and resource intensity of the judicial process.

These studies provide an important methodological foundation for performance-based judicial funding. They show that the adequacy of judicial resources cannot be evaluated solely through the absolute amount of funding. A comprehensive assessment should consider workload, court productivity, procedural duration, organizational efficiency, digital capacity, and the quality of judicial administration.

The reviewed literature identifies three complementary research directions: institutional approaches to judicial independence and financial autonomy; public-finance approaches to judicial budgeting and expenditure efficiency; and research on digitalisation and the changing resource requirements of courts. However, these directions are usually examined separately. Studies of judicial independence concentrate mainly on legal and institutional guarantees, efficiency studies focus on resource inputs and court outputs, while digitalisation research emphasizes technological capabilities and risks.

Consequently, the comprehensive reform of judicial administration funding—integrating baseline institutional financing, judicial workload, digital needs, administrative performance, transparency, and medium-term financial sustainability—remains insufficiently developed. This research gap provides the basis for proposing a performance-oriented funding framework that combines institutional autonomy with accountability and efficient public resource allocation.

Overall, the literature shows that digitalisation has become a structural factor shaping the resource requirements of judicial administration. Investments in digital infrastructure, cybersecurity, data management and intelligent systems can improve administrative efficiency and access to justice, but they also require stable medium-term financing and appropriate institutional safeguards. These findings support the development of a funding framework that integrates judicial workload, digital needs and administrative performance while preserving the institutional autonomy of the judiciary.

3. Analysis and Research Results

International experience shows that funding the judicial system today includes not only the maintenance of courts but also significant investments in the development of digital infrastructure. Consequently, spending on court digitalization should be considered an important element of judicial administration funding, as it contributes to increased efficiency in the use of budgetary funds, a reduction in transaction costs, and strengthening the institutional independence of the judiciary.

Judicial funding reform represents a transition from the traditional model of budgetary support for courts to a system of strategic management of public financial resources focused on the efficiency, transparency, and institutional sustainability of the judiciary. Under current conditions, funding for the judicial administration is viewed not only as a means of ensuring the ongoing operations of courts but also as a tool for improving the quality of public administration, strengthening the rule of law, and creating a favourable institutional environment for economic development.

Modern approaches to judicial funding reform call for changes in the principles of judicial budget formation. Instead of allocating financial resources solely based on judicial maintenance standards, performance-based budgeting, in which funding amounts are based on objective performance indicators of the judicial system, is becoming increasingly widespread. These indicators include judicial workload, the number of cases heard, court proceedings, the level of digitalization of court processes, the quality of judicial services, and the efficiency of public resource use.

One of the key areas of reform is the development of digital judicial infrastructure. Investments in e-justice, automated case management systems, electronic document management, remote participation in court hearings, and intelligent decision support systems can significantly reduce administrative and transaction costs, increase the productivity of court administration, and ensure more efficient use of budgetary funds. Therefore, expenditures on court digitalization should be considered as an integral part of judicial system funding, and not solely as information technology expenditures. Table 1 demonstrates significant differences in the level of digital maturity of judicial systems across European countries.

Table 1: Judicial Information-System Maturity across European Countries

Country	Information Tools	Productivity Tools	Communication Tools	IT Project Governance	Total Maturity Score
Austria (AT)	3	20.20	13.00	5.00	41.2
Belgium (BE)	3	13.90	10.65	1.80	29.35
Switzerland (CH)	3	11.00	7.50	4.50	26.00
Germany (DE)	3	17.90	13.00	3.50	37.40
Denmark (DK)	1	12.90	9.17	3.40	26.47
Spain (ES)	4	18.20	11.00	5.00	38.20
Finland (FI)	2	19.60	11.00	3.70	36.30
France (FR)	2	12.00	8.44	1.70	24.14
England/Wales (GB)	1	12.50	7.50	2.66	23.66
Greece (GR)	0	10.20	3.78	2.30	16.28
Italy (IT)	1	19.30	10.76	3.30	34.36
Netherlands (NL)	3	7.00	2.42	1.00	13.42
Norway (NO)	4	16.25	5.50	4.83	30.58
Poland (PL)	2	13.40	7.96	3.50	26.86
Portugal (PT)	2	16.70	11.80	4.30	34.80
Sweden (SE)	3	13.90	10.00	5.70	32.60
Maximum score	5	23	13	6	47

Source: Adapted from Mathis and Mussard (2025), based on European Commission/CEPEJ data.

The highest values of the integrated indicator are observed in Austria (41.2), Spain (38.2), Germany (37.4), and Finland (36.3), reflecting a high level of development of digital judicial infrastructure, widespread use of electronic document management, digital communications, and modern IT project management mechanisms.

A moderate level of digitalization is characteristic of Portugal (34.8), Italy (34.4), Sweden (32.6), and Norway (30.6). These countries are characterized by the active implementation of digital technologies while maintaining certain organizational limitations.

The lowest values of the integrated indicator are recorded in the Netherlands (13.4) and Greece (16.3), indicating a less developed digital infrastructure of the judicial system and a lower use of modern digital tools.

The development of such an approach is particularly relevant for the Republic of Kazakhstan. The current system of judicial funding is predominantly focused on traditional budget financing and, to a limited extent, takes into account changes in the judicial workload, digital transformation processes, and the performance indicators of the judicial administration. In this regard, reform of the financing mechanism should be aimed at implementing the principles of performance-based budgeting, expanding investment in digital court infrastructure, increasing the transparency of budget allocation, and improving mechanisms for assessing the effectiveness of public expenditure.

Therefore, judicial funding reform should be viewed as a comprehensive institutional reform that integrates public funding mechanisms, digital transformation of the judicial system, and assessment of the effectiveness of budget expenditures. Implementation of this model will ensure a more rational allocation of financial resources, improve the quality of judicial administration, and strengthen the institutional independence of the judiciary.

Funding of the judicial system of the Republic of Kazakhstan in 2024 is characterized by a transition to an institutional development model in which, along with ensuring the ongoing operations of the courts, the importance of investments in digitalization, organizational modernization, and improvement of governance mechanisms increases. At the same time, further reform of the system requires a transition to performance-based budgeting, in which the distribution of public funds will take into account not only standard expenditures but also indicators of judicial workload, the efficiency of budgetary resource use, the level of digitalization, and the quality of judicial administration. This approach will improve the efficiency of public spending, ensure a more rational allocation of financial resources, and strengthen the institutional sustainability of Kazakhstan's judicial system.

A key feature of 2024 was the continuation of institutional reforms of the judicial system. State policy focused not only on funding the ongoing operations of the courts but also on improving the quality of judicial administration through the development of digital infrastructure, streamlining the organizational structure of the judiciary, and increasing access to justice. During this period, efforts were continued to develop electronic legal proceedings, improve the Torelik information system, expand electronic document management, and prepare specialized cassation courts for operation. From an economic perspective, the funding structure of the judicial system is gradually shifting from the traditional budget-based approach to a model focused on institutional development. A significant portion of budget expenditures is being allocated to the digitalization of judicial infrastructure, the modernization of information systems, ensuring information security, and improving the efficiency of judicial management. This approach is consistent with modern principles of public sector reform, where expenditures are viewed as long-term investments in the state's institutional capital.

However, analysis shows that the current funding system remains predominantly normative and cost-based and only partially takes into account objective performance indicators of the judicial system. Criteria such as judicial workload, caseload, digital maturity of the courts, performance indicators, and the efficiency of public funds are used to a limited extent when allocating budgetary resources. As a result, the distribution of financial resources does not always reflect the actual needs of the judicial administration and regional differences in the intensity of judicial activity.

An additional factor in the reform was the creation of a system of specialized cassation courts, which required the formation of a new organizational structure for the judiciary, the redistribution of human and financial resources, and additional investments in logistical support and digital infrastructure. These changes indicate the judicial system's transition to a more sophisticated budgetary management model aimed at improving the quality of judicial administration and strengthening the institutional independence of the courts. Thus, funding for the judicial system of the Republic of Kazakhstan in 2024 is characterized by a transition to an institutional development model in which, along with ensuring the ongoing operations of the courts, the importance of investments in digitalization, organizational modernization, and the improvement of governance mechanisms increases. At the same time, further reform of the system requires a transition to results-based budgeting, in which the allocation of public funds will take into account not only standard expenditures but also indicators of judicial workload, the efficiency of budgetary resource use, the level of digitalization, and the quality of judicial administration. This approach will improve the efficiency of public spending, ensure a more rational allocation of financial resources, and strengthen the institutional resilience of Kazakhstan's judicial system.

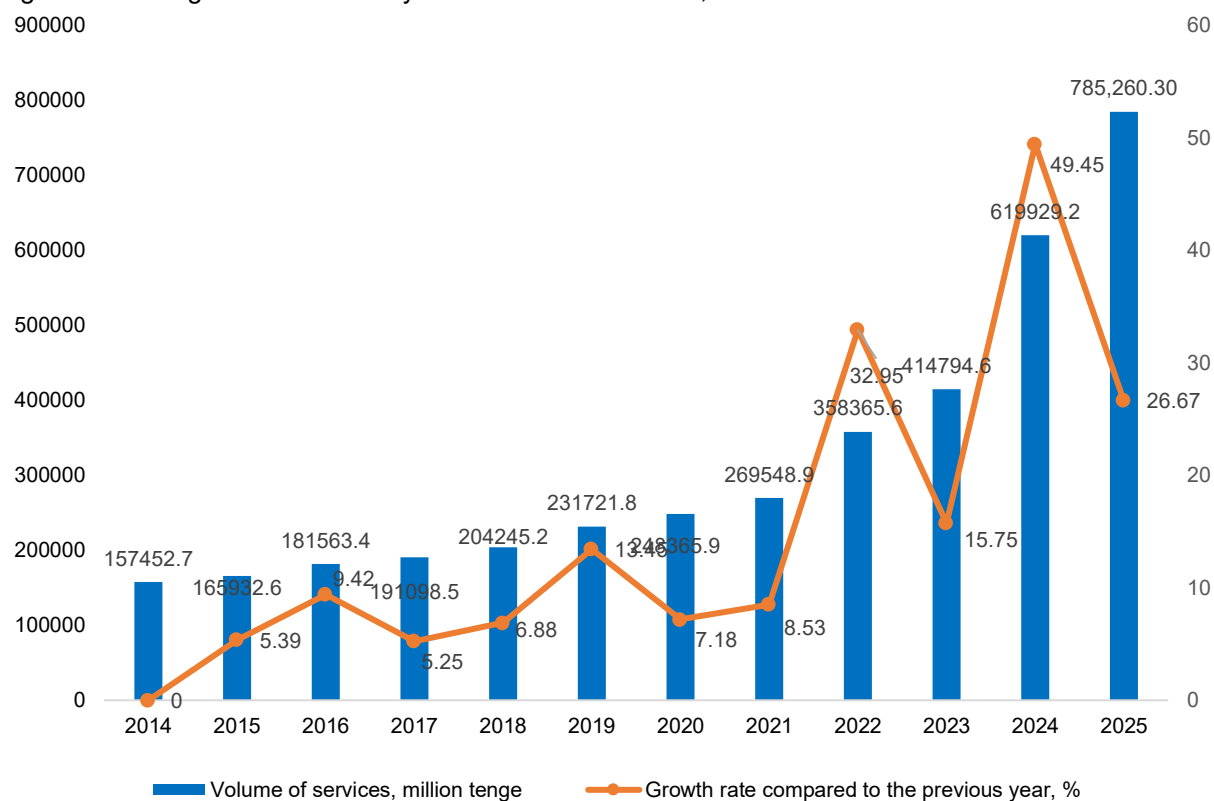
Before presenting the empirical results, it should be emphasized that all quantitative indicators used in this section describe the broader financial and institutional environment of the justice sector rather than direct budgetary expenditures of courts or judicial administration bodies. Due to the absence of a consistent and comparable long-term official statistical series on judicial administration expenditure, digital investment, personnel costs, administrative expenditure, and budget execution, the analysis relies on publicly available proxy indicators. In particular, the volume of investigation and security services is used only as an indirect measure of changes in the broader resource environment associated with justice-related activities. Therefore, the results presented below should not be interpreted as a direct assessment of judicial funding, budgetary autonomy, or institutional independence.

To examine long-term changes in the broader financial environment of the justice sector in the Republic of Kazakhstan, a comprehensive economic and statistical analysis of the available proxy indicators was conducted. Unlike studies that focus primarily on the legal and organizational aspects of judicial reform, this study examines the broader resource environment of the justice sector from the perspective of public finance and institutional economics. The quantitative results are subsequently used to inform, rather than directly test, the proposed framework for reforming judicial administration funding.

International statistics show that in Council of Europe countries, the average funding for the judicial system is approximately 0.31% of GDP, or €85 per capita. Approximately two-thirds of the judicial system budget is allocated directly to supporting court operations. These indicators can be used as benchmarks in assessing the adequacy and institutional independence of judicial funding. For Kazakhstan, reforming the funding model for judicial administration is particularly important, as financial autonomy is a key condition for the

institutional independence of the judiciary. The growth in the volume of investigative and security services in Kazakhstan (from 157,452.7 million tenge in 2014 to 619,929.2 million tenge in 2024) reflects the increasing complexity and expansion of the security and investigation infrastructure, as well as the increasing flow of materials requiring legal assessment (Figure 1).

Figure 1: Investigation and Security Services in Kazakhstan, 2014–2025



Source: Bureau of National Statistics of the Republic of Kazakhstan (2014–2025); authors' calculations.

From 2014 to 2025, the investigative and security services market demonstrated steady upward momentum. While the service volume in 2014 was 157.5 billion tenge, by 2024, this figure had almost quadrupled, reaching 619.9 billion tenge. The most significant growth was observed in 2022 (+32.95%) and 2024 (+49.45%), which may be due to stricter site security requirements, the development of digital monitoring technologies, and increased demand for security services from businesses and government agencies.

In 2025, the market reached 785.3 billion tenge, demonstrating the continued strengthening of the security sector as one of the fastest-growing segments of the Kazakhstani services market. At the same time, such rapid growth raises the issue of comparing security spending with judicial funding and assessing the impact of the financial balance between law enforcement and the judiciary on the level of institutional independence of the judiciary.

Analysis of growth rates shows that from 2014 to 2021, the development of the investigative and security services sector was characterized by moderately stable growth (an average of 5-9% per year). Beginning in 2022, a sharp acceleration was observed, with the annual growth rate exceeding 30% and reaching almost 50% in 2024.

This trend indicates not only an increase in the sector's financial volumes but also a qualitative increase in the workload of law enforcement and judicial institutions, accompanied by an exponential increase in the amount of data to be analysed. This strengthens the case for the implementation of machine learning and artificial intelligence technologies as tools for intelligent support of investigations and justice. To generate forecast values for the "Volume of Investigation and Security Services in the Republic of Kazakhstan" indicator (millions of tenge), we will analyse the corresponding time series for the period 2015–2025.

First, we will use the mean comparison method to identify the presence of a trend in the time series. This algorithm assumes that the original time series is divided into two parts, each approximately equal in number of series members, each treated as a separate, independent sample population. If the time series exhibits a trend, the means calculated for each population separately should differ significantly. If the discrepancy is insignificant and random, then the time series does not exhibit a trend in the mean. Therefore, testing the null hypothesis (H_0) about the presence of a trend in the series under study amounts to testing the hypothesis that the means of the two populations are equal, that is:

$$H_0: \bar{y}_1 = \bar{y}_2$$

$$H_1: \bar{y}_1 \neq \bar{y}_2$$

Due to the small number of observations, we will test the proposed hypothesis using the nonparametric Mann-Whitney test. The results of the hypothesis test are presented in Table 2.

Table 2: Mann–Whitney Test for the Trend Shift, 2015–2025

Indicator	Mean, 2015–2019	Mean, 2020–2025	Z statistic	p-value
Service volume, million tenge	194912,3	449377,4	-2,647	0,0081

Source: Authors' calculations based on Bureau of National Statistics of the Republic of Kazakhstan data.

Since the observed Z value is -2.647 and the p-value is 0.0081, which is less than the 0.05 significance level, the null hypothesis of equality of the means is rejected. Consequently, statistically significant differences exist between the first (2015–2019) and second (2020–2025) parts of the time series. This indicates a consistent upward trend in the volume of investigation and security services in the Republic of Kazakhstan, allowing the use of a trend model for further forecasting.

To approximate the original time series, a first-degree polynomial was chosen as the growth curve:

$$y_t = a_0 + a_1 t + \varepsilon_t, \quad (1)$$

The model parameters were estimated using the ordinary least squares method. This resulted in the following trend model:

$$y_t = 313679,21 + 53338,7t$$

where: y_t - volume of services, million tenge; t - ordinal number of the year. The mean value of the residuals is practically zero: $\bar{\varepsilon} \approx 0$.

The coefficient of determination of the model was $R^2 = 0,776$. This means that 77.6% of the variation in service volume is explained by the time factor, indicating a good linear model and the presence of a stable long-term growth trend for the indicator under study.

To assess the adequacy of the model, the regression residuals were analysed. The study revealed the absence of systematic deviations, and the coefficient of determination confirms the acceptable explanatory power of the model. However, the accelerated growth of the indicator in 2023–2025 indicates a possible strengthening of the nonlinear trend due to the expanding demand for security services, the digitalization of law enforcement, and increased budgetary funding for the relevant sector.

To test the adequacy of the model, a series of residuals were examined, i.e., the discrepancy between the levels calculated by the model and actual observations. The following properties of the residual component were verified: equality of the mathematical expectation to zero, independence of successive levels of the residual series, their randomness, and conformity to the normal distribution law.

During the verification of the equality of the mathematical expectation of the levels of a series of residuals to zero ($H_0: |e| = 0$) Student's t-statistic is constructed:

$$t_{observ.} = \frac{|\bar{e}|}{S} \sqrt{n} = 0,000$$

where: $n = 11$ is number of observations and the number of degrees of freedom $n - 2 = 9$, the critical value at the significance level is $\alpha = 0,05$ makes up $t_{crit} = 2,262$.

Thus $t_{observ.} = 0,000 < t_{crit.} = 2,26$. H, the null hypothesis that the mathematical expectation of the residuals is zero is not rejected. Therefore, the linear model is free of systematic bias. When testing the independence of the residuals, the observed value of the Durbin-Watson dw test was determined:

$$dw = \frac{\sum_{t=2}^n (e_t - e_{t-1})^2}{\sum_{t=1}^n e_t^2} = 0,497 \quad (2)$$

The value is significantly lower than 2 and indicates a pronounced positive autocorrelation of the residuals. The first-order autocorrelation coefficient was also:

$$r(1) = \frac{\sum_{t=2}^n e_t e_{t-1}}{\sum_{t=1}^n e_t^2} = 0,508 \quad (3)$$

This means that the residuals from adjacent years are interrelated, and therefore the condition of their independence for the linear model is not satisfied. When testing whether the mathematical expectation of the residuals is zero, the observed value of the student's t-test was $t_{observ} \approx 0.000$. Since this value is less than the critical value of $t_{crit} = 2.262$ at a significance level of 5%, the hypothesis that the mean value of the residuals is zero is not rejected. Therefore, the constructed trend model is not characterized by systematic bias.

At the same time, the Durbin–Watson criterion value was $DW = 0.497$, and the first-order autocorrelation coefficient was $r(1) = 0.508$. These values indicate the presence of positive autocorrelation of the residuals. Thus, the linear model reflects the general direction of growth of the indicator, but does not fully account for the acceleration of its dynamics in recent years. To improve forecasting accuracy, it is advisable to consider a nonlinear trend model, in particular a quadratic or exponential one.

$$p_{crit.} = \left[\frac{2}{3} (n - 2) - 1,96 \sqrt{\frac{16n - 29}{90}} \right] = 3,50 \quad (4)$$

Thus $p_{observ.} > p_{crit.}$, therefore, a series of residues can be considered random.

The conformity of the residual series to the normal distribution is particularly important for the validity of constructing point and interval forecast values. For verification, the RS-criterion was used, the observed value of which is equal to:

$$RS = \frac{e_{\max} - e_{\min}}{s} = \frac{302356757}{9057826} 3,338 \quad (5)$$

The value of $RS = 3.34$ is within the estimated acceptable range for a small number of observations. Therefore, the hypothesis of a normal residual distribution is not rejected. However, this result should be considered in conjunction with the peaks test and the Durbin–Watson test, which indicate a structural dependence of the residuals.

The obtained value falls between the tabulated test limits: $2.67 < 3.49 < 3.67$. Therefore, with 95% confidence, it can be stated that the hypothesis of a normal residual distribution is accepted, and in this case, it is permissible to construct predicted values.

To assess the accuracy of the model, the average relative error of approximation was calculated:

$$E_{rel.} = \frac{1}{n} \sum_{i=1}^n \frac{|e_t|}{y_t} \cdot 100\% = 10,1\%, \quad (6)$$

Given the average approximation error of 26.34% and the positive residual autocorrelation ($DW = 0.497$), the linear model should be treated as an exploratory trend model rather than a robust forecasting model. Accordingly, the point and interval estimates below are presented as indicative projections and should be interpreted with caution. To calculate the point forecast, the corresponding factor values were substituted into the constructed model. To construct an interval forecast, a confidence interval was determined at the specified significance level.

The width of the confidence interval was determined using the formula:

$$U(k) = S_e t_{\alpha} \sqrt{1 + \frac{1}{n} + \frac{(n+k-\bar{t})^2}{\sum_{t=1}^n (t-\bar{t})^2}} \quad (7)$$

$$\bar{t} = 6, \sum (t-\bar{t})^2 = 110.$$

To assess the normal distribution of the residuals, the RS-criterion was calculated. The maximum residual was 184,855.30 million tenge, the minimum was minus 117,501.26 million tenge, and the standard deviation of the residuals was 90,578.26 million tenge. The calculated value of the criterion was:

The results of constructing point and interval forecasts for 2026–2029 are presented in Table 3.

Table 3: Forecast of Investigation and Security Services, 2026–2029 (million tenge)

Year	Point Forecast	Prediction Interval	
		Lower Bound	Upper Bound
2026	653,743.70	383,977.35	923,510.06
2027	707,082.41	426,300.68	987,864.14
2028	760,421.12	467,443.53	1,053,398.71
2029	813,759.83	507,546.90	1,119,972.75

Source: Authors' forecasts based on Bureau of National Statistics of the Republic of Kazakhstan data.

One of the factors determining the judicial system's need for financial resources is the volume of pre-trial investigations, which creates a potential burden on justice agencies. An analysis of regional investigation dynamics allows us to assess spatial differences in the intensity of criminal proceedings and identify areas for improving the funding model for judicial administration bodies, taking into account the actual burden on the judicial system (Table 4).

Table 4: Pre-Trial Investigations by Region, 2019–2025

Region	2019	2020	2021	2022	2023	2024	2025
Republic of Kazakhstan	230 710	156 549	149 367	149 421	132 995	127 313	116 032
Astana city	18 063	12 666	15 146	15 915	16 605	17 055	14 830
Almaty city	50 511	26 713	25 398	32 877	25 778	23 343	20 495
Shymkent city	13 550	10 813	10 230	9 323	6 221	5 568	5 725
Abay	0	0	0	2 328	5 138	4 403	4 336
Akmola	11 123	7 547	6 602	5 207	4 851	4 805	4 717
Aktuibinsk	10 490	6 837	6 800	6 465	5 948	5 732	5 345
Almaty	21 528	14 198	13 694	11 917	9 604	10 084	8 382
Atyrau	6 120	4 242	4 173	4 458	4 166	4 449	4 024
East Kazakhstan	17 750	13 168	11 744	7 692	4 864	4 627	4 514
Zhambyl	8 139	6 090	5 287	5 042	4 325	4 033	4 177
Zhetysu	0	0	0	1 916	3 637	3 230	2 825
West Kazakhstan	8 976	6 615	6 002	5 751	4 371	4 155	3 898
Karaganda	15 352	11 953	11 104	9 337	8 768	7 293	6 434
Kostanay	13 313	9 242	8 209	6 781	5 649	4 894	4 870
Kyzylorda	5 816	3 775	3 488	3 015	2 816	2 890	2 699
Mangistau	4 980	3 946	3 725	3 542	3 029	3 357	2 841
Pavlodar	7 843	5 794	5 440	4 845	4 813	5 327	5 040
North Kazakhstan	6 222	4 870	4 593	4 450	3 594	3 408	2 970
Turkestan	8 064	5 917	5 521	5 649	5 268	5 142	4 666
Ulytau	0	0	0	727	1 317	1 323	1 279

Source: Committee on Legal Statistics and Special Accounts of the Prosecutor General's Office of the Republic of Kazakhstan (Qamqor).

Despite a decline in the number of pre-trial investigations in Kazakhstan from 230,700 in 2019 to 116,000 in 2025 (a 49.7% decrease), the judicial system continues to require sustainable funding. A reduction in the number of investigations does not automatically mean a reduction in the need for judicial funding, as demands for digitalization of processes, the quality of case processing, information security, and judicial independence are simultaneously increasing.

To assess regional differentiation in the workload, it is useful to calculate each region's share of the total number of pre-trial investigations initiated in the Republic of Kazakhstan:

$$I_{reg} = \frac{D_{reg}}{D_{Kz}} * 100, \quad (8)$$

where: Ireg – share of the region in the total load, %; Dreg – number of investigations in the region; DKZ – total number of investigations in the Republic of Kazakhstan.

The results of regional differentiation of the burden on the justice system are presented in Table 5.

Table 5: Regional Shares of Pre-Trial Investigations, 2019–2025 (%)

Region	2019	2020	2021	2022	2023	2024	2025
Astana city	7,83	8,09	10,14	10,65	12,49	13,40	12,78
Almaty city	21,89	17,07	17,00	22,00	19,38	18,34	17,66
Shymkent city	5,87	6,91	6,85	6,24	4,68	4,37	4,93
Akmola	4,82	4,82	4,42	3,49	3,65	3,77	4,07
Aktuibinsk	4,55	4,37	4,55	4,33	4,47	4,50	4,61
Almaty	9,33	9,07	9,17	7,98	7,22	7,92	7,22
Atyrau	2,65	2,71	2,79	2,98	3,13	3,49	3,47
East Kazakhstan	7,69	8,41	7,86	5,15	3,66	3,63	3,89
Zhambyl	3,53	3,89	3,54	3,37	3,25	3,17	3,60
West Kazakhstan	3,89	4,23	4,02	3,85	3,29	3,26	3,36
Karaganda	6,65	7,64	7,43	6,25	6,59	5,73	5,55
Kostanay	5,77	5,90	5,50	4,54	4,25	3,84	4,20
Kyzylorda	2,52	2,41	2,34	2,02	2,12	2,27	2,33
Mangistau	2,16	2,52	2,49	2,37	2,28	2,64	2,45
Pavlodar	3,40	3,70	3,64	3,24	3,62	4,18	4,34
North Kazakhstan	2,70	3,11	3,07	2,98	2,70	2,68	2,56
Turkestan	3,50	3,78	3,70	3,78	3,96	4,04	4,02

Source: Authors' calculations based on Qamqor official statistics.

The results demonstrate significant regional differences in the burden on Kazakhstan's justice system. Throughout the observation period, the highest concentration of pre-trial investigations occurred in the central cities of Almaty and Astana. In 2019, Almaty accounted for 21.9% of all investigations nationwide, and in 2025, it accounted for 17.7%, maintaining its leading position. Astana's share increased from 7.8% to 12.8% over the same period, indicating an increasing burden on the capital's law enforcement and judicial systems.

Also among the regions with consistently high burdens are Almaty, Karaganda, East Kazakhstan, and Aktope regions, which annually account for 4 to 9% of all investigations.

These results confirm significant differences in the intensity of criminal proceedings between regions. This demonstrates the need to transition to a differentiated funding model for judicial administration bodies, taking into account the actual workload of the judicial system, the volume of cases handled, and the level of digitalization of judicial processes. This approach will improve the efficiency of budgetary resource allocation and strengthen the institutional independence of the judiciary.

The analysis also calculated a digital maturity index for the judiciary:

$$IDJ = \frac{\text{Electronic investigations}}{\text{Total investigations}} * 100, \quad (9)$$

As a result, we obtain the index of digitalization of justice (Table 6).

Table 6: Justice Digitalisation Index, 2018–2025

Year	Digitalisation Index
2018	0,047
2019	0,190
2020	0,433
2021	0,765
2022	0,940
2023	0,932
2024	0,953
2025	0,905

Source: Authors' calculations based on official statistics of the Committee on Legal Statistics and Special Accounts.

Based on the obtained data and the overall analysis, it can be noted that in 2020–2021, a structural shift in the organization of judicial proceedings has been observed, driven by the large-scale implementation of digital technologies. The share of electronic investigations increased from 43.3% to 76.5%, indicating a transition to a new institutional model for managing investigative processes and judicial administration.

However, it should be noted that despite the decrease in the number of pre-trial investigations in Kazakhstan from 230.7 thousand in 2019 to 116.0 thousand in 2025 (a 49.7% decrease), the judicial system continues to require sustainable funding. A reduction in the number of investigations does not automatically mean a reduction in the need for judicial funding, as demands for the digitalization of processes, the quality of case processing, information security, and ensuring judicial independence are simultaneously increasing.

Based on the available data, a preliminary model can be calculated to assess the impact of the workload on the digitalization of justice:

$$Dt = \beta_0 + \beta_1 L_t + t \quad (10)$$

where: Dt - share of electronic investigations, %; L_t - total number of pre-trial investigations, thousands of cases.

Table 7: Regression of Judicial Digitalisation on Investigation Workload

Parameter	Estimate
β_0	167,72
β_1	-0,618
R^2	0,865
p-value	0,0008
Observations	8

Source: Authors' calculations based on the official data reported in Tables 4 and 6.

Calculation result $D = 167,72 - 0,618L$. Coefficient $R^2 = 0,865$ This means that 86.5% of the change in the share of electronic investigations is explained by changes in the overall caseload. The negative coefficient of -0.618 indicates that with a decrease in the number of pre-trial investigations per 1,000 cases, the share of electronic investigations increases by an average of 0.618 percentage points. This means that the digitalization of justice is developing against a backdrop of a reduction in the overall caseload and a transition to a more manageable electronic model for recording and managing cases.

Digital technologies in the modern world are rapidly transforming the judicial system and changing the principles of its functioning. Digitalization itself facilitates the acceleration of legal proceedings, a reduction in administrative costs, and increased transparency of court decisions. Online hearings, electronic documents, and automated systems help reduce bureaucracy and expedite proceedings.

4. Proposed Performance-Based Funding Allocation Model

Building upon the empirical findings of this study, we propose a performance-based judicial funding allocation model designed to improve the efficiency, transparency, and sustainability of judicial administration financing in Kazakhstan. The findings suggest that further improvements should focus not only on increasing financial resources but also on reforming the principles governing their allocation. In this context, a performance-based funding framework is proposed to improve the efficiency, transparency and sustainability of judicial administration financing.

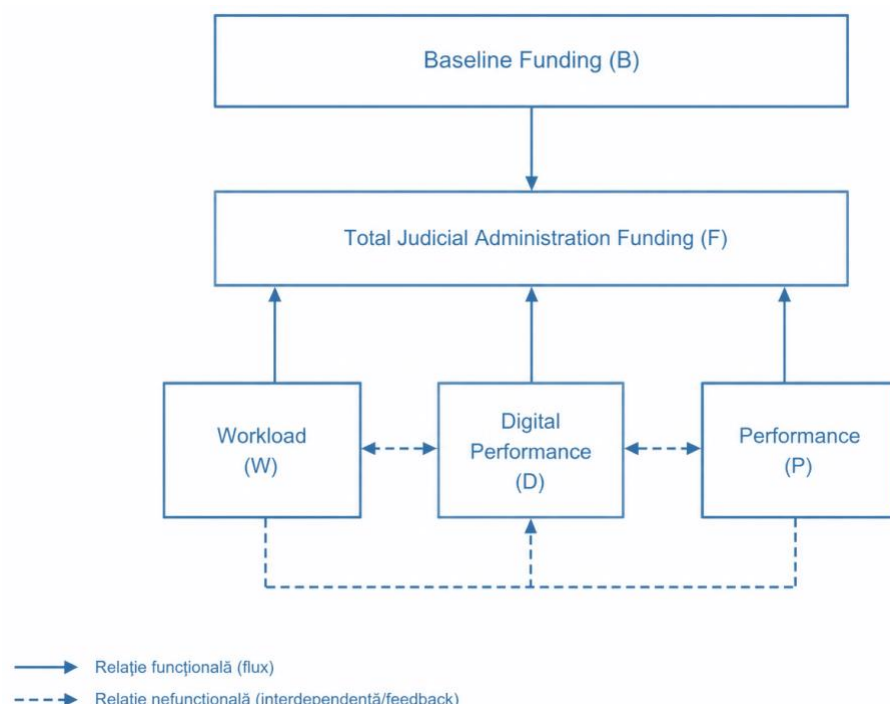
To operationalise the proposed reform, judicial administration funding may be allocated using a composite performance-oriented model:

$$F_{i,t} = B_{i,t} + \alpha W_{i,t} + \beta D_{i,t} + \gamma P_{i,t}$$

The proposed allocation model consists of four complementary funding components. Baseline funding guarantees institutional continuity, while the remaining components introduce needs-based and performance-oriented adjustments. where: $F_{i,t}$ – total funding allocated to judicial administration unit i during year t ; $B_{i,t}$ – baseline funding required to maintain the minimum operational capacity of courts; $W_{i,t}$ – workload component (number of incoming cases, pending cases, judicial complexity, regional demand); $D_{i,t}$ – digitalisation component (digital infrastructure, cybersecurity, e-justice systems, AI applications, ICT maintenance, digital competencies); $P_{i,t}$ – performance component (case disposition rate, average case duration, budget execution efficiency, service quality indicators); α , β , γ – policy weights reflecting government priorities.

Unlike traditional line-item budgeting, the proposed framework allocates resources according to measurable institutional needs. The baseline component guarantees the minimum functioning of judicial institutions, whereas the workload, digitalisation, and performance components introduce flexibility and efficiency into budget allocation. The relative weights (α , β , γ) are determined by public policy priorities and may be revised periodically according to strategic judicial objectives and available fiscal resources.

Figure 2: Performance-Based Judicial Funding Allocation Model



Source: Authors' own elaboration.

Although the proposed framework is not estimated empirically in the present study, it provides a policy-oriented analytical structure that can support future judicial budgeting reforms. As more detailed court-level financial and operational data become available, the model may be empirically calibrated and validated using panel-data or efficiency-analysis techniques.

Table 8: Illustrative Indicators for the Proposed Funding Model

Funding Component	Illustrative Indicators
Baseline funding (B)	Court operating costs, salaries, utilities, statutory expenditures
Workload (W)	Incoming cases, pending cases, regional caseload, case complexity
Digitalisation (D)	E-courts, cybersecurity, AI tools, ICT infrastructure, staff digital training
Performance (P)	Clearance rate, average trial duration, budget execution, user satisfaction

Source: Authors' own elaboration.

The baseline component (B) guarantees the institutional stability of the judiciary by ensuring minimum financing necessary for the continuous functioning of courts irrespective of annual fluctuations in workload. The workload component (W) introduces an objective mechanism for allocating additional resources according to the actual demand for judicial services, thereby reducing regional imbalances in court financing.

The digitalisation component (D) reflects the increasing importance of investments in electronic justice, cybersecurity, digital infrastructure and intelligent decision-support systems. Treating digital investment as an integral element of judicial financing rather than a separate information technology expenditure encourages long-term modernization of judicial administration and improves public access to justice.

The performance component (P) links part of judicial funding to measurable administrative outcomes, including procedural efficiency, implementation of digital services, quality of court administration and compliance with national judicial performance standards. Importantly, this component should not be interpreted as influencing judicial decision-making or judicial independence; rather, it is intended to evaluate the efficiency of administrative resource management within the judiciary.

The relative importance of the workload, digitalisation and performance components may be determined through a transparent multi-criteria budgeting procedure. Possible approaches include expert evaluation involving representatives of the judiciary, the Ministry of Finance and independent public finance specialists; multi-criteria decision-making techniques such as the Analytic Hierarchy Process (AHP); or periodic review based on medium-term budget planning and empirical evidence on court performance. From a public-finance perspective, the proposed allocation model offers several potential advantages. First, it enhances transparency by introducing explicit allocation criteria. Second, it improves accountability through measurable administrative and digital-performance indicators. Third, it promotes a more efficient allocation of public expenditure by linking financial resources to objectively identified judicial needs. Finally, the model supports long-term fiscal sustainability while facilitating the digital transformation of judicial administration.

Based on the empirical findings and the reviewed literature, a conceptual framework for performance-based judicial administration funding is proposed. The framework integrates four complementary components: baseline institutional funding, judicial workload, digitalisation needs, and administrative performance. The components and expected outcomes of the proposed framework are presented in Table 9.

Table 9: Components and Expected Outcomes of the Proposed Funding Framework

Funding Component	Description	Economic Rationale	Expected Policy Outcome
Baseline institutional funding (B)	Minimum guaranteed funding required for the constitutional functioning of courts and judicial administration	Ensures institutional stability and continuity of judicial services regardless of annual fluctuations	Guarantees uninterrupted operation of courts and strengthens institutional sustainability
Judicial workload (W)	Number and complexity of incoming and resolved cases, regional workload differences	Allocates financial resources according to actual demand for judicial services	Improves equity in resource allocation and reduces regional imbalances
Digitalisation needs (D)	Investments in e-justice systems, digital infrastructure, cybersecurity, AI-based services and electronic case management	Supports technological modernization and reduces administrative and transaction costs	Accelerates digital transformation and improves access to justice
Performance indicators (P)	Administrative efficiency, timeliness of case processing, implementation of digital services, quality of judicial administration	Links part of the funding to measurable administrative outcomes	Enhances accountability, transparency and efficient use of public resources

Source: Authors' own elaboration.

The proposed funding framework integrates four complementary components: guaranteed institutional funding, workload-related financing, digitalisation needs and administrative performance. Unlike the traditional line-item budgeting approach, the proposed model allocates public financial resources according to objective indicators reflecting the operational needs and modernization priorities of judicial administration. Although the weighting coefficients are not estimated in this study because of data limitations, they may be determined through expert evaluation, medium-term budget planning or multi-criteria decision-making methods. Such an approach could improve transparency, strengthen accountability and increase the efficiency of public expenditure while preserving the institutional independence of judicial administration.

Conclusion

Based on the conducted analysis, it can be concluded that the proposed hypotheses received different degrees of support within the limitations of the available data and the proxy-based empirical strategy. The economic and statistical analysis revealed positive, albeit uneven, dynamics in the broader financial environment of the justice sector. The linear model's coefficient of determination was $R^2 = 0.776$, while the Durbin–Watson test ($DW = 0.497$), the peak criterion, and the average approximation error of 26.34% indicate structural changes and limitations of the simple linear model. Therefore, the forecast results should be interpreted as exploratory projections rather than robust predictions of future judicial funding.

H2 received empirical support based on the analysed proxy indicators. H3 received partial support because the proxy-based analysis does not permit direct conclusions regarding judicial administration expenditure or institutional independence; however, the calculations do not support the assumption that increased spending will automatically lead to increased institutional independence. H1 and H5 were also partially supported. Their complete empirical verification requires direct indicators of judicial administration expenditure, expenditure structure, budgetary autonomy, judicial workload, and administrative performance, which are currently unavailable in a consistent long-term statistical form. H4 is conceptually supported by the empirical patterns and the proposed funding approach but was not directly tested, as the weighting coefficients of the framework were not empirically estimated.

The identified regional differentiation in caseloads and the high level of digitalisation demonstrate the relevance of incorporating workload and digital indicators into financial resource allocation mechanisms. The analysis suggests that the current approach to judicial administration funding could be further improved by taking into account judicial workload, digitalisation, administrative performance, and medium-term financial sustainability. Increasing financial resources alone may therefore be insufficient to improve the effectiveness and institutional sustainability of judicial administration; the mechanisms governing their allocation and use are also important.

The main limitation of the study is the use of a proxy indicator representing the broader financial environment of the justice sector rather than direct judicial administration expenditure. Accordingly, the findings should not be interpreted as direct evidence of changes in judicial funding or institutional independence. Future research should incorporate direct indicators of judicial administration expenditure, the budget of the Supreme Court, expenditures of the High Judicial Council, digital investment, court infrastructure expenditure, budget execution rates, judicial caseload, and administrative performance.

CRedit Authorship Contribution Statement

Muratbekov, D.: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. Zhaksylykov, M.: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. Salimzhan, K.: Data curation, Formal analysis, Investigation, Writing – review & editing. Bakytzhanova, G.: Data curation, Formal analysis, Investigation, Writing – review & editing. Sisenova, D.: Methodology, Formal analysis, Validation, Writing – review & editing. All authors reviewed and approved the final manuscript.

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Data Availability Statement

The study uses publicly available secondary and aggregate data from official sources of the Republic of Kazakhstan, including the Bureau of National Statistics and the Committee on Legal Statistics and Special Accounts of the Prosecutor General's Office. The empirical series analysed cover 2014/2015–2025, depending on the indicator. Source information is provided in the relevant tables and figures. Derived data and calculations are available from the corresponding author upon reasonable request.

Ethical Approval Statement

This study relies exclusively on publicly available secondary and aggregate data and does not involve human participants, personal data, animal subjects, or experimental interventions. Therefore, ethical approval was not required.

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