Original Research

Results of social research on assessing the needs for pharmaceutical personnel

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Abstract

The pharmaceutical industry in Kazakhstan faces increasing demand for qualified personnel caused by rapid technological developments, changes in the regulatory environment and the growing role of inter-organizational collaboration. At the same time, there is a shortage of professional specialists, which complicates personnel recruitment and requires a rethinking of personnel policies. **Aim of the study:** To analyse the current workforce distribution, educational level, personnel recruitment issues, and professional skills requirements, as well as to develop recommendations to overcome personnel challenges in the pharmaceutical industry. **Methods:** The survey covered demographic data, professional roles, recruitment issues, skill requirements and prospects for collaboration in the pharmaceutical industry. Four hundred twenty-three people participated, of which 405 valid questionnaires remained after excluding incomplete responses. Data were collected through a secure online platform, and from paper forms, they were entered manually. The analysis aimed to identify trends in the workforce composition, recruitment issues and key skill requirements. **Results:** The survey identified significant gaps in staffing, the most in-demand skills and key competencies, and the relevance of inter-organizational interaction strategies. The study results highlight the need to develop comprehensive approaches to solving recruitment problems, improving educational programs, and adapting HR policies to the current needs of the industry.

Keywords: Pharmaceutical workforce, recruitment challenges, skills gaps, medical-pharmaceutical clusters, professional competencies

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INTRODUCTION

The pharmaceutical industry is widely recognised as a pivotal driver of scientific and healthcare progress, primarily due to continuous advancements in science and technology. The development of Kazakhstan's pharmaceutical industry is a national priority, as outlined in the 2024 National Development Plan. However, domestic production remains limited, with only 14.4% of the pharmaceutical market and 32% of drug purchases comprised of Kazakhstani products in 2023. To bolster domestic production, the government aims to foster collaboration with global pharmaceutical companies, attract investment, and facilitate technology transfer[1-3]. This ambitious goal requires a long-term perspective, recognising the significant investment and favourable conditions necessary for success. Addressing these challenges requires understanding the workforce distribution, the relevance of different roles, education adequacy and building strategic foresight. Drawing upon the work of Cambra-Fierro et al. (2017) and Birkie and Trucco (2020), it highlights the importance of resource allocation, strategic planning, and adaptability in achieving organisational

success[4-6].

The formation of the medical and pharmaceutical cluster "Shymkent" is a strategically important step for the development of the domestic pharmaceutical and medical industry of Kazakhstan. The cluster is aimed at stimulating scientific research and development, increasing production volumes and expanding product sales markets, training highly qualified personnel, and strengthening international cooperation and interaction with government agencies to create favourable conditions for the development of the industry[7].

At the core of our commitment to creating successful medical and pharmaceutical clusters is the imperative to build and empower a workforce that is fully responsive to evolving needs. Poskey emphasises the importance of factors such as leadership, compensation, and workplace culture in fostering a strong workforce. The Minnesota Hospital Association similarly highlights the need for customized retention strategies tailored to individual employee needs. Ultimately, human capital is the cornerstone of organizational success. The human resource department plays a pivotal role in shaping retention strategies, recognising the profound influence of organisational culture on employee performance and retention. Organisations can cultivate a competitive edge in the evolving pharmaceutical landscape by prioritising the careful selection and long-term development of skilled talent[8-14]. Association for the Support and Development of Pharmaceutical Activities of the Republic of Kazakhstan has noted among the existing problems to solve that we have to pay more attention to the development of competent human resources for the pharmaceutical industry[15].

Through the following survey of pharmaceutical professionals, this study aimed to identify crucial workforce needs and skills gaps. The findings will inform the development of effective workforce development and recruitment strategies to enhance the sustainability and efficiency of the Kazakhstani pharmaceutical industry.

MATERIALS AND METHODS

Study design

We conducted an online and paper-based survey among pharmacists and pharmacy managers practising in Kazakhstan. A questionnaire was developed based on a literature review and exploratory qualitative

study. Survey questions were structured to collect quantitative and qualitative data, and responses were scored on scales where applicable (e.g. a five-point scale for role relevance). The survey was distributed to the pharmacy workforce and covered demographics, professional roles, organisational locations, educational levels, recruitment challenges, skills requirements and prospects for collaboration within healthcare and pharmaceutical clusters. The survey was distributed through WhatsApp, Kazakhstan's most popular social chat app.

Digital responses were collected through a secure online platform, while paper surveys were manually entered into an analysis system.

Procedures and data collection

Eligible pharmacists received a study information sheet, questionnaire, and assurance that their responses would remain anonymous. They were informed that their participation was completely voluntary.

After conducting a pilot test with 12 pharmacists, we designed and adjusted a comprehensive questionnaire. We asked to complete and return the questionnaire within four weeks.

Eligibility

Participants had to be pharmacists practising in Kazakhstan to participate in the survey.

Data analysis

Descriptive statistics and categorical variables as frequencies and percentages were used to summarise the findings

The analysis focused on identifying trends in workforce composition, recruitment challenges and skills requirements. The survey targeted pharmacists in senior roles and aimed to assess the pharmaceutical industry's workforce distribution, recruitment challenges, and skills needs. A total of 423 participants were initially recruited, of which 263 responded online, and the remaining participants completed paper surveys. However, 18 responses were excluded due to incomplete or illegible responses, leaving 405 valid responses.

RESULTS

The 405 responses were used in the analysis. Respondents represented a variety of roles in the pharmaceutical industry, including quality assurance, clinical pharmacy, and management positions. Most organisations were located in Shymkent (17.9%) and the Turkestan region (58.6%)(Figure 1). The age range was mainly concentrated between the ages of 23 and 55. The number of female participants (79.88%) was significantly higher than that of male participants (20.02%). Educational background analysis revealed that the most common degrees
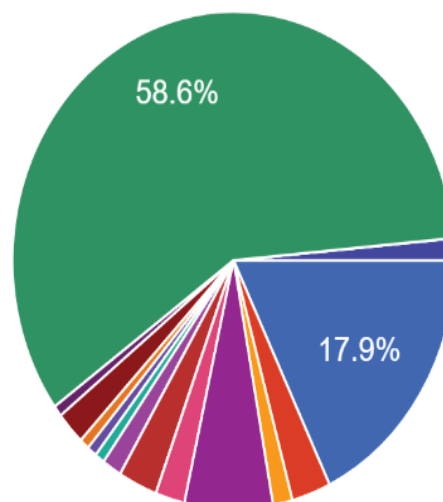

Figure 1. Work placement characteristics of respondents

among respondents were Secondary Professional (52.9%) and Bachelor's (44.2%) (Figure 2). Regarding workplaces, 59.3% worked in small pharmaceutical organisations with fewer than 15 employees. Companies with 16-100 employees and more than 250 employees each accounted for 18.5% of respondents, while the remaining 13.7% worked in organisations with 100-250 employees.

A pressing concern shown by this study is the significant shortage of retail pharmacists, with 40.40% of surveyed organisations reporting a critical need for these professionals. This finding underscores the essential role of community pharmacies in healthcare delivery and the challenges faced in adequately staffing these essential services. While the demand for pharmacist-managers is also substantial (17.90%), the perceived need for specialised roles such as pharmacist-informers, organisers, and technologists appears to be relatively lower. These findings suggest potential skill gaps within the pharmaceutical workforce and emphasise the need for tailored training programs that address the specific needs of the evolving healthcare landscape (Figure 3).

A significant challenge identified in our study was the mismatch between available candidates' skills and experience and the pharmaceutical industry's specific needs. 35.0% of organisations reported a "Lack of specialists in the required field," while 30.7% cited a "Lack of experience among candidates." This highlights the importance of aligning pharmacy education and training programs with the evolving needs of the industry. Furthermore, 20.9% of organisations cited "Low level of education" as a concern, emphasising the need for continuous improvement in the quality and relevance of pharmacy education (Figure 4).

Pharmaceutical organisations reported difficulties in attracting qualified personnel, especially for specialised positions. The most effective platforms for online recruitment were industry job portals and professional networks. However, such challenges as a limited candidate pool and high competition for specialised talent were often mentioned.

The study included a survey among pharmaceutical industry employees to identify their preferences for job search platforms. Of the 405 respondents, 27.4% chose the Qyzmet.kz platform as their primary job search resource, indicating the popularity of the job aggregator. Enbek.kz and HeadHunter.kz received the same preference level, with a score of 23.4% each, indicating the demand for both state and commercial platforms. The remaining respondents noted that they prefer to search for vacancies through traditional advertisements in publications and social networks such as Instagram, which emphasizes their importance for the employment market, especially in regions with limited access to specialized sites. (Figure 5)
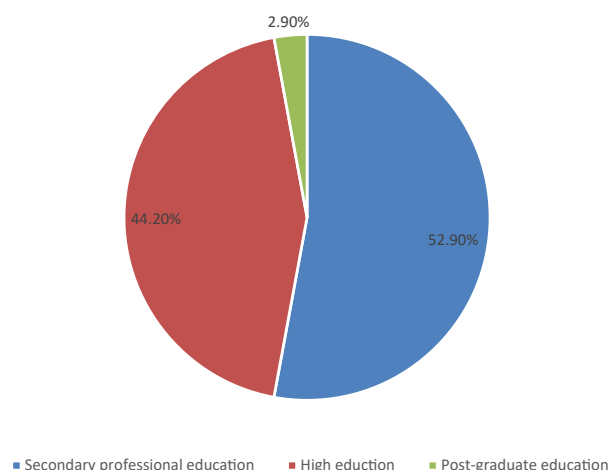

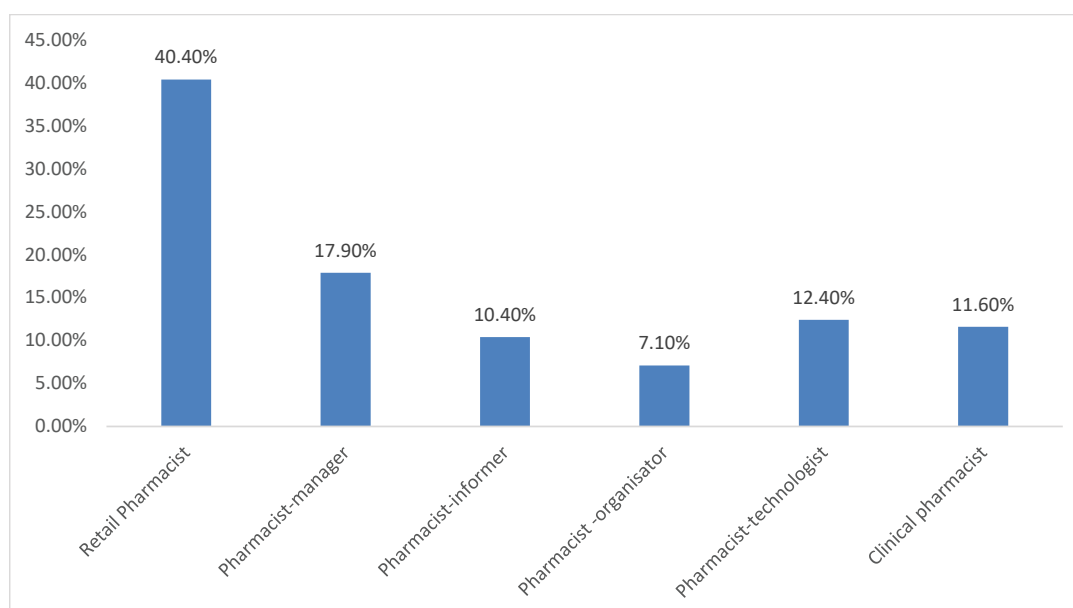**Figure 2.** Educational background of respondents

Figure 3. EProfessions (specialities, positions) in the pharmaceutical field in which the organisation feels a shortage
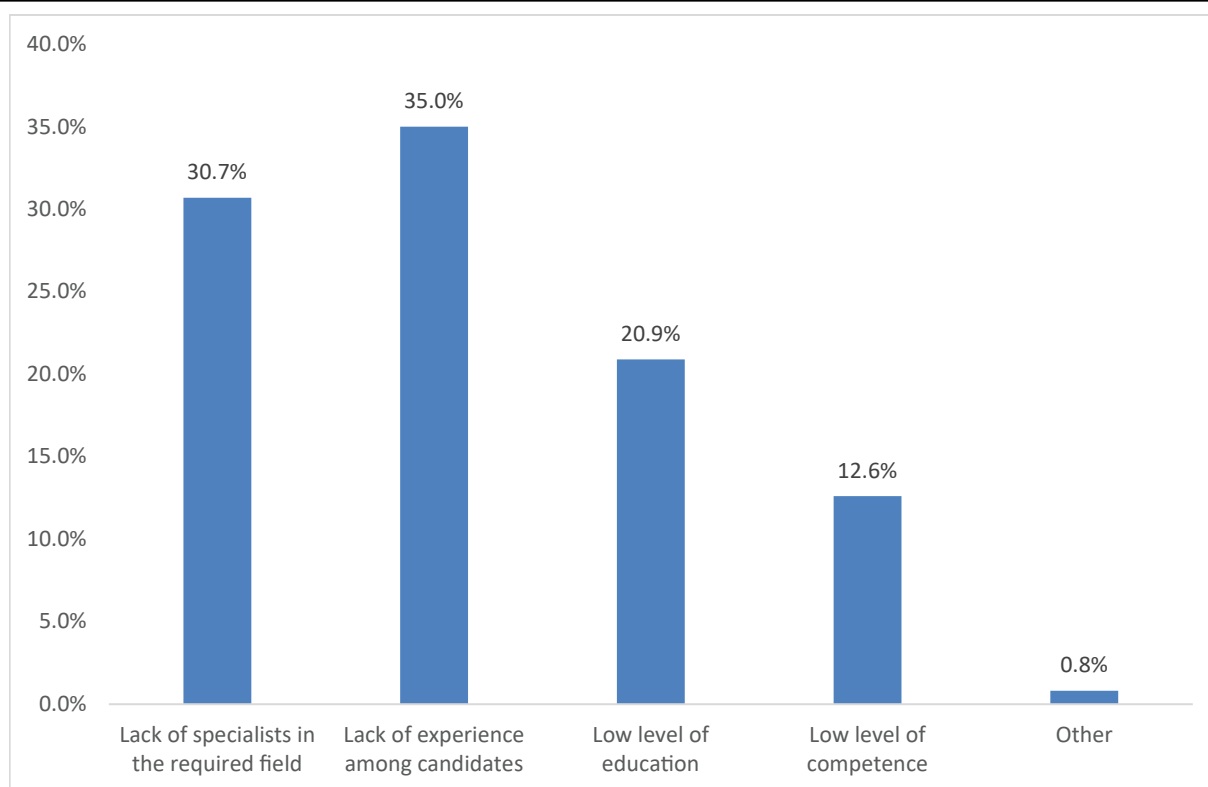
Figure 4. Problems faced by a pharmaceutical organisation when recruiting personnel
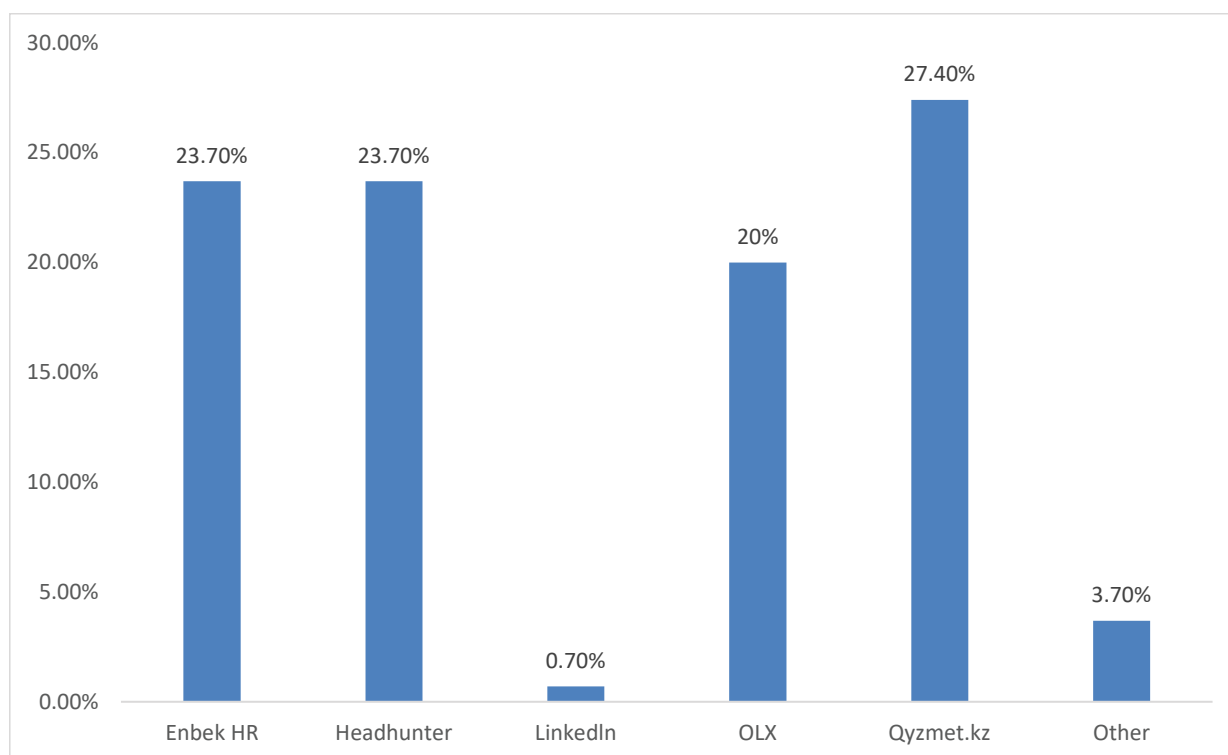

Figure 5. Popular Internet Portals for Recruitment

Enbek.kz, HeadHunter.kz and Qyzmet.kz. Platforms were selected based on their popularity and functionality in the Kazakhstani labour market. The comparative table is presented below and allows us to analyse each of the sites under consideration by key characteristics, including the availability of free services, the level of content moderation, the source of job postings and the specifics of the target audience[16-21] (Table 1).

As part of the study, respondents were asked: "Does the existing nomenclature of pharmaceutical specialities meet the needs of the modern pharmaceutical industry?" The majority of participants (85.5%) answered affirmatively, noting that the current nomenclature generally meets the needs of the industry. However, 9.4% of respondents disagreed, pointing out several significant problems. Among the most frequent comments were a shortage of specialists in the field of clinical pharmacy, a lack of rationality in the distribution of responsibilities, the need to take into account legal aspects, as well as the low efficiency of the current structure. It was also noted that the nomenclature does not consider the specifics of production, and a number of processes are perceived as a formality. Thus, the survey results indicate that although most specialists are satisfied with the current state of the nomenclature, there is a significant share of opinions indicating the need for its revision and modernization.

The survey asked respondents to rate the relevance of various pharmaceutical specialities on a 5-point scale, where "1" meant "not at all relevant" and "5" meant "very relevant".

The average score for all specialities ranged from 3.43 to 4.00, indicating that most professions are in high demand. The specialities with the highest average scores and the proportion of respondents who rated them as "very relevant" (5 points) include:

• Pharmacist – Manager (Average score: 4.00).

• Pharmacist for Quality Management (Average score: 3.77).

• Clinical Pharmacist (Average score: 3.75).

The least relevant among respondents were such specialities as pharmacist-informer (Average score: 3.43) and pharmacist-commodity specialist (Average score: 3.43).

The results show that respondents highlight key roles in management, clinical practice, and quality control as being the most significant for the modern pharmaceutical industry. However, some areas require attention and possible modernisation to increase their demand.

According to the survey results, the annual need of organisations for pharmaceutical workers is distributed as follows:

• From 1 to 5 people - 48.5% of respondents, which indicates the most common needs category.

• From 6 to 10 people - 23.9%, which indicates a significant share of organisations with average requests.

• From 11 to 20 people - 12.7%.

• From 21 to 30 people - only 1.5%, indicating the rarity of large requests.

• More than 30 people - 13.4%, which highlights the presence of organisations with high demand for personnel (Figure 6).

Our findings reveal a diverse range of workforce needs within the pharmaceutical industry. While nearly half of organisations require only a small number of specialists annually, a significant minority (13.4%) experience high demand, exceeding 30 new hires per year. This underscores the need for a flexible personnel training system to adapt to these varying demands.

The pharmaceutical industry is undergoing rapid change, requiring a re-evaluation of core competencies. A survey conducted among pharmaceutical professionals identified key areas that are expected to be in high demand in the coming years. The most frequently cited competency was pharmaceutical management and organisation, cited by 51.1% of respondents, highlighting the critical need for effective

Table 1. Comparative analysis of web portals for employment			
Criteria	**Enbek.kz**	**HeadHunter.kz (HH.kz)**	**Qyzmet.kz**
Type	State portal	Commercial recruiting site	Vacancy aggregator
Job vacancy database	Constantly updated from various sources: employers, state employment centres, agencies.	Specialised positions, highly qualified specialists	Aggregates vacancies from Kazakhstani websites
Target audience	All categories of workers throughout the country	Professionals, middle and senior managers, qualified specialists	All categories of applicants, including mass positions
Convenience for employers	Free publication, access to a government database and opportunities for government subsidies	Paid services for more accurate and faster hiring and resume confidentiality control.	Redirect to original job sites for response.
Convenience for applicants	Free access to vacancies, the ability to respond, and a subscription to the vacancy mailing list	Convenient tools for managing responses, flexible privacy settings	Simplified search for all popular Kazakhstani sites
Cost	Free	Paid services for employers	Free for applicants
Additional functions	Personal account, state subsidies, accounting of employment contracts, professional testing and state consultations	Moderation, automation of recruitment, and integration with the international network of vacancies The Network	Universal keyword search and filters
The number of advertisements for pharmacists	100	18	463

operational and policy frameworks in an increasingly complex industry. Quality assurance of medicines came in second with 28.8% responses, reflecting the sector's continued focus on safety and regulatory compliance. In particular, 21.6% of respondents identified drug pharmacology expertise as vital to developing innovative treatments. New technologies were also prominently featured, with 20.9% of participants highlighting the integration of IT and artificial intelligence in healthcare and drug development. In addition, a renewed interest in natural products was evident, with 8.6% of respondents highlighting the importance of medicinal plants and the extraction of bioactive substances. These findings provide a roadmap for shaping education programmes and training the workforce to meet the changing needs of the pharmaceutical industry (Figure 7).
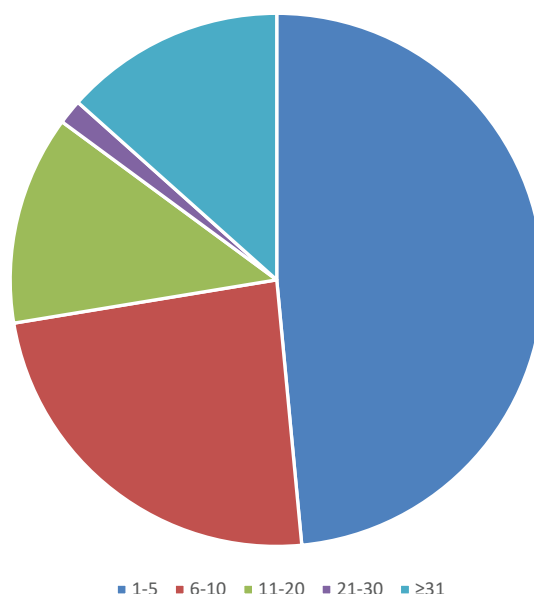

1-5   6-10   11-20   21-30   ≥31
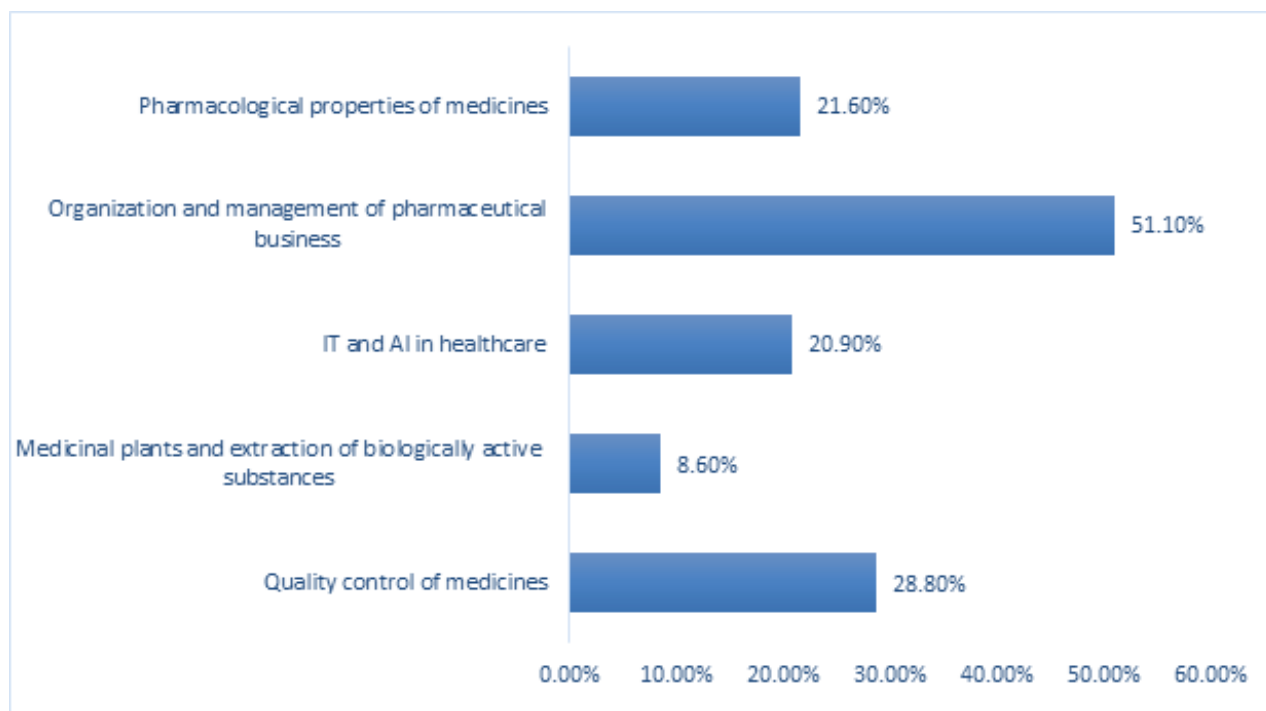
Figure 6. Annual workforce needs

Figure 7. Hard skills in demand

The survey results identified key soft skills pharmaceutical professionals require to thrive in a rapidly changing environment. The most important competencies, identified by 64.4% of respondents, were flexibility, rapid professional adaptation and willingness to move to other fields or industries, highlighting the need for resilience in an evolving sector. The ability to collaborate with others was noted by 33.3% of respondents, highlighting the importance of teamwork in a multidisciplinary setting. Additionally, 37.5% recognised the importance of problem-solving skills, highlighting the demand for professionals who can effectively solve problems in dynamic work environments. Meanwhile, independence in work was noted by 22.5%, reflecting the growing need for self-reliant and reliable employees. Other notable competencies included the ability to learn and self-learn (26.8%) and initiative and entrepreneurship (20.3%), both of which indicate the importance of continuous skill development and proactive contribution. The findings suggest that the pharmaceutical industry values adaptability, collaboration and self-directed growth as essential qualities for future professionals (Figure 8).

Inter-organizational collaboration within pharmaceutical clusters was emphasized, with most respondents supporting establishing intermediary organizations to improve communication and resource sharing. The survey also identified four key barriers to effective university-industry collaboration: lack of a clear mechanism for interaction between organizations (30,8%), inconsistency between the norms and procedures of organizations (27.7%), complex relationships between the university and the labour market (26.2%) and lack of investment in education (26.2%).

When asked about their willingness to engage in high-risk innovation projects, organisations reported mixed levels of commitment. Resource constraints and risk tolerance emerged as key determinants of willingness, indicating the need for structured support to encourage engagement in high-risk innovation projects.

In response to a survey question asking whether an intermediary organization is necessary for successful collaboration between participants within a medical and pharmaceutical cluster. The responses showed that the majority (65.9%) of participants supported the idea, confirming that such an organization is necessary to facilitate collaboration and ensure effective interaction between cluster organizations. However, 30.4% of respondents disagreed, indicating scepticism regarding an intermediary organisation's added value or necessity. A smaller proportion of participants expressed uncertainty and 3.7% chose "I don't know" (Figure 9 and Figure 10).

Respondents highlighted the importance of additional education in areas such as data analytics, project management, legal knowledge, and traditional pharmaceutical training. These interdisciplinary skills are becoming increasingly relevant in response to regulatory complexities and technological advances in the industry(Figure 11).

DISCUSSION

This cross-sectional survey, conducted in Kazakhstan's populous South region, provides valuable insights into the demand for pharmacists and the essential competencies required. This
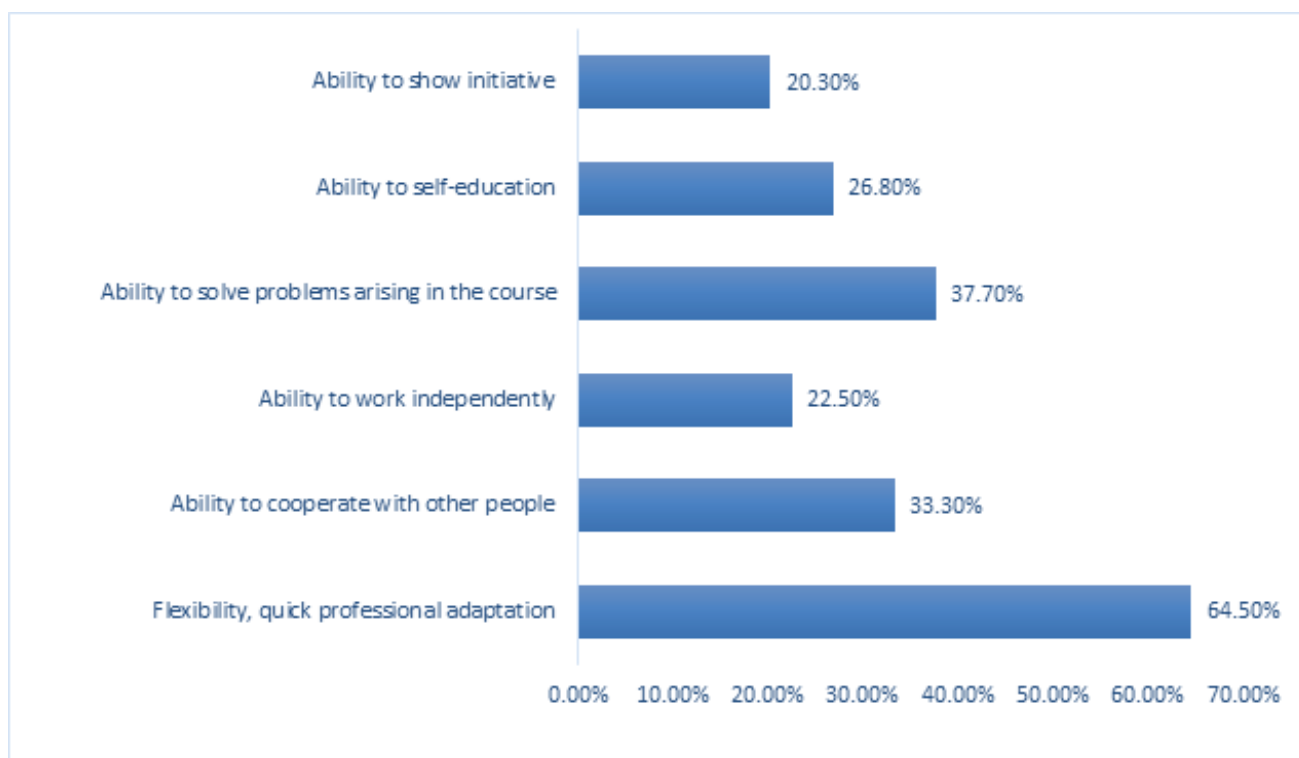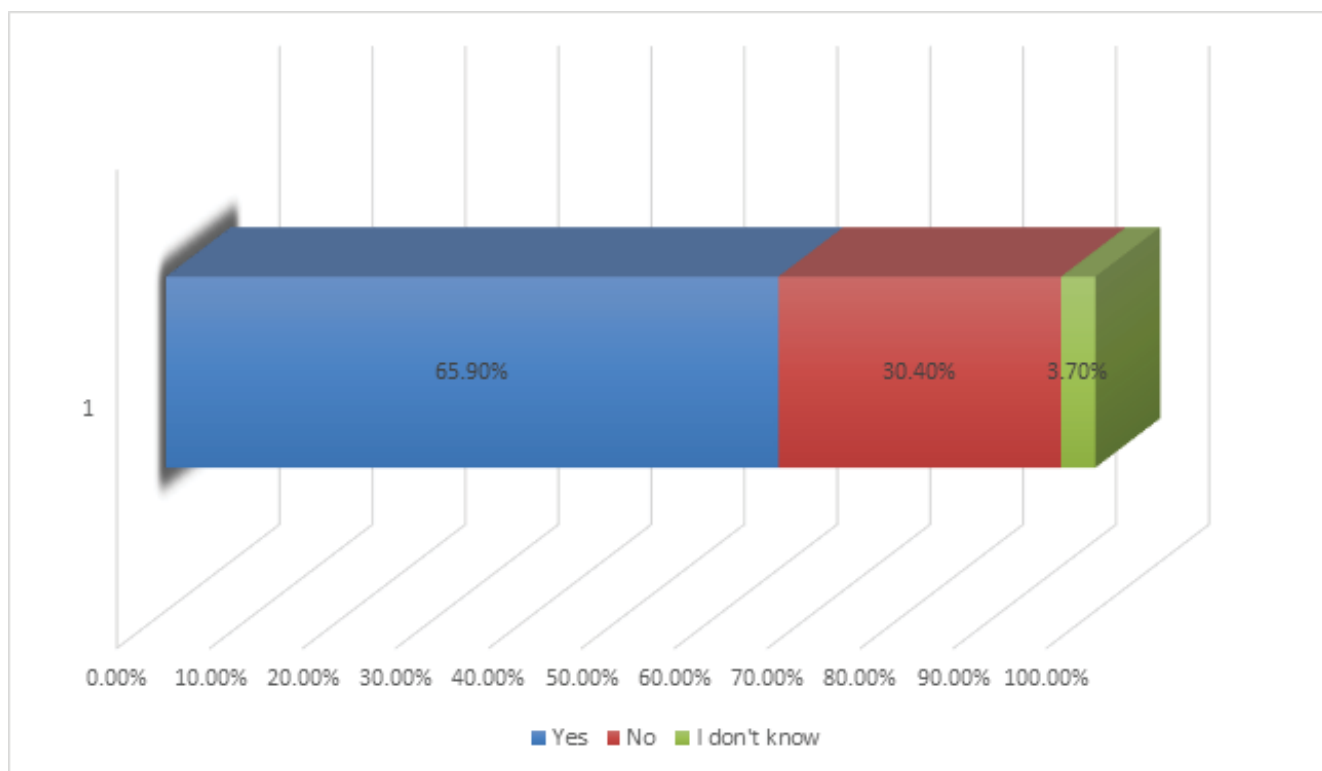

Figure 8. Required soft skills

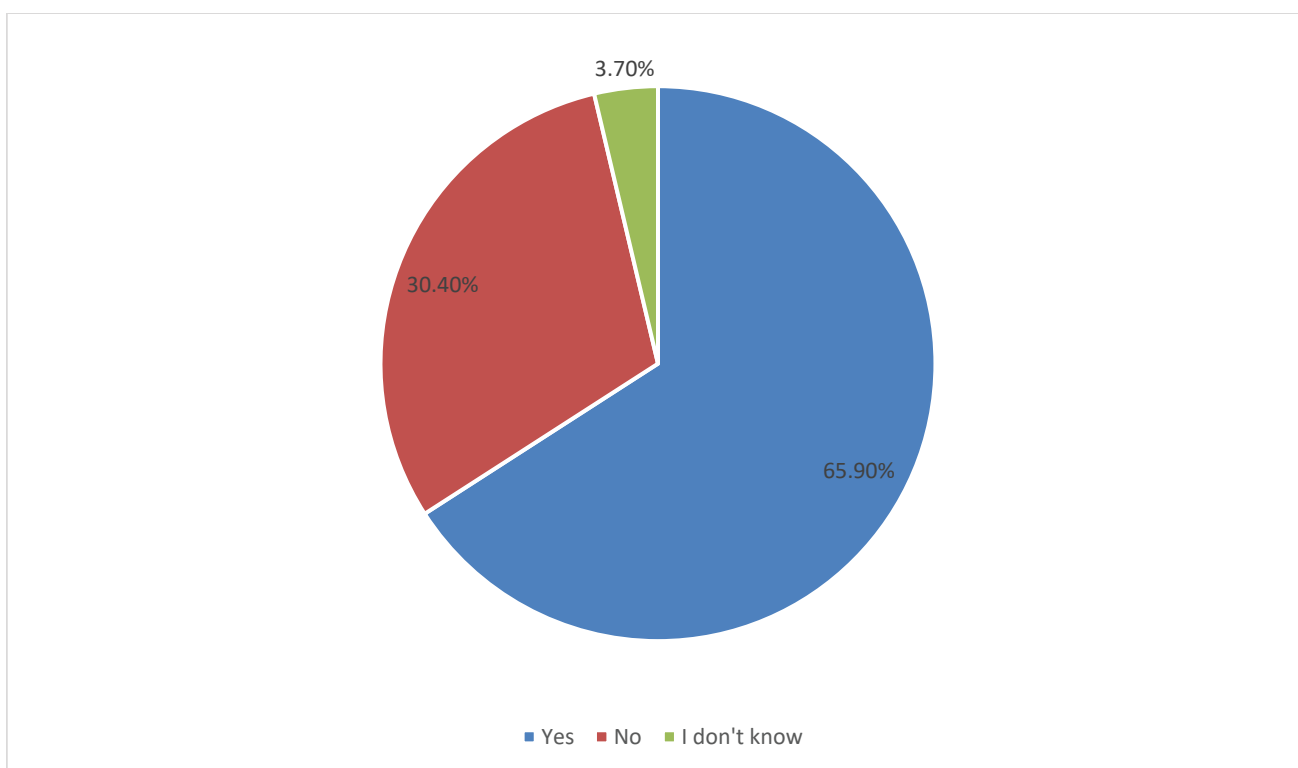**Figure 9.** Core competencies

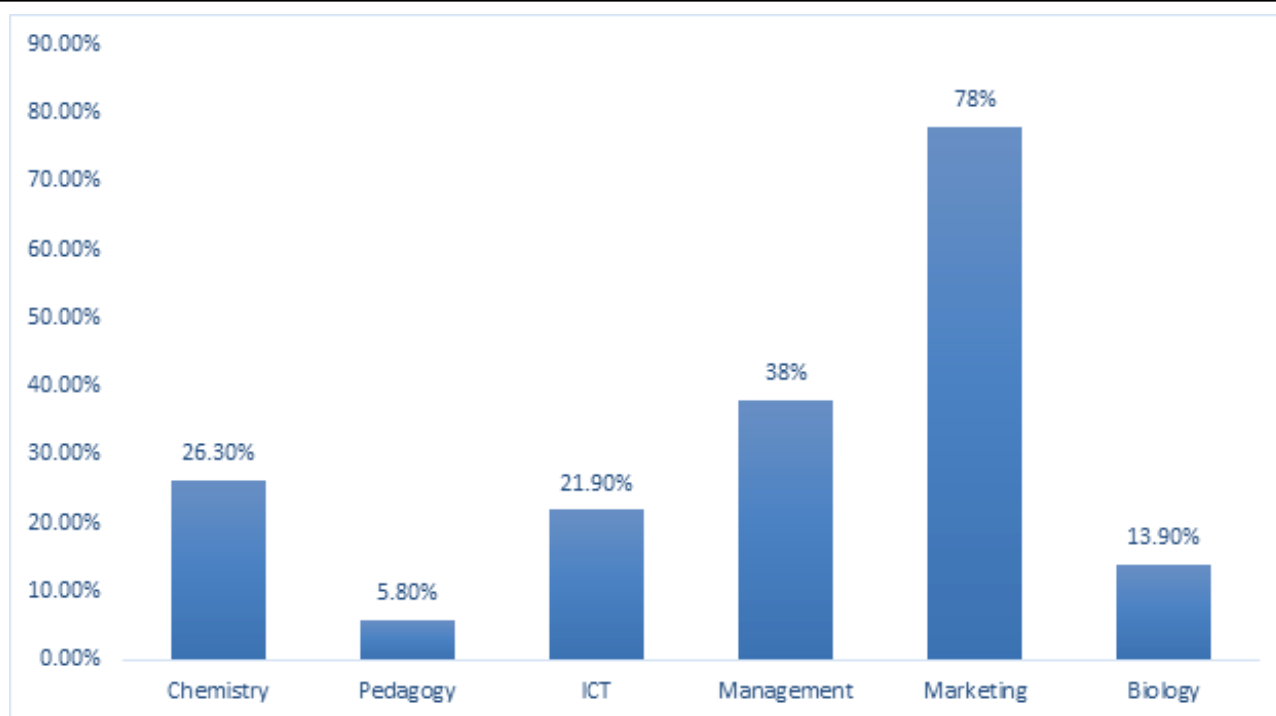**Figure 10.** Willingness to engage in high-risk innovation projects

Figure 11. Additional education

research contributes significantly to the existing literature. It uniquely combines quantitative data with a comprehensive competence shortage analysis, addressing an often-overlooked aspect of the pharmacist recruitment process. Focusing on the specific needs of the Kazakhstani context, it develops tailored policy recommendations that can be adapted and applied to other healthcare systems in Central Asia and beyond.

The survey results reveal a landscape in which the pharmaceutical industry must address key workforce challenges to remain competitive and meet healthcare demands. One of the reasons for the staff shortage might be the system of remuneration of pharmacists in Kazakhstan, which can be described as insufficiently flexible and stimulating. Salaries often depend on the overall turnover of the pharmacy, and not on the individual achievements and qualifications of the specialist. The lack of differentiated payment and bonuses related to the performance of specific tasks demotivates workers and does not contribute to improving the quality of pharmaceutical services. Furthermore, the mismatch between job nomenclature and industry needs suggests that updating job classifications could facilitate better recruitment by clarifying job responsibilities and required competencies[22]. Shortages of skilled personnel in quality management and clinical pharmacy require a change in the labour legislation and targeted recruitment and training initiatives, particularly in underserved areas. The new national professional standard in Pharmacy has to be detailed in the responsibilities of job positions and precise in educational background and qualifications.

The development of pharmaceutical science in Kazakhstan is hampered by a number of factors, including an ineffective system of training and advanced training of scientific personnel and insufficient interaction between academic and scientific institutions. Furthermore, the demand for technical and soft skills reflects the changing nature of pharmaceutical work in Kazakhstan, which increasingly involves regulatory navigation, quality management, and interprofessional communication. This calls for a change in pharmaceutical education's content and regulatory system[23-24]. Bachelor's and master's degree programs in Pharmacy should include local industry mentoring, extended corporate internships (6-12 months), and interdisciplinary projects to enhance hands-on learning and career readiness.

Additionally, as creating a medical and pharmaceutical cluster is seen as one of the solutions to problems in Kazakhstan's pharmaceutical industry, the results highlight the perceived importance of a centralised intermediary structure to improve coordination and communication within the cluster. The high proportion of affirmative responses suggests that many stakeholders recognise potential benefits such as streamlined processes, conflict resolution, and improved resource allocation. Conversely, dissenting opinions may reflect concerns about additional bureaucracy, costs, or a preference for direct inter-organizational collaboration without intermediaries. Medical and pharmaceutical clusters offer significant benefits to all participants, from patients to scientific, pharmaceutical, medical and business communities. Thanks to such close interaction, new integrated services appear for patients, which significantly increases the convenience and quality of medical and pharmaceutical care. Joint infrastructure ensures the continuity of the treatment process, reducing gaps in its course.

Scientific activity in such clusters receives a powerful incentive for development. Joint cluster projects not only improve the quality of research and development but also attract significant investments, which enhances the innovative potential. In addition, medical and pharmaceutical clusters play a key role in optimizing healthcare processes. They contribute to the increased efficiency of medical and pharmaceutical services, and also improve personnel training, providing access to modern technologies and training.

In the modern conditions of the development of medicine and pharmaceuticals, the effective activity of personnel plays a key role in achieving high results. Medical and pharmaceutical clusters unite scientific, educational, industrial and clinical structures, which requires coordinated work at all levels. Successful implementation of tasks is possible only with professional, motivated and competent personnel capable of working in the conditions of rapidly changing technologies and standards. A study of the experience of clusters in Korea, Russia, the USA and other foreign countries revealed that many biomedical cluster organizations organize coaching sessions for their employees to help them acquire additional competencies (for example, in project management, advanced ICT, communications and research). Most clusters include universities or organizations specializing in training and retraining of personnel. For example, the BioOhio cluster in the USA offers various programs at the Center for Professional Innovation and Education. Cluster member companies that pay for the training of their specialists in the field of pharmaceuticals or medical technologies at the center receive a discount. Thus, the cluster, on the one hand, organizes advanced training for medical and pharmaceutical personnel, and on the other hand, contributes to the improvement of the healthcare system[25-29]. The newly created medical and pharmaceutical cluster in Shymkent would benefit from the inclusion of such a mechanism in its activities.

Therefore, we have developed methodological recommendations aimed at the development and implementation of effective HR management strategies that will not only improve productivity and quality of work but also ensure sustainable development of the entire cluster. The main attention is paid to such aspects as the formation of a systematic approach to the organization of work, which will contribute to the increase of the qualification competence of employees, improvement of working conditions and creation of a favourable working atmosphere.

It is important to note that the rules of interaction, budget allocation and responsibilities of cluster participants should be clearly spelled out in the cluster charter and other regulatory documents. This will ensure the transparency and efficiency of the cluster, as well as prevent possible conflicts and misunderstandings.

Further research is essential to better understand workforce issues in the pharmaceutical industry. This research should examine the relationship between these issues (such as staff shortages) and other important factors, including wage levels, turnover and organisational performance. Analysing data on the causes of staff shortages, such as inadequate training, low wages and limited career opportunities, is essential. In addition, examining regional differences in workforce needs and investigating the potential impact of these shortages on patient outcomes will provide valuable information for developing effective workforce planning and retention strategies.

CONCLUSION

This social study highlights critical areas for workforce development, improved recruitment and educational alignment in the pharmaceutical industry. Addressing skill shortages, clarifying and promoting essential skills will strengthen the industry's ability to meet future healthcare needs. Moreover, facilitating effective collaboration in clusters and supporting innovation initiatives will be key to developing the pharmaceutical sector. Future research should focus on longitudinal studies to assess the impact of strategic interventions on recruitment and retention in the pharmaceutical industry.

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