

APPLICATION OF DIGITAL TOOLS FOR BIG ANALYSIS DATA WHEN ATTRACTING SPECIALISTS TO THE CIVIL SERVICE

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ABSTRACT

This article explores contemporary approaches to modernising the civil service recruitment system in the Republic of Kazakhstan amid ongoing digital transformation and evolving labour market dynamics. It substantiates the need to shift from traditional recruitment practices toward leveraging big data analytics and digital platforms as key instruments for enhancing the effectiveness of HR policy. Particular attention is given to the implementation of the Civil Service Development Concept of the Republic of Kazakhstan for 2024–2029, which prioritises strategic workforce planning, meritocracy, and the automation of HR processes. The article analyses the stages of digitalising personnel recruitment, including the development of the e-Qyzmet Information System, the expansion of the Unified HR System to the quasi-public sector, and the prospects for establishing a platform to attract specialists from the private sector. Furthermore, the article examines the potential of big data research in predicting candidate performance, increasing the transparency of personnel decisions, and developing a robust talent pool, while also identifying key challenges associated with the introduction of these technologies. The article concludes that integrating big data analytics is a critical prerequisite for the sustainable development and enhanced competitiveness of the civil service.

Keywords: Big Data, digitalisation, civil service, HR technologies, personnel, recruitment, strategy

INTRODUCTION

Amid ongoing digital transformation and structural shifts in the global labour market, the effectiveness of public administration increasingly depends on the quality of human capital. The professionalism, adaptability, and digital competencies of civil servants have become critical determinants of the state's sustainable development. However, traditional recruitment methods, primarily based on job postings and standardised selection procedures, no longer meet modern requirements. Intensifying competition for skilled personnel, the rapid introduction of digital technologies, and the growing complexity of management tasks necessitate a comprehensive modernisation of existing human resource mechanisms.

The urgency of these changes is underscored in the Civil Service Development Concept of the Republic of Kazakhstan for 2024–2029, which emphasises strategic workforce planning, the strengthening of meritocratic principles, and the integration of digital tools into HR management processes. In line with these priorities, Kazakhstan is gradually advancing the digitalisation of its civil service recruitment system. The upgrade of the e-Qyzmet information

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system is aimed at automating internal personnel movements and enhancing the transparency of civil servants' career trajectories. Meanwhile, the expansion of the Unified Personnel System to the quasi-public sector lays the foundation for the creation of an integrated, multi-level talent pool that supports more effective and strategic human capital development across the broader public sector.

A logical continuation of these reforms is the adoption of big data analytics and external digital HR tools to identify and evaluate candidates beyond the traditional civil service talent pool, including professionals from the private sector and civil society. Big data enables the processing of large volumes of both structured and unstructured information, supports the prediction of candidates' professional performance, reveals hidden competencies, and facilitates the development of personalised growth trajectories. These capabilities are especially relevant as the public sector increasingly competes with private organisations that actively employ advanced HR technologies.

The need for further automation and digitalisation of HR processes is also reflected in the *Address of the President of the Republic of Kazakhstan to the People of Kazakhstan* (2 September 2024), which highlights the importance of introducing modern technologies in state-funded organisations and reinforcing the principles of meritocracy. Nevertheless, the implementation of big data analytics in the civil service faces several constraints, including legal restrictions on data usage, the state of digital infrastructure, and the readiness of public agencies in terms of personnel and competencies.

In this context, studying the prospects for integrating big data analytics into the recruitment and selection processes of Kazakhstan's civil service gains particular scientific and practical relevance. It raises the key research question of how the use of big data analytics can enhance the effectiveness of personnel selection and contribute to building a professional, competitive, and sustainable civil service workforce.

RESEARCH METHODOLOGY

The methodology of this study is grounded in an integrated approach that combines theoretical and empirical analytical methods, enabling a comprehensive examination of the potential for using big data-driven digital tools in attracting specialists to the civil service of the Republic of Kazakhstan.

The theoretical and methodological foundation of the research draws on concepts of digital transformation in public administration, human resource management theories, and the meritocratic approach to personnel policy. The study incorporates the works of domestic and international scholars in the fields of big data analytics, HR digitalisation, and civil service modernisation. Significant attention is also given to the analysis of Kazakhstan's strategic and regulatory documents, including the Civil Service Development Concept for 2024–2029, as well as legal regulations governing HR processes within the public administration system.

The empirical component of the study employs a case study method based on an analysis of international practices in implementing digital platforms and big data analytics within government HR systems. This approach made it possible to identify practical mechanisms for applying digital tools, as well as the barriers and risks associated with their integration into civil service recruitment processes. In addition, a sociological method was used, consisting of a questionnaire survey conducted among HR and IT specialists, as well as civil servants directly involved in recruitment activities. The survey data were processed using descriptive statistical techniques and served to validate the theoretical findings.

RESULTS AND DISCUSSION

Talent acquisition represents the initial stage of the recruitment cycle and is a key component of effective human resource management. In the modern context, this process involves identifying and attracting both active and passive candidates through a wide range of online and offline recruitment methods.

A diverse set of channels may be used in this process, including employee referral programmes, social media platforms, professional networks and communities, résumé databases, recruitment agencies and third-party recruiters, job boards, specialised digital platforms, corporate career websites, universities and alumni networks, as well as traditional media such as billboards and print advertising (Isson et al., 2016). Conversely, the use of modern digital recruiting tools enables HR professionals to efficiently publicise vacancies and centrally track responses to multiple positions, regardless of geographic location, thereby significantly enhancing the efficiency and transparency of the recruitment process (Uma et al., 2023).

Figure 1. Talent search



Source: Ilchenko, 2021

Traditional search methods

For many years, government agencies in Kazakhstan relied on conventional approaches to hiring. These methods typically included publishing vacancy announcements in printed media and on official job portals, administering mandatory qualification examinations and tests, and conducting multi-stage selection procedures involving in-person interviews with selection committees. Recruitment often focused on internal candidates - promotions or transfers - rather than broad external searches. The traditional recruitment process was characterised by significant duration and administrative complexity: submission of extensive paper documentation, long waiting periods for interview appointments, and protracted timelines for candidate review and decision-making. In addition, the attractiveness of civil service positions has historically been limited. Constraining factors included restricted opportunities for career advancement, comparatively low salary levels, and slow administrative procedures, which collectively discouraged many potential applicants.

The study indicates that traditional recruitment methods, such as vacancy announcements and formalised selection procedures, can be effective but require modernisation in order to attract a more diverse pool of candidates, particularly for positions in law enforcement and other government agencies (Linos, 2018). Furthermore, despite the widespread adoption of online recruiting, career fairs continue to play a significant role in engaging young professionals and recent graduates. Direct interaction with potential employers substantially increases the likelihood of successful hiring outcomes, especially for entry-level roles.

The findings further demonstrate that career fairs remain an important recruitment channel for young specialists in fields where face-to-face communication is especially valuable, such as engineering and medicine. At the same time, traditional tools, such as in-person interviews and professional recommendations, retain their relevance in highly skilled or specialised sectors. However, their effectiveness diminishes in large-scale recruitment efforts and in highly competitive labour markets, where speed, digital presence, and broader outreach are essential (Faliagka et al., 2012).

Talent attraction strategies

A strong employer reputation is essential for attracting qualified professionals. Organisations with a well-established employer brand consistently perform better in recruiting and retaining talent. In the public sector, employer branding refers to a strategic system of communication and reputation management aimed at shaping a positive perception of the civil service as an appealing and meaningful place to work. In a competitive labour market - particularly for young professionals and IT specialists - it is important that the civil service is viewed not merely as a bureaucratic structure, but as a stable, reputable, and socially significant field.

In the Republic of Kazakhstan, elements of employer branding are already being introduced, i.e., the principles of meritocracy, career transparency, and digital transformation are being promoted, and the image of civil servants is being actively modernised; for example, through initiatives of the Agency for Civil Service Affairs, public competitions, and internship programmes. However, a fully integrated and systematic employer-branding strategy has yet to be developed. Strengthening the attractiveness of the civil service will require expanding digital communication channels, developing modern career platforms, highlighting real success stories, and establishing clear corporate culture standards.

In this regard, a survey was employed for data collection through the use of questionnaires containing codified, as well as open-ended questions. Two questionnaires were administered; one through official correspondence with government agencies, and the second through digital social networks. One survey covered 815 IT specialists - with women representing a slight majority (437 women compared to 378 men). Geographically, the highest number of respondents came from the Eastern region of Kazakhstan (326), followed by the Southern region (235) and the Northern region (133). The second survey reached 1,657 respondents - dominated by women (992) - HR specialists and government employees. With respect to regional distribution, the largest number of respondents were from the Eastern region (615), the Northern region (423), and the Southern region (287).

Both surveys generated representative data reflecting the views of professionals from different regions of Kazakhstan regarding the digitalisation of HR processes and the use of technology in HR management.³ Respondents were asked to indicate which modern digital HR tools they were familiar with. The majority reported awareness of at least some HR technologies,

³ The collected responses were exported from Google Forms to Excel for subsequent analysis, and the key findings are presented in chart form.

demonstrating the widespread adoption of digital solutions. Fewer than 15% stated they were unfamiliar with any digital HR tools, indicating that virtually all participants had exposure to contemporary HR systems.

The most widely recognised tools were HRIS (Human Resources Information System). Many respondents also reported familiarity with automated recruiting platforms, including various types of applicant tracking systems (ATS). A significant number of respondents had experience with digital recruiting platforms such as job search websites and specialised online services for sourcing candidates. Some participants, particularly HR specialists, were also aware of chatbots and digital HR assistants, although these tools were mentioned less frequently compared to traditional systems.

Overall, HR professionals in the private sector demonstrated broader awareness of digital HR solutions, more often citing tools such as HRIS and LinkedIn. In contrast, government employees typically referred to more basic systems, such as the e-Qyzmet information system. Nevertheless, the level of familiarity with HR technologies across both groups is relatively high, creating favourable conditions for further digital adoption.

Responses to the question about whether organisations actively use digital HR tools showed a notable variation. Approximately one-third of respondents (30–35%) indicated that their organisations “actively use” digital HR solutions. Another 40% reported that such tools are used occasionally. The remaining 25–30% stated that their organisations do not use digital HR technologies at all. Active use was more frequently observed among HR specialists in the private sector, many of whom work in organisations where HR processes have already undergone digital transformation (e.g., personnel management systems, online recruitment tools).

Among civil servants, only a small share (less than one quarter) reported actively implementing digital tools; most government agencies indicated that they *either rarely use such tools or do not use them at all*. This demonstrates that the digitalisation of HR processes in the public sector remains at a very early stage: more than half of government employees acknowledge that they either lack digital HR instruments altogether or use them only occasionally.

The situation is somewhat more advanced in the private sector. While challenges persist, a significantly larger proportion of HR specialists in private companies (compared to those in government agencies) are actively integrating digital solutions into their HR practices.

Attractiveness of civil service

One of the goals of the modernisation efforts is to attract a broader pool of applicants, including candidates from the private sector and younger professionals — to civil service competitions. Previously, the average number of candidates per vacancy was 1.6; however, the new approaches have nearly tripled this figure. During the 2023 pilot project - conducted through the external portal *e-Qyzmet* - an average of 4.6 applicants competed for each vacancy, indicating both wider reach and increased public interest in civil service opportunities.⁴

Based on the monitoring of the civil service workforce in the Republic of Kazakhstan for 2021, 2022, and 2023, several factors influencing the attractiveness of civil service can be identified. Over the past three years, the number of civil servants ranged from 88,321 in 2021 to 90,583 in 2023, with women consistently representing around 55% of the workforce, particularly within Corps B. The average age of civil servants remains around 40 years, which reflects a stable

⁴ Monitoring of the civil services in the Republic of Kazakhstan as of January 1, 2024.

staffing structure but also indicates a declining share of employees under the age of 30. This trend underscores the need to review and strengthen strategies aimed at attracting young professionals.

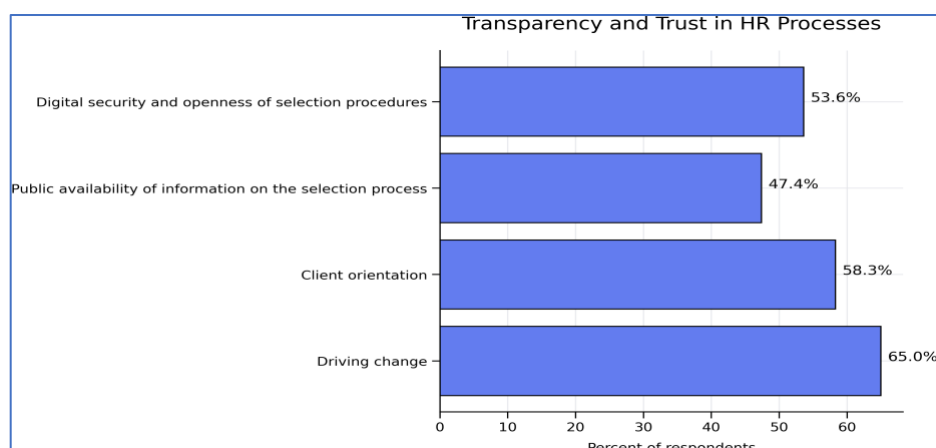
More than 90% of civil servants have higher education, mainly in economics, law, and technical fields, which reflects the generally strong qualifications of the workforce. At the same time, the declining share of young employees suggests a need to create more attractive and competitive conditions to encourage young people to join public service. Employees with disabilities make up around 1% of the civil service, indicating that steps are being taken to promote inclusivity. The average length of service is 11.5 years, showing a relatively stable and experienced workforce. Overall, the civil service remains attractive due to its highly educated staff, balanced gender representation, and efforts toward inclusion. However, to strengthen its appeal further, it is important to focus on attracting more young professionals and offering clearer opportunities for career growth and inclusive participation.

Modern recruitment methods, such as online job postings and professional social media, enable targeted outreach to *passive candidates*, individuals who are not actively seeking a civil service position but may become interested after encountering an appealing opportunity. Traditional methods cannot achieve this effect: on the e-Qyzmet platform, for example, applications mostly come from individuals who are already motivated to seek employment in government agencies.

Transparency and trust.

New approaches to government personnel management are increasingly focused on increasing transparency and accountability of selection procedures. This is due to the need to strengthen public trust in public service institutions and reduce subjectivity in personnel decision-making. Transparency and trust: New methods are usually more audit-friendly, as digital systems capture all stages of the process. Digital traces of actions are preserved: it is possible to establish who evaluated the candidate and when, and what points were awarded by the algorithm. If necessary, this data can be verified. The publication of open statistics on competitions (for example, the number of candidates who applied, the number of those who passed the test and the winner of the competition) also increases public confidence. In Kazakhstan, as part of the pilot system, an anonymous identifier was assigned to a candidate at the testing stage, and only at the interview stage was his name disclosed.

Figure 2. Perceptions on transparency of HR processes



The data from two sociological surveys (N=815 and N>1,500) indicate the high importance of transparency in personnel procedures. In particular, 53.6% of respondents noted that digital security and openness of selection procedures are the most important factors for increasing

trust, while 47.4% indicated the need to expand the public availability of information about the selection process (see Figure 2).

Despite positive feedback regarding the implementation of digital tools, the relatively low scores for client orientation focus (58.3%) and driving change (65%) indicate that the level of trust remains insufficient. Strengthening trust will require targeted efforts to improve these specific dimensions.

Costs and resources.

On the one hand, deploying digital platforms, purchasing licenses for CV analysis systems, and training staff all require notable upfront investment. Initial expenditures may therefore increase. On the other hand, the operating costs of each competition decrease: less paperwork, fewer business trips (as candidates no longer need to travel), and reduced commission time (since automated early-stage screening frees experts from routine tasks). Over the long term, analytical tools help optimise spending by reducing turnover: each unsuccessful hire is costly because the search process has to be repeated.

One of the advantages of advanced analytics is the ability to assess the effectiveness of different recruitment channels and evaluation methods. For example, by analysing historical competition data, an agency may find that a particular assessment has a weak predictive value for job performance and decide to remove it, thereby accelerating the process and avoiding unnecessary expenses.

In public administration, especially in environments with regulated procedures and multi-stage approvals, time and indirect costs often play a role no less significant than direct costs. In this context, one of the key operational indicators is the time-to-hire (TTH) metric: the number of days that elapse from the moment a vacancy is posted until the selected candidate actually assumes the position. In the civil service, this process typically involves several regulated stages: preparation of tender documentation, publication of the vacancy notice, receipt and screening of applications, administration of assessments and interviews, and final approval and onboarding procedures. Depending on the job category and the organisational level, the overall duration may range from 30 to 45 calendar days.

Such lengthy procedures generate indirect costs which, although not directly reflected in the budget, have a substantial impact on administrative and economic efficiency. These costs include:

- time spent by HR staff and supporting departments participating in the selection process;
- reduced productivity within the unit due to a prolonged vacancy;
- temporary redistribution of workload among current employees, increasing the risk of professional burnout.

According to official data for 2024, a total of 12,110 competitions for civil service positions were conducted in the Republic of Kazakhstan, resulting in only 5,056 appointments, a success rate of just 41.7%. This means that more than 58% of all selection procedures concluded without filling the position, whether due to an absence of suitable candidates, candidate refusals, or unsuccessful competitions. Such figures point to the low effectiveness of the current recruitment model and highlight the need to reconsider it in terms of costs, processing time, and a more strategic approach to talent acquisition and development.

The high proportion of unsuccessful competitions is associated with significant indirect and administrative costs that, while not explicitly reflected in budget execution reports,

nevertheless impose a real burden on the system. Each competition, regardless of its outcome, requires administrative preparation, technical support, the involvement of HR specialists, tender committee members, and the time and effort of civil servants participating in the process.

Given that competitive selection procedures take on average 30 to 45 days, it can be inferred that the time costs associated with the 7,054 unsuccessful competitions (12,110 – 5,056) amount to tens of thousands of lost man-days. This results in:

- diverting employees from their core responsibilities;
- redistributing workload within units that operate with a vacancy;
- decreasing the overall efficiency of government bodies, particularly in critical governance functions;
- increasing the administrative burden on HR departments and selection commissions.

If a single competition requires, on average, the involvement of five employees for 10 hours (including document submission, review, interviews, and meetings), then at least 352,700 man-hours were spent on unsuccessful procedures. Using an average hourly labour cost, this translates into approximately KZT 881,750,000 in indirect expenditures, excluding the cost of technical support, digital platforms, and information-system maintenance.

Furthermore, the second most frequently cited barrier among respondents was insufficient funding for the digitalisation of HR processes, reported by approximately 431 participants (26%). This challenge is especially relevant for government agencies, where limited budgets hinder the adoption of modern HR systems and the training of personnel. The 2024 data therefore demonstrates that the current approach is suboptimal: substantial effort does not yield proportionate results. This creates a solid basis for revising competitive procedures, developing preliminary stages of the recruitment funnel (such as screening, profiling, and rating), and making more effective use of digital HR tools.

Selection quality and new-hire performance.

An important question is whether modernisation leads to a better match between candidates and positions. Early data indicates that new methods improve the accuracy of competency assessment. For example, incorporating situational tasks and essay-based evaluations helps reveal candidates' thinking styles and analytical abilities - qualities that are difficult to measure through standard tests.

The key indicator of selection quality is successful probation completion and subsequent retention. A decrease in the percentage of new hires leaving within the first one to two years would demonstrate that the selection process has become more precise and effective.

Analysis of the survey results shows strong support among respondents for introducing automated personnel selection systems in the public sector. Approximately 72.8% believe that digital solutions based on objective criteria significantly improve the quality of selection by reducing subjective judgments and potential corruption risks. Automation enhances transparency and enables standardised assessments, an essential factor in a highly competitive environment with limited resources.

In addition, 68.5% of respondents emphasised the importance of using digital monitoring tools to evaluate the performance of newly hired employees. Such tools make it possible not only to assess whether new hires meet job requirements after onboarding, but also to provide timely feedback, predict adaptation and performance outcomes, and refine selection

procedures based on real performance data.

Process speed and efficiency.

Traditional recruitment was slow: vacancies often remained unfilled for long periods, creating staffing gaps that negatively affected the work of government agencies. Digital solutions significantly accelerate the process. Electronic platforms make it possible to run several stages in parallel — for example, automatically administering online knowledge tests before interviews — and to schedule interviews immediately after results are received. Candidates no longer need to wait for fixed exam dates; they can take tests remotely at any convenient time.

In Kazakhstan's pilot project, competitive selections were conducted 24/7 and entirely remotely up to the final interview. This allowed applicants to participate from anywhere and at any time — an option previously unavailable. As a result, the overall selection cycle was shortened considerably. Survey data confirms that recruitment speed is becoming one of the most sensitive issues in the civil service system. About 65.4% of respondents indicated a need to accelerate competitive procedures, including through digital platforms and automated assessment tools. This reflects strong public demand for reducing time expenditures, which remain excessively long compared to the expectations of modern job seekers and the dynamics of today's labour market.

However, despite the generally positive reception of technological solutions, the survey also revealed a key challenge in change management. Only 58.7% of respondents expressed satisfaction with the current speed and efficiency of recruitment, indicating the persistence of institutional barriers, bureaucratic inertia, and limited adaptability within HR departments. This demonstrates that digitalisation alone is not sufficient for meaningful reform unless accompanied by changes in organisational culture, staff training, and revised procedures.

It is also worth noting that a portion of respondents reported no perceived barriers. Open-ended responses included statements such as *"there are no barriers," "digital tools have already been implemented,"* and *"nothing interferes."* These answers were more commonly provided by HR managers from organisations where the digitalisation of HR functions is already well established.

Implementing big data analytics in civil service recruitment is a complex task that requires a phased, systematic approach. Drawing on research in HR analytics and the experience of pilot projects, several practical recommendations can be identified. The proposed system should function as an integrated information platform that automates interaction between the HR department of the government agency, the Agency, and eGov users (potential candidates).

This system is designed to automate civil service recruitment processes through the use of big data analytics. It includes the intake and processing of information, secure storage and management of candidate data, automated analysis, and selection of the most suitable candidates based on predefined criteria, as well as the generation of notifications and feedback. Routine tasks, such as data verification and CV-to-requirements matching, are performed automatically, significantly reducing the workload of HR departments. The system also produces real-time reports and dashboards to monitor key recruitment metrics. All interactions (requests, data entry, notifications) are conducted electronically, ensuring a fully digital, paperless workflow.

Before implementing digital tools or analytics in the recruitment process, it is essential to clearly define the specific problems that data analysis should solve. This prevents a purely

formal approach to digitalisation and ensures alignment with the organisation's real needs. In particular, it is necessary to identify the challenges inherent in traditional recruitment methods: high turnover, ineffective candidate selection, subjectivity in evaluations, lengthy hiring processes, or low predictability of new-hire performance. For example, an objective might be to reduce the average time to fill a vacancy by 30% or to increase the share of successful new hires who pass their probationary period to 95%. Accordingly, key performance indicators for the hiring process (time, quality, candidate satisfaction, etc.) and their target values must be clearly defined.

After defining goals and performance indicators, the next step is to create a digital infrastructure that will allow collecting, transmitting and analysing relevant data. This requires the integration of government information systems and platforms used to ensure data exchange between the stages of competitive selection.

Stage 1: e-Qyzmet Integration → Smart Bridge (requirements transfer):

Digital search and selection is an automated process for identifying and attracting candidates to public service positions through integrated information systems and big data analytics. Its core component is the unified e-Qyzmet HR system, which digitises personnel management at every stage—from posting a vacancy to completing the hiring process.

When a vacancy arises in a government agency, authorised staff enter the position details into e-Qyzmet, including job responsibilities, required experience, education level, competencies, work location, and other qualification criteria.

The system then transfers this information externally via the Smart Bridge integration platform. Through API interfaces, vacancy descriptions and candidate requirements are automatically uploaded into a broader digital ecosystem accessible to both internal and external recruitment channels. This ensures that vacancy information is promptly and consistently published across external HR platforms, job boards, and the unified talent pool.

As a result, vacancies become visible to potential candidates in real time, accelerating response times and enhancing the transparency of competitive selection processes (see Figure 4).

Data analysis enables not only the management of current vacancies but also the forecasting of future staffing needs in government agencies. Through predictive analytics and the integration of data from e-Qyzmet, Smart Bridge, and other related systems, it becomes possible to anticipate where and when additional specialists will be needed. For example, analytical algorithms can account for contract expiration dates, employee age structure, upcoming retirements, historical turnover patterns by department, and planned organisational changes such as staff optimisation, the creation of new units, or the introduction of new functions. They can also incorporate factors that influence temporary workforce fluctuations, including the likelihood of maternity leave, training assignments, business trips, and official transfers.

By combining these inputs, the system can generate forecasts of upcoming vacancies and support the early formation of a talent pool. This allows government agencies to proactively adjust their recruitment and training strategies to align with anticipated shifts in workforce composition.

Figure 3 illustrates a one-way flow from e-Qyzmet to Smart Bridge, where job posting parameters are transmitted. In practice, however, the integration is bidirectional because Smart Bridge is also capable of returning responses. Nonetheless, at this stage of the process, the initiative primarily comes from the HR system.

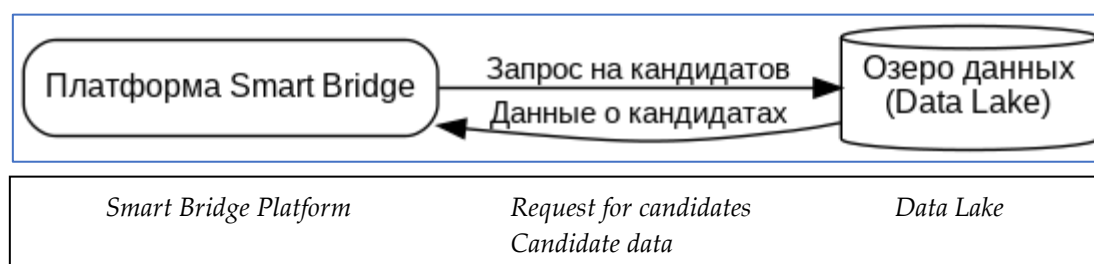
Figure 3. Integration of the e-Qyzmet system

Figure 3 demonstrates how e-Qyzmet (left) sends a “Job Requirements” data package to Smart Bridge (right). For example, a vacancy for a chief specialist in a city administration may include requirements such as a relevant higher education degree, at least five years of professional experience, familiarity with applicable legislation, and other qualification criteria. Through Smart Bridge, these parameters become available for further automated candidate search and processing.

Stage 2: Smart Bridge → Data Lake interaction (candidate search):

After receiving the job posting parameters through Smart Bridge, the system automatically generates a search filter based on the specified criteria. The *Data Lake* is an integrated repository that consolidates information from multiple sources on potential candidates combining data on citizens and civil servants, including their education, qualifications, professional experience, current position, and other relevant attributes (see Figure 4).

Using the qualification requirements from the job posting, Smart Bridge queries the Data Lake to identify individuals who meet the specified criteria. For example, a filter may include the required level of education, minimum years of service, relevant specialty, language proficiency, location within the same region, and other role-specific attributes. The system sends this request to the Data Lake, after which it receives structured information on potential candidates: full name, IIN (identifier), hashed personal data, education, length of service, field of work, and additional profile characteristics.

Figure 4. Smart Bridge → Data Lake

During our internship at the *National Institute of Technology*, we worked with sample data to analyse key characteristics and systematisation capabilities relevant to candidate search processes. The dataset included demographic, professional, educational, and medical information, as well as financial status indicators, which made it possible to model an effective candidate selection mechanism.

As part of this work, we catalogued information systems currently integrated or suitable for future integration into the civil service recruitment process. This involved systematising and evaluating the digital resources of various government agencies to identify reliable sources of structured data on age, education, work experience, region of residence, and other relevant factors. Based on an analysis of approximately 20 information systems, we assessed their readiness for integration, including the availability of regulatory documentation, frequency and relevance of data updates (ETC/Dump), and actual usage levels.

Additional information on candidates' medical categories, diagnoses, and regions of residence was also reviewed. When handled in full compliance with confidentiality and personal data protection requirements, this information can help more accurately assess the physical suitability of applicants for positions involving increased physical exertion, stressful environments, or safety-critical responsibilities.

This approach also contributes to the development of an inclusive HR policy. The analysis supports the identification of candidates with disabilities and helps determine the need for workplace adaptations, alternative positions, or flexible work arrangements. As a result, the process becomes more objective and socially equitable, ensuring that no candidate is excluded due to biased assumptions and that selection decisions are based on accurate and justified factors.

The candidate employment database contains essential information required for an objective and comprehensive analysis of an applicant's career trajectory. In particular, it records the candidate's current employment status - whether they are employed, temporarily unemployed, or working in a field unrelated to their specialisation. This information allows for assessing the relevance of their professional experience and the degree of alignment between their career path and the industry in which they intend to work.

The database also captures detailed employment history, including the start and end dates of previous positions. These data points make it possible to analyse the duration of employment at different career stages, identify patterns in job changes, and detect potential gaps between periods of work. Such insights are important for evaluating career stability, motivation, and potential indicators of high turnover or inconsistent professional behaviour.

Educational documents contained in the database not only allow verification of the authenticity of information provided by candidates but also enable comparison of their qualifications with specific vacancy requirements, taking into account the level of education, field of study, and the accreditation of the educational institution.

Taken together, the integrated analysis of these parameters enables recruitment systems and HR specialists to form a more accurate and objective profile of each candidate. This, in turn, enhances the reliability of preliminary screening and supports the selection of the most suitable candidates for the subsequent stages of the competitive recruitment process (see Figure 5).

The information set also includes parameters such as citizenship, nationality, mode of study (full-time or part-time), and level of education (bachelor's, master's, or higher). These data points enable recruitment systems not only to record candidates' formal characteristics but also to apply deeper filtering and preliminary ranking based on their suitability for a specific vacancy.

The mode of study may serve as an indirect indicator of a candidate's level of preparation: full-time education typically provides more intensive coursework and greater exposure to practical training, while part-time programs are often chosen by individuals who are already employed and combine work with studies. The level of education, in turn, helps match a candidate's qualifications with job requirements, such as cases where a master's degree is needed for analytical or managerial roles.

Figure 5. Information on the employment status

ID	A:2 JOB_STATUS	A:2 STARTORDERNUMBER	A:2 FINISHORDERNUMBER	A:2 STARTDATE	A:2 FINISHORDERDATE	A:2 FINISHDOCDATE	A:2 FINISHDIPLOMNUMBER
1	Не трудоустроен	000	39	2012-08-01	2015-06-01	[NULL]	[NULL]
2	Не трудоустроен	000	39	2012-08-01	2015-06-01	2015-01-01	0687926 ЖБ-6
3	По специальности	-	317с	2015-01-09	2019-06-28	2019-06-03	ЖБ-6 1448332
4	Не трудоустроен	1615-n	1416-n	2022-08-25	2024-06-26	2024-07-01	MD NR
5	По специальности	508	414	2019-08-25	2023-06-07	2023-06-30	NR
6	[NULL]	45	79	2004-08-01	2007-06-01	2007-07-09	[NULL]
7	[NULL]	[NULL]	201/с-к	2020-08-17	2023-05-23	[NULL]	NR
8	[NULL]	407	1346 CT	2017-08-25	2021-06-25	2021-07-07	00018305497
9	[NULL]	1694	147	2015-08-29	2019-07-10	2019-07-03	ЖБ-6 N11464798
10	Не по специальности	6/89-1	6/203-CA	2019-01-11	2019-06-21	2019-06-21	ЖБ-6 N11496164
11	Не по специальности	4347-с от 25.08.2009	3650-с от 30.04.2013	2010-08-01	2013-06-01	2013-04-23	0065235 ЖБ-6
12	Не по специальности	6813-с от 25.08.2005	4729-с 11-06-2005	2009-08-01	2013-06-01	2013-06-28	ЖБ-6 00065235
13	[NULL]	NA	917-6	2019-08-19	2023-06-30	2023-07-01	00017238023
14	Не трудоустроен	[NULL]	26-03-207-6/к	2021-08-20	2023-06-27	2021-07-05	ЖБ-6 N11709023

In addition, these parameters enable segmentation of the candidate database by field of study, allowing identification of specialists with narrow or highly technical qualifications (e.g., IT, law, economics). This significantly accelerates the selection process and reduces the likelihood of subjective errors at the preliminary screening stage (see Fig. 6).

Figure 6. Data on educational attainment

ID	A:2 CITIZENSHIP	123 NATIONID	A:2 NATION	123 STUDYFORMID	A:2 STUDYFORM	123 DEGREEID	A:2 DEGREE NAME
113	КАЗАХСТАН	122	Уйгуры	2	очная 3 года обучения	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	10	Дневная ускоренная дистанционная (3)	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	2	дневная(Первое высшее образование)	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	3	магистратура 2 г.	2	Магистрант по научно-педагогическому напр
113	КАЗАХСТАН	0	[NULL]	1	очная(4)	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	7	Заочная (Срок обучения 3 года)	1	Бакалавр
113	КАЗАХСТАН	[NULL]	[NULL]	1	Очная (срок обучения 4 года)	1	Бакалавр
113	КАЗАХСТАН	[NULL]	[NULL]	1	очная (4 года)	1	Бакалавр
113	КАЗАХСТАН	[NULL]	[NULL]	1	4 года очное	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	9	Вечернее ускоренное	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	1	бакалавр очная полная	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	1	бакалавр очная полная	1	Бакалавр
113	КАЗАХСТАН	5	Казаки	1	дневное	1	Бакалавр
113	КАЗАХСТАН	1	Русские	2	2г Интернатура	4	Интерн

In addition, the Data Lake includes information on the language of instruction, academic majors, and grade point average (GPA). These data points make it possible to assess not only the candidates' professional competencies and subject-matter knowledge but also their academic performance, which is particularly important for highly skilled or specialised positions (see Figure 7).

Figure 7. Data on educational attainment

ID	A:2 STUDYLANGUAGE	123 PROFESSIONID	A:2 PROFESSION	123 ISMARRIEDID	A:2 ISMARRIED	123 GPA	123 HAS_JOB
1	русский	9	Финансы	[NULL]	[NULL]	0	
2	русский	14	[NULL]	0	[NULL]	0	
3	казахский	390	Радиотехника, электроника и телекоммуникации	[NULL]	[NULL]	3.4700000286	
4	казахский	401	Коммуникации и коммуникационные технологии	2	Холост/Не замужем	3.81	
5	русский	9	Подготовка учителей физической культуры	2	Холост/Не замужем	2.92	
6	русский	0	[NULL]	0	[NULL]	0	
7	казахский	50	Педагогика и методика начального обучения	2	Холост/Не замужем	3.23	
8	русский	12	Иностранный язык: два иностранных языка	0	[NULL]	3.07	
9	русский	12	Автоматизация и управление	2	Холост/Не замужем	3.11	
10	казахский	25	Русский язык и литература	0	[NULL]	0	
11	казахский	0	[NULL]	0	[NULL]	0	
12	казахский	36	Безопасность жизнедеятельности и защита окружающей среды	0	[NULL]	0	
13	казахский	1,301	Градостроительство, строительные работы и гражданское строи	2	Холост/Не замужем	2.6	[NULL]
14	русский	3	Общая медицина	2	Холост/Не замужем	2.92	

Data on the number of loans, outstanding debts, and late payments provides insight into a candidate's financial reliability. Such information may be particularly relevant when recruiting for positions involving financial responsibility or roles in government agencies where an impeccable reputation is essential (see Figure 8).

Figure 8. Financial data

	HASH_IIN	COUNT_CREDIT	AMOUNT	DEBT_VALUE	DEBT_PASTDUE_VALUE	PAYMENT_DAYS_OVERDUE
1	455007C2710543122D38130278932506AC419C31AF2499F36AA2631F	20	30	20	100	70
2	45500988EAE8D972A68B1051A398B9674D7CDB1F2357C6D23676D7	20	10	10	100	70
3	4550107818E8D0D4471E28E439701509FD371F262AB025E34AA98496	10	30	40	100	70
4	455019E9C718FE00E637B106F7F50540D9568380CBB6EABBA40F4F3C	20	80	70	100	70
5	4550269F23F34C6A78C8078C81CE9140F6A1DFD66D7736757F1120D	0	70	60	60	50
6	455027AF9A0F66F95135ACD651ACBFEC5018BD162379E358CAC1C	10	60	60	60	0
7	455038E6D34964C8D757193F117720CCF771AB1355C5CB97D224B4B	20	100	90	100	70
8	45503F34A0500E4E9286280A3FAF1145FB25446AAC5D663CB8D73D	10	20	20	100	70
9	45505115C3C34D42533E4570FBF24507E1D0240EF4629E8517E4B0402	0	70	100	40	0
10	455057EB9BEC2734D4ADE0ECAF561425FDE050F83CCCE96F04ED565C	20	20	40	9	10
11	45505DFA87769228D1313E0964BDF0920AF38830A321685B1DA0310	20	60	80	100	70
12	4550613529683FC06B76F6BC1BC734CC0E2A3D65CECD73ED20E	20	100	100	90	10
13	4550625D125FDDA35682B7BDDA9D7B6FEE58C90DA42E84211BCB7A	0	8	10	100	70
14	455065D58A46664EC1A6728AD3302A3D0E165E5CB49A28F479F4E71	20	40	60	100	70

Additionally, the query applies filters to exclude deceased individuals, minors, incarcerated persons, and candidates who do not meet the required age criteria (e.g., 21 to 50 years). This ensures the formation of a preliminary pool of candidates who meet the basic eligibility requirements (see Figure 9).

After applying these filters, the Data Lake generates a selection of matching records, which Smart Bridge then returns to e-Qyzmet (shown in the diagram as the left-facing response arrow). In practice, this means that the system may identify, for example, 50 candidates whose experience and education match the specified criteria and prepare their profiles for further analysis.

Figure 9. Candidate filtering code

```

442
443
444 SELECT *
445 FROM DM_PGU_ZEROS.GBL_PERSON_CITIZEN_ACTUAL gpc
446 INNER JOIN DM_PGU_ZEROS.EPVO_GRADUATES_HIST egh
447 ON gpc.IIN = egh.IIN
448 WHERE
449 (IIN not in (SELECT PERSON_IIN FROM DM_PGU_ZEROS.ZAGS_DEATH_ARCHIVE_ACTUAL ))
450 AND
451 (IIN not in (SELECT IIN FROM DM_PGU_ZEROS.RPN_MEDDEATHREG_TOTAL))
452 AND
453 (IIN not in (SELECT IIN FROM DM_PGU_ZEROS.GBL_PERSON_DEATHS))
454 AND
455 (PERSON_AGE BETWEEN 21 AND 50)
456 AND
457 IMPRISONED_STATUS_ID is null

```

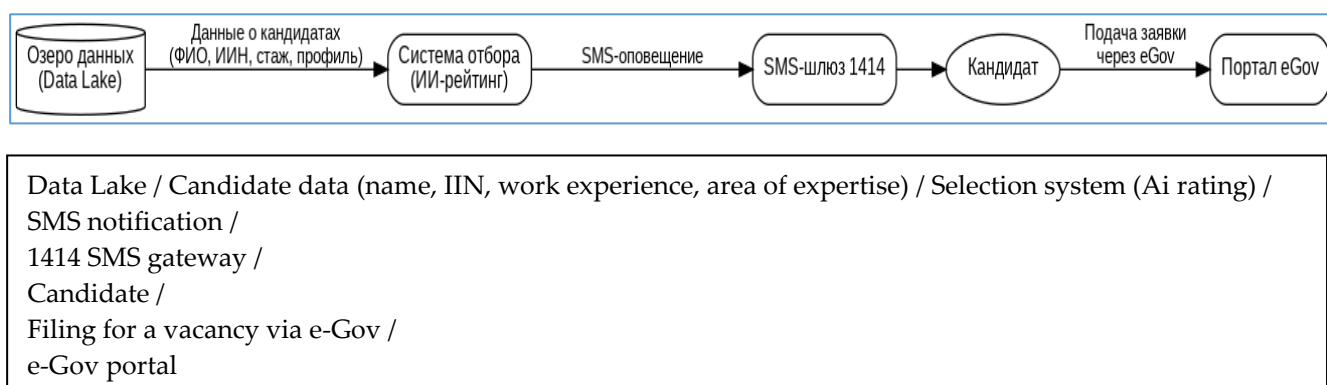
Candidates are not required to manually submit certificates since the digital platform automatically retrieves all necessary information, eliminating redundant bureaucratic procedures. As a result, a database is formed containing potential candidates whose profiles most closely match the requirements of the vacancy.

Stage 3: From Data Lake to 1414 SMS gateway and candidate response (selection chain).

The system intelligently selects suitable candidates from the generated pool. A dedicated module powered by Big Data and artificial intelligence analyses the retrieved profiles and assigns each candidate a rating score reflecting their suitability for the position and their predicted performance. The scoring model may take into account professional skills, achievements, education level (e.g., a master's or PhD degree), past assessment results, career progression, and other development indicators.

AI algorithms may also incorporate automated testing or, in some contexts, analysis of video interviews and digital behavioural patterns. However, in the public service context, the focus remains on the objective verification of formal eligibility criteria and merit-based principles (see Fig. 10).

Figure 10. Selection chain



SMS notifications are then generated through the 1414 SMS gateway and delivered to the selected candidates. Upon receiving the message, the candidate follows the link to the eGov portal to submit an application. In the diagram, the left side illustrates how the Data Lake provides detailed information to the selection system, while the central block (“Selection System — AI Rating”) represents the use of AI algorithms to evaluate candidate profiles.

Through integration with the 1414 SMS service, messages are sent automatically to the designated recipients. The candidate receives an SMS (e.g., “Dear A., you are offered the vacancy; please follow the link to submit your application...”) and can immediately proceed to the website to complete the application process.

The e-Gov portal functions as a single-entry point. After authentication, candidates view detailed information about the vacancy and submit their applications. Because e-Qyzmet is integrated with e-Gov, all applications submitted through the portal are instantly transferred to the HR system for further review.

On the right side of the diagram, the SMS gateway (1414) is shown sending the notification, followed by the candidate’s step of applying for the vacancy through eGov.

Additionally, the system enables tracking the effectiveness of job postings and candidate engagement by monitoring clicks on unique links embedded in vacancy descriptions. This information is automatically recorded and linked to matching results and subsequent competitive selection outcomes. As a result, HR specialists can assess not only the performance of recruitment channels but also how many respondents were deemed suitable and, retrospectively, how many were ultimately hired. This analytics capability provides HR departments and government agencies with a powerful tool for optimising recruitment

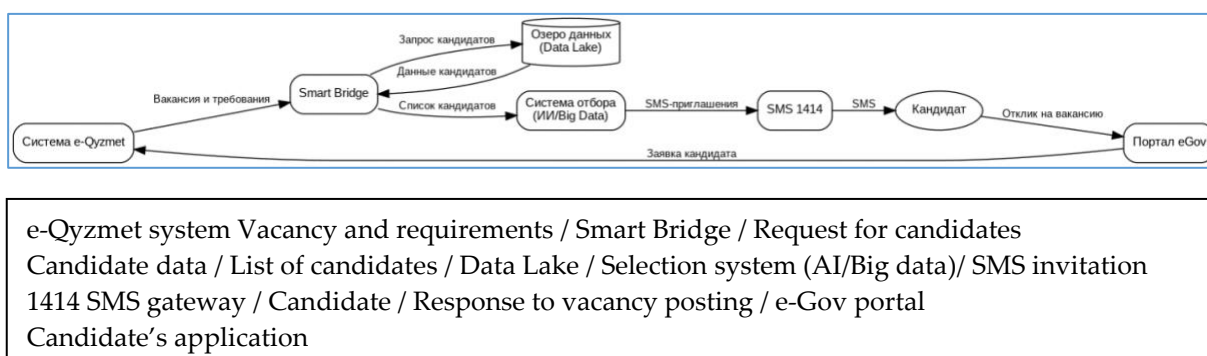
strategies, reallocating posting efforts, and improving the accuracy of job performance forecasting.

Step 4: Digital Experience Framework and Data Routes

A summary diagram illustrates the data flows across all components of the recruitment process. It outlines each participant and the direction of information exchange: the e-Qyzmet system, through Smart Bridge, retrieves candidate data from the Data Lake and sends SMS notification requests to 1414; the candidate, in turn, interacts with e-Qyzmet via eGov to receive vacancy information and submit an application.

The arrows depict the main pathways: vacancy requirements → Smart Bridge; candidate search → Data Lake; rating results → SMS 1414; response → e-Gov; and the final application returning to e-Qyzmet. This architecture enables seamless, end-to-end digital data transfer without human involvement (see Figure 1).

Figure 11. Data flow



The data flows through the following sequence: vacancy (e-Qyzmet) → filtering (Smart Bridge) → candidate selection (Data Lake) → rating (AI module) → notification (1414) → candidate response (via eGov) → final application (returned to e-Qyzmet). This end-to-end chain eliminates time and information gaps, ensuring that all interactions occur digitally and in real time. Integration through Smart Bridge enables e-Qyzmet to request the necessary information directly from external government systems without administrative delays.

Candidate data circulates securely and is used exclusively for hiring decisions. The process is also transparent for candidates: they receive an official invitation, submit their documents online, and can further track the results through their personal eGov account. Thus, Figure 14 illustrates how digital platforms interact to automate the entire recruitment cycle—from the moment a vacancy is posted to the moment the candidate's response is recorded.

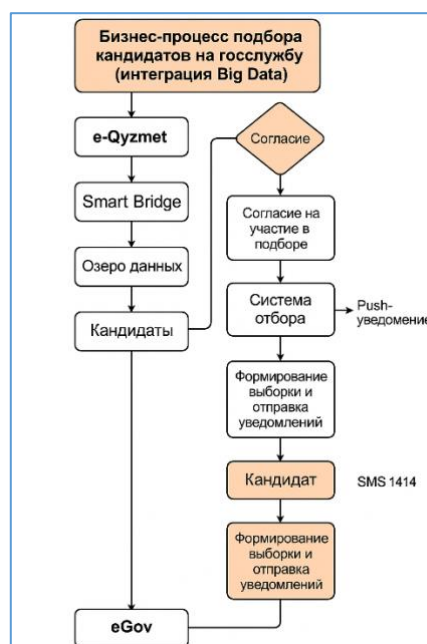
A key stage of digital recruitment in the civil service is obtaining the candidate's prior informed consent for personal data processing and participation in the automated job-matching process. This requirement ensures compliance with Kazakhstan's personal data protection legislation and supports ethical standards in digital recruitment.

Once the system identifies suitable profiles in the Data Lake based on the defined qualification filters, it sends each potential candidate a consent request. The notification is delivered via the official 1414 SMS channel or as a push message in the eGov mobile app. The message explains the purpose of data processing and prompts the candidate to choose a response option: "Agree" or "Refuse" (see Figure 12).

Figure 12 presents an architectural diagram showing how the recruitment process is embedded within the broader digital public administration ecosystem. At the center is e-Qyzmet, the core system, which interacts with its external environment through multiple

integration channels. On the right, the Smart Bridge platform serves as the connectivity hub between e-Qyzmet and other government information resources. It enables seamless interaction with required services and databases, functioning as a “one-stop shop” integration layer for IT systems.

Figure 12. Ecosystem



Business process of selection of candidates for civil service vacancies (integration of Big Data)	
e-Qyzmet	Consent
Smart Bridge	Consent to participate in selection
Data Lake	Selection system
Candidates	Push notification
	Identification of candidates and sending of notifications
	Candidate
	Identification of candidates and sending of notifications
e-Gov	

This approach reflects the principle of seamless government services, where data moves smoothly between systems while fully complying with security and privacy requirements. Kazakhstan is working toward building precisely such a GovTech ecosystem, in which most government information systems are interconnected through a unified integration gateway.

A candidate is advanced to the next stage - analysis and ranking by the artificial intelligence module - only if they provide affirmative consent. If the candidate declines, their data is excluded from further processing, and they do not receive offers related to current vacancies.

The available data enables a comprehensive, multi-layered approach to structuring candidate information and supports the development of an effective digital recruitment architecture. A unified database consolidates demographic characteristics (age, gender, region of residence), educational background (level, mode, and field of study), employment history (positions held, employment periods, industry), medical indicators (health limitations), as well as information on current employment, legal status, and even financial reliability.

This breadth of information forms the basis for automating the pre-screening stage: the system can promptly exclude applications that do not meet the required minimum qualifications, experience thresholds, or other predefined criteria. SQL queries play a central role in this process, enabling rapid filtering, sorting, and aggregation of data from multiple sources in real time. This capability is especially critical in large-scale recruitment campaigns where the number of applicants may reach several thousand.

Automated SQL-based filtering helps identify the most suitable candidates for subsequent stages, including the assessment of soft skills, motivation, professional aptitude, and potential team fit. Moreover, this system enhances objectivity and transparency in the selection process, as decisions are based on clear algorithmic criteria rather than subjective judgment.

Over time, the system can be expanded by integrating additional external data sources such as hh.kz, Enbek.kz, LinkedIn, and other digital platforms and social networks, including Facebook, Instagram, Telegram, X (Twitter), and YouTube. These resources offer valuable supplementary signals about a candidate's professional activity, interests, public engagement, expertise, and even soft skills.

By analysing publicly available digital traces, the system can generate a more holistic candidate profile that reflects communication style, motivation, professional reputation, and readiness for collaboration. Such information can be especially useful when selecting candidates for managerial, public relations, or other communication-sensitive roles.

Thus, Figure 13 shows additional external nodes connected to the system through API interfaces, directing data flows into a centralised Data Lake, where filtering, evaluation, and candidate pool formation take place. Integration with social networks increases the depth and accuracy of assessments but also requires strict adherence to ethical standards and personal data protection legislation.

Figure 13. External sources.

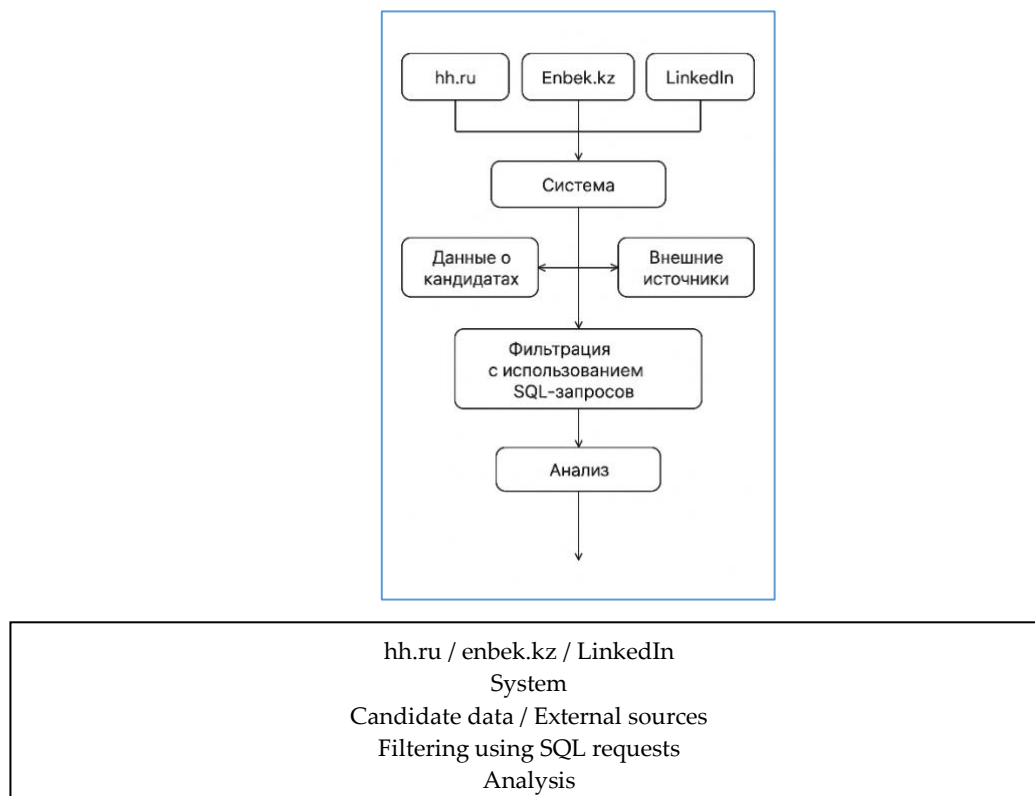
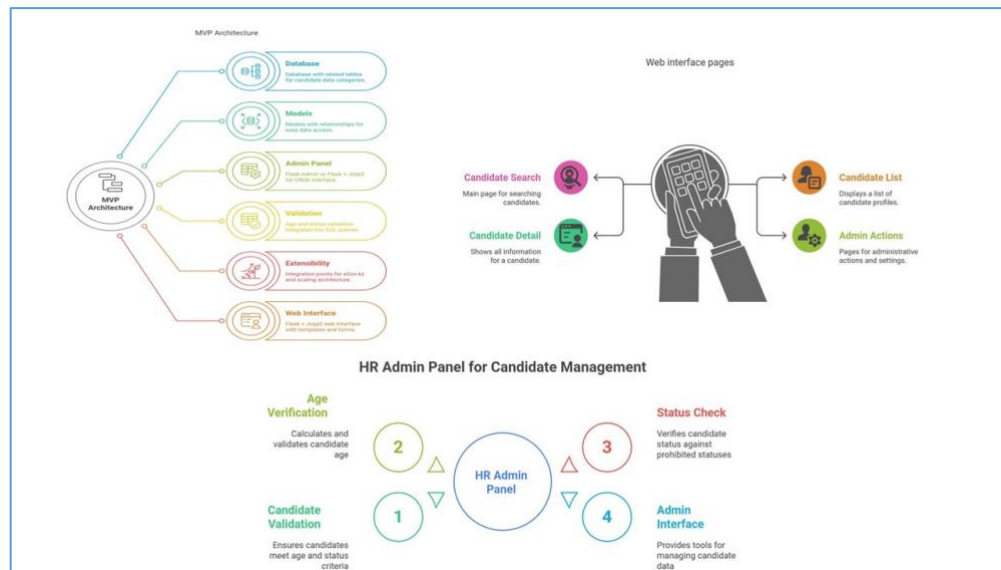


Figure 14 illustrates the architecture of the digital candidate management system, which includes three main blocks. The first block comprises the core components: the database, functional modules, HR dashboard, web interface, microservices, and the security module. The second block consists of the interface pages used for searching, viewing, and managing candidates, including administrative tools. The third block outlines the internal logic of candidate management, covering validation, age verification, status tracking, and the administrator interface. Together, these components form an architecture designed to automate and streamline the recruitment process while maintaining high standards of security and transparency.

Figure 14. MVP and platform interface



In HR system, the candidate management platform receives data from various internal and external sources in anonymised and hashed form, ensuring full compliance with privacy and personal data protection requirements. Core information is consolidated in the 'Candidates' table, which captures key demographic, educational, and professional attributes. Last name, first name, and patronymic are stored in encrypted form, while date of birth, gender, contact details, address, education, work experience, skills, languages, and profile creation date are presented in a structure optimised for analytical processing (see Figure 15).

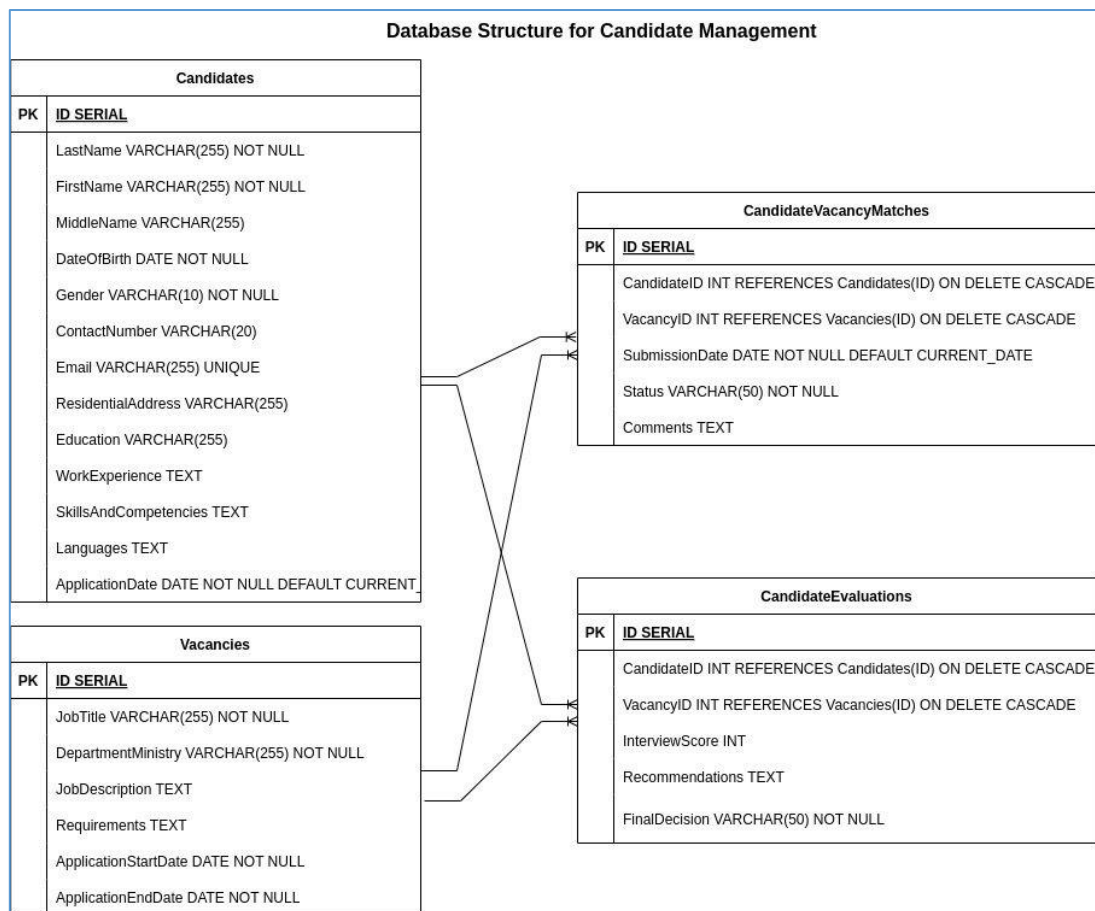
A parallel table, 'Vacancies', contains information on available vacancies in government bodies and the quasi-public sector. It includes the job title, agency or department, job description, candidate requirements, and application deadlines.

The automated matching process is implemented through the CandidateVacancyMatches table, which captures the results of algorithmic matching—specifically, which anonymised candidate profiles correspond to particular vacancies, the timestamp of each match, the current status (e.g., 'match confirmed', 'awaiting evaluation', 'assigned to talent pool'), and analytical comments logged during the process. This table also tracks statistics on application submission and processing, which is particularly important during large-scale recruitment campaigns.

At the final stage, the CandidateEvaluations table is used to store data on candidate assessments for specific job openings. Here, the system automatically records interview or test results (when applicable), algorithm-generated conclusions based on comparison outcomes, and the final hiring decision, for example 'recommended for inclusion in the talent pool', 'does not

meet the criteria', or *'conditionally accepted'*. All identifiers remain hashed, and re-identification is possible only through secure service access under a strictly regulated procedure.

Figure 15. Structure of the HR system



This architecture not only ensures the protection of personal data but also supports the development of a logical, scalable mechanism for analysis and candidate selection. It enables decision-making based on digital traces and comparable criteria, allowing full automation of the initial screening stage without human involvement.

To successfully implement a recruitment system based on big data analytics, it is essential to ensure strict compliance with privacy and personal data protection requirements, particularly given the sensitivity of the information stored in the database (e.g., data on health, marital status, education, ethnicity, previous employment, and other personal attributes). This necessitates adherence both to national legislation and to international standards governing the processing, storage, and transmission of sensitive information. Robust technical and organisational safeguards must be in place, including data encryption, role-based access control, user authentication, and a transparent personal data consent policy.

Equally important is the adaptation of candidate filtering and ranking algorithms to the specific requirements of each vacancy. In addition to formal criteria, such as education, professional experience, and relevant skills, algorithms should take into account industry-specific factors, organisational priorities, and typical career progression patterns.

The successful implementation of a digital civil service recruitment system requires careful calibration of all parameters with the involvement of key experts: HR professionals, data analysts, and software developers. Their joint work ensures that the wide range of factors influencing the objectivity, accuracy, and legality of decisions is properly addressed. Particular

attention must be paid to preventing discriminatory outcomes related to gender, age, place of residence, or other characteristics, which may arise if algorithmic parameters are configured incorrectly.

Furthermore, it is important to avoid a formulaic approach in which the system mechanically selects candidates based solely on rigid criteria, disregarding individual qualities, development potential, and the broader context of previous experience. Without the ability to adapt flexibly to changes in HR policies and public expectations, the system risks losing the trust of both candidates and government organisations.

Adhering to the principles of transparency, flexibility, and legality will enable digital tools not only to accelerate recruitment processes but also to ensure a balanced alignment of technological efficiency, legal compliance, and fairness in personnel decision-making. This is particularly critical in the civil service, where the quality of human resources directly influences the achievement of strategic objectives and public trust in government institutions.

CONCLUSION

The analysis made it possible to confirm the hypothesis put forward about the expediency and effectiveness of using Big Data technologies to optimize recruitment processes in the public sector. This is confirmed by several research results. Firstly, the results of the conducted sociological surveys (N = 815 and N > 1,500) showed a high level of support for the digitalization of personnel procedures and the use of analytical tools to increase transparency and objectivity of selection. Secondly, the analysis of existing digital solutions has demonstrated that the integration of information systems can reduce the processing time of candidate data and increase the effectiveness of competitive procedures. Thirdly, the institutional and organizational conditions necessary for the implementation of analytical tools in the personnel processes of the civil service have been identified. The article presents a conceptual model of the integrated platform, including the interaction of e-Qyzmet, Smart Bridge, data lake and analytical modules systems, as well as legal, organizational and ethical aspects of its implementation.

The key results of the study include:

- the systematisation of modern digital HR tools and the justification of their applicability within public administration;
- the development of a digital recruitment business-process model incorporating end-to-end digital solutions;
- the formulation of proposals for institutional and regulatory measures to support the integration of Big Data technologies into civil service recruitment.

One of the priority areas for development is the broad adoption of People Analytics in the public sector. Analytical tools make it possible to move away from intuitive or subjective decision-making toward objective, evidence-based evaluations of candidates' personal and professional characteristics. This improves the accuracy of matching candidates' competencies to job requirements, increases productivity, and reduces turnover.

A key component of the future human resource management system is the creation of a 360-degree digital candidate profile that integrates data from multiple sources: internal HR systems (e-Qyzmet), government registries (e-Gov), open platforms (e.g., LinkedIn, HeadHunter), and digital traces from professional and social environments. This approach enables a comprehensive, continuous, and reliable assessment of each candidate's potential.

Personalised selection methods based on digital footprints and behavioural analytics support the development of individualised strategies for attracting, selecting, and onboarding candidates. This not only enhances the effectiveness of recruitment processes but also strengthens public trust in government institutions.

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