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# ISSUES IN UNIVERSITY AND INDUSTRY COLLABORATION: RESULTS OF A STAKEHOLDER SURVEY

**Abstract**: In 2024, Kazakhstan introduced a new science and technology policy to bridge academia and industry. Despite this, challenges persist due to conflicting goals, limited industry capacity, and bureaucratic obstacles. Based on a survey of 700 academics and 108 business representatives, this study identifies major barriers to collaboration, including the underdevelopment of high-tech industries, bureaucratic hurdles in research organizations, and insufficient funding. Notably, satisfaction varied by organization type, with state universities expressing higher satisfaction compared to private research institutions. These findings underscore the need for policy reforms that reduce bureaucratic barriers, enhance funding, and foster active engagement in university-industry partnerships for innovation.

**Keywords:** University-industry collaboration, Research commercialization, Barriers to innovation, Stakeholder engagement, Science policy

## Introduction

In recent years, Kazakhstan has undertaken significant reforms to promote innovation and technological advancement, particularly by encouraging collaboration between academia and industry. The enactment of the 2024 Science and Technology Policy law marks a pivotal step toward bridging the traditional divide between universities and the private sector. This law replaces prior legislation on science and commercialization, offering updated guidelines and incentives aimed at enhancing research commercialization and facilitating a robust framework for applied research. Additionally, amendments to the tax code and other legal instruments have introduced tax incentives and streamlined procurement processes, fostering a more supportive environment for scientific and technological collaboration.

Despite the efforts made in recent years, the problem of the gap between academia and industry remains significant. Although universities in Kazakhstan are increasingly focused on applied research and innovation, their traditional focus on knowledge creation and education often contradicts the market-oriented goals of the private sector. The Ministry of Science and Higher Education is pursuing a policy of strengthening the connection between business and science. Work has begun to identify the tasks of large business that could be solved by domestic scientists. On the other hand, there is a certain resistance to such initiatives on the part of some representatives of the scientific community with a call not to turn industry science into a laboratory for factories (Zharmenov, 2024).

On the part of business in Kazakhstan, there is also a problem of low interest, as well as weak potential for the adoption of new technologies, especially at the regional level (Kenzhaliyev et al., 2021). Large companies that are open to innovation often buy off-the-shelf technologies overseas, with the rare exception of companies that set up their own R&D departments.

This study explores the current state of university-industry collaboration in Kazakhstan, analyzing barriers and stakeholder perspectives across academic and industry representatives. By examining these factors, the study contributes to a deeper understanding of the structural

and operational changes needed to support effective science-business partnerships in Kazakhstan.

**Literature review and theoretical base**

Research points to a potential problem where universities can turn to companies to sell their R&D as finished products without fully considering the market suitability or value proposition of the technology.(Battaglia et al., 2021) That is, there is a problem of mismatch between the results of scientific research and the needs of industry, which can hinder the successful transfer of technology and the commercialization of research results.(Ravi & Janodia, 2022) Technology intermediaries or innovation partners play a key role in understanding the needs of firms and translating them into academic units. They also identify potential applications of scientific knowledge from universities, facilitating knowledge transfer activities.(Bigliardi et al., 2015)

Also, without a clear methodology for assessing the cost of technologies, universities may experience difficulties in attracting potential partners or investors.(Dias & Porto, 2018) The use of the Technology Roadmap and Technology Readiness Levels (TRL) has been identified as useful for managing R&D and technology transfer efforts, indicating the need for strategic management of technology portfolios.(Lavoie & Daim, 2018) One of the barriers mentioned in the studies on Kazakhstan is the limited number of research results suitable for commercialization. Universities have few research results suitable for commercialization due to the embryonic nature of the technology, which often requires significant refinement.(Belitski et al., 2019)

Problems also arise from enterprises. Many companies, especially in regions with low technological intensity, have limited absorption capacity for R&D innovation due to their small size and the nature of their production processes.(Kenzhaliyev et al., 2021) This poses the challenge of effective technology transfer and commercialization, as universities may need to explore alternative forms of collaboration to meet the needs of such firms.(Ramos-Vielba & Fernández-Esquinas, 2012)

Another significant barrier in the commercialization process is the lack of interest and trust among the stakeholders involved in the process. Building trust and encouraging mutual interests is critical to overcoming these obstacles.(da Silva et al., 2022) The researchers recognize the importance of improving communication skills, clarifying project expectations, and adapting to the industry's short timelines to increase the success of collaborative projects.(Berman, 2008) Building trust at the individual and organizational levels is important for the success of joint initiatives.(O'Dwyer et al., 2023) In Kazakhstan, research has revealed a lack of emphasis on developing a sustainable culture of engagement with industry hampers long-term collaboration and innovation.(Jonbekova et al., 2020)

Interviews with scientists showed that some enterprises in Kazakhstan do not trust the competence of research groups and have limited confidence in the results of their research. This lack of trust stems from the belief that research in Kazakhstan does not yield meaningful results, causing skepticism about collaborating with domestic scientists on research and innovation projects.(Kuchumova et al., 2023)

Internal bureaucracy, lack of innovation culture, and insufficient human resources dedicated to technology transfer activities in academic institutions are significant obstacles.(Berman, 2008; da Silva et al., 2022) In Kazakhstan, the concept of commercialization and technology transfer offices is relatively new, as there was previously no need for mechanisms for the commercialization of knowledge and the protection of intellectual property (IP) in central planning systems. The development of standards to encourage the transfer of knowledge from universities has begun recently, which indicates the lack of an established infrastructure for effective technology transfer.(Belitski et al., 2019)

Commercialization offices are often perceived by scientists as additional bureaucratic structures, which reduces their influence on the commercialization of university research.(Belitski et al., 2019)

Research also highlights protracted internal procedures and competing stakeholder interests in universities as a significant obstacle to the technology transfer process.(Alexander et al., 2020; Dias & Porto, 2018)

The transfer of research results into market products or services is difficult due to the lack of knowledge in the field of business management among scientists and the lack of knowledge about entrepreneurial activities. There is a lack of skills and knowledge necessary for the effective commercialization of research results.(Ilysheva & Rozhkov, 2017) Despite the fact that scientists at universities have high technical knowledge, they often lack the necessary business and entrepreneurial skills.(Heng et al., 2012)

A study in Brazilian universities points to a lack of a strong culture of innovation and entrepreneurship.(Dias & Porto, 2018) Academic entrepreneurs may not have a full understanding of the commercialization process, which can lead to potential illusions and mistakes.(Maia & Claro, 2013) Supervisors involved in technology transfer may not have the necessary business skills, such as marketing and commercialization expertise.(McAdam et al., 2009) Formalized training and convergence of academia-industry links are important strategies to address these gaps and improve the efficiency of technology transfer.

**Methodology**

Based on a review of the scientific literature and interviews conducted on the project in which this article was prepared, the following barriers to interaction between science and business were identified:

1) Lack of platforms for meetings between scientists and business representatives
2) Lack of state support for the commercialization of the results of scientific and scientific-technical activities
3) Scientists' Lack of Understanding of Business Needs
4) Low level of developments of domestic scientists
5) Insufficient capacity of companies to implement new technologies
6) Lack of financial resources to work with scientists and introduce new technologies
7) Bureaucratic and Other Barriers in Scientific Organizations (Universities/Research Institutes)
8) Lack of understanding by companies of the need to innovate and attract scientists

These statements were included in a more extensive survey conducted by the Academy of Sciences of Kazakhstan under the President of the Republic of Kazakhstan from August 20 to September 30, 2024. Respondents evaluated each statement on a five-point scale, where 1- means "is not a barrier", 5 means "a significant barrier" and there is a variant that is difficult to answer.

The survey contained demographic data, including field of research, the type of organization (university/research institute, public/private) and other data. Business representatives indicated the company's industry, the level of interaction with scientific organizations, the level of innovation (the scale from "The company does not invest in new technologies and developments" to "The company has its own patents implemented in the production of goods or the provision of services") and other data.

Also, the survey measured the level of satisfaction of public administration in the field of science based on 32 indicators, including the following indicators: holding competitions for commercialization projects; promotion of research results for their application, implementation and commercialization; stimulation of cooperation between scientists and business. Respondents could choose the following options: Not satisfied (1), Rather dissatisfied (2),

Rather satisfied (3), Satisfied (4), Difficult to answer (-). The results related to overall satisfaction level presented here may differ from results issued by National Academy of Sciences due to data cleaning. Many respondents answered the first part on satisfaction level and failed to answer the second part on barriers and other questions. Some responses also indicated the tendency to straightlining.

The data was collected online through the SurveyMonkey platform. Respondents to the survey included academia and representatives of business and other stakeholders. Links to the questionnaire and invitations to participate are sent to all higher and postgraduate education organizations and research institutes of Kazakhstan for further distribution among employees. Data from business representatives and other stakeholders are collected through the business associations.

**Results**

1649 representatives of the scientific community and 270 representatives of business agreed to take part in the survey and filled it out. Respondents who did not respond to all parts of the questionnaire were removed from this number, or straightlining was observed where respondents spent very little time on the survey and chose the same answer option for questions in the same category. In summary, the analysis of the data for this article includes 700 responses from 1,649 academics and 108 business representatives

The majority of respondents are from state universities (see Table 1), which is natural, since they are the main employers for a large part of the scientific community. Representatives of private scientific organizations also participated in the research.

**Table 1**

*Place of work of representatives of the scientific community*

| Place of work | Stake |
|---|---|
| Public Higher Education Institution | 338 |
| Private Higher Education Institution | 134 |
| State Research Organization | 186 |
| Private research organization | 42 |
| Altogether | 700 |

The largest number of respondents conduct research in the field of natural sciences (See Table 2). In the study, researchers in the areas of social sciences and agricultural and veterinary sciences are least represented.

***Table 2***

*Scientific directions of representatives of the scientific community*

| Scientific direction | Stake. |
|---|---|
| Agricultural and veterinary sciences | 76 |
| Engineering & Technology | 129 |
| Humanities | 147 |
| Medical & Healthcare | 124 |
| Science | 151 |
| Social sciences | 73 |
| Altogether | 700 |

Most of the respondents are representatives of business and other stakeholders working in large businesses with more than 500 employees. Three respondents engaged in individual entrepreneurial activities also participated in the survey.

**Table 3**

*The size of companies, business representatives and other stakeholders*

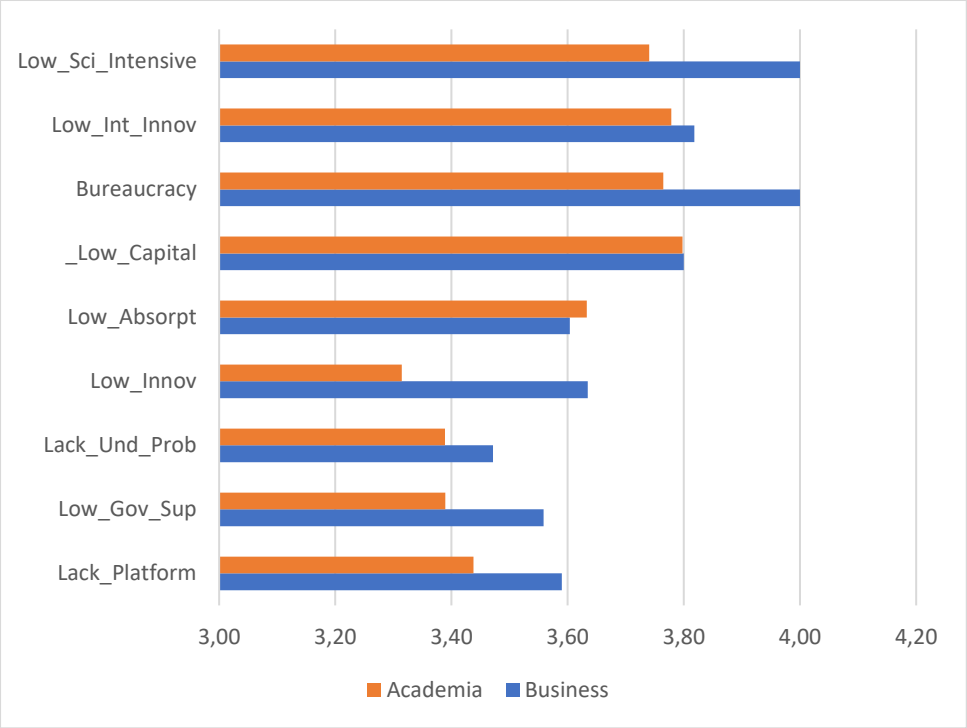
| Company size | Stake. |
|---|---|
| More than 500 employees | 46 |
| 100-500 employees | 24 |
| 26-99 employees | 25 |
| Maximum of 25 employees | 10 |
| Individual entrepreneur without employees | 3 |
| Altogether | 108 |

*Barriers to interaction between science and business*

The survey showed that the problems identified during the interviews are significant. The most significant barriers to interaction between business and science are the low level of development of knowledge-intensive industry and bureaucratic and other barriers in scientific organizations (Universities/Research Institutes).

**Figure 1**

*Assessment of the level of materiality of barriers*




Explanation of abbreviations in Figure 1:

- Lack_Platform - Lack of platforms for meetings between scientists and business representatives
- Low_Gov_Sup - Insufficient level of state support for the commercialization of the results of scientific and scientific-technical activities
- Lack_Und_Prob - Lack of understanding of business needs by scientists

- Low_Innov - Low level of development of domestic scientists
- Low_Absorpt - Insufficient capacity of companies to implement new technologies
- _Low_Capital - Lack of financial resources to work with scientists and introduce new technologies
- Bureaucracy - Bureaucratic and other barriers in scientific organizations (Universities/R&D institutions)
- Low_Int_Innov - Lack of understanding by companies of the need for innovation and involvement of scientists
- Low_Sci_Intensive - Low level of development of high-tech industry

The average values based on the results of the assessment by the scientific community and business are equal to the barrier - the lack of financial resources to work with scientists and introduce new technologies. The researchers also noted that the lack of understanding by companies of the need for innovation and attracting scientists is a fairly significant barrier, which is also agreed by representatives of business and other stakeholders.

Among the barriers, according to scientists, the low level of development of domestic scientists is not significant. Insufficient understanding of the needs of business by scientists is also not a very significant barrier in the opinion of representatives of business and the scientific community.

*Satisfaction with public administration in the field of science and commercialization*

Table 4 shows the overall level of satisfaction with public administration in the field of science for 32 indicators based on 808 answers and three indicators directly related to commercialization and interaction between science and business. For the indicator of stimulating cooperation between scientists and business, the lowest degree of satisfaction is observed, while satisfaction with holding competitions for commercialization projects is higher than the general level, according to the representatives of the business and other stakeholders (1.95 and 2.36 in Table 4).

**Table 4**

*Average Satisfaction Values*

| Indicators | Scientific community | Business and other stakeholders |
|---|---|---|
| Holding Commercialization Project Tenders (Commer_Grant) | 2.35 | 2.36 |
| Promotion of research results for their application, implementation and commercialization (Applied_Research_Commer) | 2.16 | 2.11 |
| Stimulating cooperation between scientists and business (Bus_Sci_Cooperation) | 2.03 | 1.95 |
| Overall level of satisfaction according to 32 criteria (AvgSatisfaction) | 2.37 | 2.19 |

Interestingly, there is a statistically significant positive correlation between the level of innovation of companies and the level of overall satisfaction with public administration in the field of science (p-value 0.0037, correlation coefficient 0.3). The ANOVA analysis shows a higher level of satisfaction at the third and fourth levels of innovation activity (2.53 and 2.40 in Table 5)). The difference in mean values is statistically significant (p-value 0.0064).

**Table 5**
*ANOVA Results (Innovation and Satisfaction)*

| Level of innovation | n | mean | std. dev |
|---|---|---|---|
| 1 - The company does not invest in new technologies and developments | 11 | 1.88 | 0.81 |
| 2 - The company sometimes acquires and implements new technologies | 21 | 1.82 | 0.71 |
| 3 - The company acquires and implements new technologies on a regular basis | 15 | 2.53 | 0.81 |
| 4 - The company itself or in close cooperation with scientific organizations develops new technologies and implements | 48 | 2.40 | 0.76 |

At the same time, the level of innovation does not correlate with the level of satisfaction with stimulating cooperation between scientists and business (p-value 0.1564). That is, companies that are already working closely with scientific organizations or developing technologies themselves are not entirely satisfied with measures in this direction.

The type of scientific organization also affects the overall level of satisfaction with public administration in the field of science. Analysis using the ANOVA test shows that there is a statistically significant difference between the mean values [p-value 0.000]. Public higher education institutions are the most satisfied with the management of science (2.49 in Table 6), while private research organizations are the least satisfied. means that more than 50% of respondents chose the answers "satisfied" or "rather satisfied".

**Table 6**
*ANOVA Results (Type and Satisfaction)*

| **Type of organization** | **n** | **mean** | **std. dev** |
|---|---|---|---|
| Public Higher Education Institution | 338 | 2.49 | 0.670 |
| Private Higher Education Institution | 134 | 2.31 | 0.72 |
| State Research Organization | 186 | 2.28 | 0.62 |
| Private research organization | 42 | 2.09 | 0.70 |

As for stimulating cooperation between scientists and business, this indicator also correlates with the type of scientific organization. The ANOVA test shows that there is a statistically significant difference between the mean values [p-value 0.0272]. Public higher education institutions are most satisfied with measures to *encourage cooperation between scientists and business (2.13*), while public and private research organizations are rather dissatisfied (1.90 and 1.75 in Table 7). universities do not have commercialization offices.

**Table 7**
*Results of ANOVA (type of organization and stimulation of cooperation between business and science)*

| **Type of organization** | **n** | **mean** | **std. dev** |
|---|---|---|---|
| Public Higher Education Institution | 251 | 2.13 | 0.92 |
| Private Higher Education Institution | 104 | 2.04 | 0.91 |
| State Research Organization | 147 | 1.90 | 0.89 |
| Private research organization | 36 | 1.75 | 0.10 |

**Conclusion**

An analysis of the responses to the survey of 700 representatives of the scientific community and 108 business representatives revealed key insights about the barriers and challenges affecting cooperation between science and business in Kazakhstan.

One of the most significant findings is the identification of the main barriers to cooperation between science and business. Both scientists and business representatives pointed to the low level of development of knowledge-intensive industries and bureaucratic barriers in research organizations as significant obstacles. In addition, the lack of funding for cooperation and the introduction of new technologies was also perceived as a common problem by both groups.

Scientists expressed concern about the lack of understanding by companies of the importance of innovation, and business representatives expressed similar opinions. Respondents among scientists do not perceive the low quality of domestic scientific developments or the limited understanding of business needs by scientists as the most significant barriers.

The level of satisfaction with the management of science and commercialization by the state also highlights the need for improvement to promote effective cooperation. Among the indicators analyzed, the lowest levels of satisfaction in both groups were related to the stimulation of cooperation between scientists and business. Despite initiatives to support commercialization, these results indicate a gap between policy intentions and practical outcomes, which may require a review of current measures and consideration of new incentives.

The analysis also showed a statistically significant positive correlation between companies' innovation and satisfaction with research administration, suggesting that companies with higher levels of innovation activity tend to be more satisfied. However, such a correlation was not found between innovation and satisfaction with measures to promote cooperation between science and business, which indicates problems with existing initiatives aimed at promoting cooperation.

Differences in satisfaction also arose depending on the type of scientific organization. Respondents from state universities are more satisfied than respondents from other types of organizations, with a lower degree. Satisfaction among private research organizations. These results indicate differences in the level of support or institutional infrastructure available to these organizations, especially with regard to commercialization opportunities, such as the availability of specialized technology transfer offices.

The research shows that reforms are needed to reduce bureaucratic barriers, improve funding mechanisms, and encourage both public and private organizations to engage in cooperation.

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**Conflict of Interest Statement**

The authors declare no potential conflicts of interest regarding the research, authorship, or publication of this article.

**References**

Alexander, A., Martin, D. P., Manolchev, C., & Miller, K. (2020). University–industry collaboration: Using meta-rules to overcome barriers to knowledge transfer. *The Journal of Technology Transfer*, *45*(2), 371–392. https://doi.org/10.1007/s10961-018-9685-1

Battaglia, D., Paolucci, E., & Ughetto, E. (2021). The role of Proof-of-Concept programs in facilitating the commercialization of research-based inventions. *Research Policy*, *50*(6), 104268. https://doi.org/10.1016/j.respol.2021.104268

Belitski, M., Aginskaja, A., & Marozau, R. (2019). Commercializing university research in transition economies: Technology transfer offices or direct industrial funding? *Research Policy*, *48*(3), 601–615. https://doi.org/10.1016/j.respol.2018.10.011

Berman, J. (2008). Connecting with industry: Bridging the divide. *Journal of Higher Education Policy and Management*, *30*(2), 165–174. https://doi.org/10.1080/13600800801938762

Bigliardi, B., Galati, F., Marolla, G., & Verbano, C. (2015). Factors affecting technology transfer offices' performance in the Italian food context. *Technology Analysis & Strategic Management*, *27*(4), 361–384. https://doi.org/10.1080/09537325.2014.1002464

da Silva, V. L., Kovaleski, J. L., & Pagani, R. N. (2022). Fundamental elements in Technology Transfer: An in-depth analysis. *Technology Analysis & Strategic Management*, *34*(2), 223–244. https://doi.org/10.1080/09537325.2021.1894328

Dias, A. A., & Porto, G. S. (2018). Technology transfer management in the context of a developing country: Evidence from Brazilian universities. *Knowledge Management Research & Practice*, *16*(4), 525–536. https://doi.org/10.1080/14778238.2018.1514288

Heng, L. H., Rasli, A. M., & Senin, A. A. (2012). Knowledge Determinant in University Commercialization: A Case Study of Malaysia Public University. *Procedia - Social and Behavioral Sciences*, *40*, 251–257. https://doi.org/10.1016/j.sbspro.2012.03.187

Ilysheva, N. N., & Rozhkov, A. V. (2017). Technology Transfer Issues at Leading Russian Universities. *Problems of Economic Transition*, *59*(7–9), 560–567. https://doi.org/10.1080/10611991.2017.1394751

Jonbekova, D., Sparks, J., Hartley, M., & Kuchumova, G. (2020). Development of university–industry partnerships in Kazakhstan: Innovation under constraint. *International Journal of Educational Development*, *79*, 102291. https://doi.org/10.1016/j.ijedudev.2020.102291

Kenzhaliyev, O. B., Ilmaliyev, Z. B., Tsekhovoy, A. F., Triyono, M. B., Kassymova, G. K., Alibekova, G. Z., & Tayauova, G. Z. (2021). Conditions to facilitate commercialization of R & D in case of Kazakhstan. *Technology in Society*, *67*, 101792. https://doi.org/10.1016/j.techsoc.2021.101792

Kuchumova, G., Bilyalov, D., & Jonbekova, D. (2023). Faculty engagement in university-industry research partnerships: Findings from a developing country. *Studies in Higher Education*, *48*(9), 1455–1467. https://doi.org/10.1080/03075079.2023.2203135

Lavoie, J. R., & Daim, T. U. (2018). Technology readiness levels enhancing R&D management and technology transfer capabilities: Insights from a public utility in Northwest USA. *International Journal of Transitions and Innovation Systems*, *6*(1), 48–61. https://doi.org/10.1504/IJTIS.2018.090776

Maia, C., & Claro, J. (2013). The role of a Proof of Concept Center in a university ecosystem: An exploratory study. *The Journal of Technology Transfer*, *38*(5), 641–650. https://doi.org/10.1007/s10961-012-9246-y

McAdam, R., McAdam, M., & Brown, V. (2009). Proof of concept processes in UK university technology transfer: An absorptive capacity perspective. *R&D Management*, *39*(2), 192–210. https://doi.org/10.1111/j.1467-9310.2008.00549.x

O'Dwyer, M., Filieri, R., & O'Malley, L. (2023). Establishing successful university–industry collaborations: Barriers and enablers deconstructed. *The Journal of Technology Transfer, 48*(3), 900–931. https://doi.org/10.1007/s10961-022-09932-2

Ramos-Vielba, I., & Fernández-Esquinas, M. (2012). Beneath the tip of the iceberg: Exploring the multiple forms of university–industry linkages. *Higher Education, 64*(2), 237–265. https://doi.org/10.1007/s10734-011-9491-2

Ravi, R., & Janodia, M. D. (2022). Factors Affecting Technology Transfer and Commercialization of University Research in India: A Cross-sectional Study. *Journal of the Knowledge Economy*, *13*(1), 787–803. https://doi.org/10.1007/s13132-021-00747-4

Zharmenov, A. (2024). *Industry science should not turn into a factory laboratory*. Kazakhstanskaya Pravda. https://kazpravda.kz/n/otraslevaya-nauka-ne-dolzhna-prevrashchatsya-v-zavodskuyu-laboratoriyu/

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