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Faculty engagement in university-industry research partnerships: findings from a developing country

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ABSTRACT

University-industry research partnerships are crucial for promoting university entrepreneurship. Faculty as key instigators play a critical role in developing such partnerships. Previous studies demonstrate that faculty engagement depends on a diverse set of factors. Drawing on individual interviews with 76 faculty members from eight public and private universities in Kazakhstan, this study explores factors affecting faculty decisions to engage in industry research partnerships in a developing country. Applying the personal engagement theory, we found that despite perceiving industry partnerships as personally meaningful and being driven by extrinsic and intrinsic motivations, faculty engagement in industry research partnerships in Kazakhstan is limited. The reasons for this are faculty members' feelings of low safety and availability caused by structural-, organisational- and individual-level barriers and challenges. We also found that some of these barriers and challenges can be more specific for developing countries that tend to have immature economies, suffer from corruption, have limited research capacity, and invest less in research activities.

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1. Introduction

Today an unprecedented role is assigned to universities around the world in building knowledge economies and societies. Under the third mission agenda (Trippel, Sinozic, and Smith 2015), universities are expected to become more engaged and entrepreneurial to ensure their accountability in rapidly changing societies (Jongbloed, Enders, and Salerno 2008). In this context, university-industry research partnerships attract more and more attention as they are critical for innovation development and socio-economic growth (Hayter 2015; Lehmann and Menter 2016). In Kazakhstan, such partnerships are underscored as crucial for knowledge exchange and technology transfer, which can contribute to building a competitive national economy (Akorda 2021). The country undertook several initiatives, such as the Programme for the Formation and Development of the National Innovation System for 2005–2015 and two State Programmes of Forced Industrial and Innovative Development initially for 2010–2014 and then for 2015–2019, under which universities were assigned a key role in creating and disseminating knowledge and provided with additional funding for developing industry partnerships. The government also hoped to foster university-industry linkages by transforming public universities into non-profit joint-stock companies (Sagintayeva et al. 2018) and creating a national innovation system and infrastructure, including the National Innovation Fund, regional technology parks, commercialisation offices, and domestic venture capital funds

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(Smirnova 2015). However, recent research demonstrates that similar to other post-Soviet countries, such as Russia and Armenia, university-industry research partnerships in Kazakhstan are limited in number and impact despite government support. The reasons for this are scarce resources, an unfriendly environment for generating innovation, and universities' limited research capacity (Bychkova 2016; Dezhina 2018; Inzelt 2015; Jonbekova et al. 2020).

The development of industry partnerships and entrepreneurship at the university level much depends on faculty and their engagement (Plewa et al. 2013; Tartari, Salter, and D'Este 2012). In the context of the changing nature of academic professions that take on new roles and expectations under the growing academic capitalism (Gonzales, Martinez, and Ordu 2014), the perspective of faculty on their engagement is critical to understanding university-industry partnerships. Faculty engagement was predominantly researched in developed countries. Studies focusing on faculty engagement in the post-Soviet region are scarce. In terms of Kazakhstan, prior research found that academics' techno-commercial societal engagement significantly depends on university type and national academic funding (Schneijderberg et al. 2021). However, further research is needed to develop a more nuanced understanding of factors affecting faculty engagement in industry research partnerships in Kazakhstan, a developing country undergoing a transfer from the Soviet command economy to a market economy and, in contrast to developed countries, with economy heavily driven by commodity exports (Pomfret 2005), less sophisticated manufacturing base, and less mature higher education system. Therefore, this paper addresses the following research questions: (1) How do faculty from universities in Kazakhstan engage in university-industry research partnerships? (2) What factors affect their decisions to engage in university-industry research partnerships?

This paper contributes to the policy and practice of university-industry partnerships. Particularly, it contributes to developing and enhancing policy-making and institutional practices related to university-industry partnerships in Kazakhstan and similar contexts by showing a need for effective and efficient instruments for policy implementation, an adequate base and allocation of funding, and structural economic changes which can stimulate innovation. The paper also adds to the existing literature on faculty engagement by suggesting that faculty engagement in industry research partnerships can be challenged more in developing countries, which have immature economies, suffer from corruption, have limited research capacity, and invest less in research.

2. Literature review

2.1. Faculty engagement in industry research partnerships

Faculty as 'the operating core in universities' (Uslu, Calikoglu, and Seggie 2019, 1) are expected to become key instigators of university entrepreneurship by engaging with external stakeholders. In literature, faculty engagement is defined as 'knowledge-related collaboration by academic researchers with non-academic organizations' (Perkmann et al. 2013, 424). In terms of industry research collaborations, faculty engagement includes joint and contract research, consultancy, ad-hoc advice, and networking with enterprises. It also encompasses commercialisation activities such as patenting, licensing, and spin-offs (Perkmann, King, and Pavelin 2011).

The literature review shows that faculty members' experiences of industry engagement vary depending on individual attributes. Previous research found that male academics with higher seniority (Perkmann et al. 2013; Tartari and Salter 2015), industry and collaboration experiences (Huang 2018; Mendoza et al. 2018; Sjöo and Hellström 2019), or longer research experience and more publications (Chikoore et al. 2016; Klasová, Korobaničová, and Hudec 2019; Korff et al. 2014) are more often involved in industry research partnerships. While these studies provide important insights into faculty engagement, they do not capture its complex and multifaceted nature (Tartari, Salter, and D'Este 2012) shaped by faculty members' motivations to collaborate. For example, collaborative and contract research and consultancy are often pursued to access resources unavailable in

academia or further research and increase publications, while engagement in commercialisation is motivated mainly by economic returns (D'Este and Perkmann 2011; Franco and Haase 2015; Muscio and Vallanti 2014). In contrast, Lam (2011), who argues that commercialisation engagement can also be driven by reputational rewards and intrinsic motivation, suggests considering a broader mix of intrinsic motives to explain faculty engagement.

Important insights into faculty engagement also come from studies focusing on barriers to faculty engagement and university-industry partnerships. According to these studies, barriers to engagement can be structural or associated with a deficient environment lacking a supportive regulatory framework (D'Este and Perkmann 2011; Kwiek 2012; Muscio and Vallanti 2014) or knowledge-intensive companies (de Wit-de Vries et al. 2019). Furthermore, barriers can be inter-organisational (Siegel et al. 2004), when different goals, values, research agendas, and working habits prioritised by academia and industry lead to disagreement or conflicts over research goals, intellectual property rights, or information disclosure (Boardman and Bozeman 2015; Karlsson, Booth, and Odenrick 2007). Barriers can also be organisational, including bureaucratic procedures at universities, an unsupportive entrepreneurial climate, and a lack of relevant policies, execution mechanisms, support structures, and incentives (Arvanitis, Kubli, and Woerter 2008; Jongbloed, Enders, and Salerno 2008; Korff et al. 2014; Muscio and Vallanti 2014; Tartari, Salter, and D'Este 2012; Watermeyer 2015). Finally, barriers can be at the individual level associated with faculty members' underdeveloped collaboration skills and limited contacts with enterprises (Jongbloed, Enders, and Salerno 2008), as well as fears over academic autonomy, teaching, and research quality (Mendoza et al. 2018; Muscio and Vallanti 2014).

Previous research studies also underscore that meaningful and successful faculty engagement requires relevant and adequate support. The provision of support is crucial because lack of it leads to formalism in faculty engagement or 'symbolic compliance' (Bercovitz and Feldman 2008, 75) and the circumvention of university policies and rules when faculty members build individual-level links with industry (Siegel et al. 2004). This, as a result, hinders institutions from transforming into entrepreneurial universities (Shah, Shahjehan, and Afsar 2019).

2.2. Faculty engagement in the context of disciplinary and institutional differences

Previous research found that faculty engagement with industry is determined by disciplinary and institutional context. Regarding this, faculty members from STEM disciplines or technical universities, such as in Germany, are found to be more engaged with industry than their counterparts from social sciences or comprehensive universities (Chikoore et al. 2016; Franco and Haase 2015; Schneijderberg et al. 2021). The reason for this is that hard disciplines, specifically applied, can offer possibilities for industrial application and also, are in greater need of external resources (Perkmann, King, and Pavelin 2011).

Faculty engagement in the context of institutional stratification also varies between research-intensive and teaching-oriented universities with the former being more often involved in industry research collaborations even across regions (Arvanitis, Kubli, and Woerter 2008; de la Torre, Rossi, and Sagarra 2019; Schneijderberg et al. 2021). Less research-intensive universities mainly engage in consultancy and spin-offs (Sánchez-Barrioluengo, Uyarra, and Katigawa 2019). The analysis of faculty engagement in the context of institutional stratification mainly focuses on the comparison of old established research universities with younger or less research-intensive universities. However, there is still unclear how faculty engagement in research partnerships differs in the context of horizontal institutional diversification of higher education, particularly between public and private universities differing in terms of ownership, goals, accountability and budgeting (Kehm 2022; Shah, Shahjehan, and Afsar 2019). Overall, although previous research sheds light on important factors shaping faculty engagement, there is still limited theoretical understanding of how these diverse factors shape faculty members' engagement decisions.

3. Theoretical framework

This paper draws on Kahn's (1990) theory of personal engagement as a guiding analytical framework. Kahn (1990) defines engagement as a psychological state that occurs when individuals harness themselves to their work roles. The theory states that engagement is based on three psychological conditions – meaningfulness, safety, and availability – experienced by employees in a work context. According to the theory, employees are more likely to engage in tasks with high meaningfulness. Meaningfulness refers to the sense of 'receiving a return on investments of one's self in a currency of physical, cognitive, or emotional energy' (Kahn 1990, 703). The sense of meaningfulness occurs when employees feel that they make a difference and create value through task performance. They also find work meaningful if it is rewarding and mutually enriching and results in feeling valued, respected, and needed. Employees also demonstrate greater engagement in a safe environment with no 'fear of negative consequences to self-image, status, or career' (Kahn 1990, 708). A safe environment is described as promoting open, trusting, and supportive relationships with colleagues and leadership. Competent support and availability of clear and transparent processes also contribute to establishing a safe environment facilitating engagement. Availability is understood as the physical, emotional, and psychological resources necessary for engaging at work. In other words, employees' engagement depends on their life-work balance and a range of resources. In sum, psychological conditions shaped by diverse factors influence personal engagement. Kahn's (1990) theory was primarily used to explain personal engagement within an organisational context. However, we believe that it can also provide a comprehensive explanation for faculty members' engagement decisions by combining a diverse set of factors under one framework.

4. Methodology

This study is a part of a broader research project on university-industry partnerships in Kazakhstan. In this paper, we focus on faculty engagement in industry research partnerships. The study employs a descriptive qualitative research design. This design is useful for understanding a phenomenon within its real-life context by retrieving participants' memories about their own experiences (Sandelowski 2010). The data were collected through semi-structured individual interviews with faculty from eight universities, which were selected according to three criteria: (1) type of university, (2) disciplinary variety, and (3) location. More detailed information on research sites is presented in Table 1. Public universities are long-established institutions existing since the Soviet times, whereas private universities have been set up after gaining independence. All the selected universities are in regions with particular raw material industries, except three universities which are located in the biggest city of the country or near it.

The selection of participants included two stages. During the first stage, we recruited participants who according to university websites were involved in industry partnerships. In the second stage, snowball sampling was used to invite more participants. The maximal variation sampling (based on two criteria – gender and discipline) was also employed to ensure a greater variation in the stories about faculty's experiences in industry research partnerships (Creswell 2013). Overall, the

Table 1. Research sites.

University	Type	Disciplinary variety	Location
A	Public, regional	Comprehensive	East
B	Public, national, research	Technical	South
C	Public, regional	Technical	Central
D	Public, regional	Comprehensive	South
E	Private	Comprehensive	South
F	Private	Comprehensive	North
G	Private	Comprehensive	West
H	Private	Comprehensive	South

sample included 76 participants, 45 of whom were from public universities and 31 from private universities. The number of males and females in the sample was the same ($N = 38$). Male faculty mostly came from technical universities. The participants from STEM departments ($N = 54$) outnumbered their non-STEM colleagues ($N = 23$). The number of faculty with a scientific degree was higher in public universities ($N = 42$) than in private ones ($N = 10$).

The interview protocol was developed based on a systematic review of the literature on university-industry partnerships and faculty engagement in external partnerships. The interview questions focused on faculty members' background and engagement in industry research partnerships, motives driving their engagement, barriers and challenges encountered in partnerships, and factors facilitating their engagement. Because of the pandemic restrictions, data were collected via Zoom, audiotaped, and transcribed verbatim. Prior to the interview, all participants were informed about the purpose of the study, the risks and benefits of participation, as well as their rights and confidentiality procedures.

The generated data were analyzed using NVivo 11 software thematically (Braun and Clarke 2006) by reading transcripts carefully and iteratively, generating codes and grouping them into categories and themes with inductive and deductive approaches. Before the coding procedure was finalised by the lead author, joint coding was conducted to reach a consensus on the final coding scheme (see Appendix A), which consisted of 24 codes located across seven categories and three themes. The majority of codes were derived from the structured part of the interview, while the last two – individual research capacity and ageism – are based on issues raised by the interviewees.

5. Findings

The data analysis showed that faculty engagement in industry research partnerships was limited, especially at private universities. 37 out of 76 participants reported being involved in industry research partnerships within the last five years. The number of males involved in research partnerships was higher than that of females. The majority of engaged faculty members had a scientific degree, were older than 40, and worked in STEM departments. Only 15 of them had industry work experience. Table 2 presents a summary of the demographic information of engaged faculty members.

The analysis also revealed that the most widely spread type of partnership was contract research ($N = 27$). Collaborative research (conducted under state research grants) and consultancy were less frequent ($N = 19$ and 18 respectively). Notably, the involvement of industry in collaborative research was often described as a formality, where enterprises only provided research sites. Examples of research entrepreneurship were even more scarce; only eight participants talked about patents – some developed in the Soviet Union – and only two mentioned spin-off initiatives. Ad-hoc advice and networking were also limited.

As shown below, engagement varied across individual faculty members, disciplines, and universities. The explanation for this lies in three psychological conditions of personal engagement (Kahn 1990) shaped by mediating factors, specifically drivers, barriers to, and facilitators of faculty engagement. We discuss these psychological conditions in the following sections.

Table 2. Demographic information of faculty engaged in industry research partnerships.

Gender	Age	University
Male - 22	<40 - 13	Public - 34
Female - 15	>40 - 24	Private - 3
Degree	Industry experience	Discipline
Doctor of sciences - 5	Yes - 15	STEM - 32
Candidate of sciences - 17	No - 22	Non-STEM - 5
PhD - 9		
Master's - 6		

5.1. Meaningfulness of industry research partnerships

The data analysis revealed that industry research partnerships were perceived as meaningful because of extrinsic and internal motivations driving faculty engagement. Extrinsic motivations, such as receiving monetary benefits and gaining reputational and career rewards, dominated in faculty members' engagement decisions. For example, a typical explanation for faculty engagement in research partnerships was 'additional income' (Participant 8, STEM, University B) pursued to complement insufficient basic salaries that were on average slightly higher than 250 USD in 2021, almost two times lower than the average salary in Kazakhstan, 510 USD (Tengrinews, March 18, 2021). The importance of engagement in industry partnerships for ensuring reputational and career rewards was especially evident among participants from public universities (A, B and C), which under aspirations to become research-intensive institutions, recently introduced performance indicators, such as engagement with external stakeholders, research productivity and attracted investments, for calculating faculty remuneration. Regarding this, participants from these universities commonly noted that implementing research results in industry is 'a big achievement' (Participant 6, STEM, University A) and 'an important criterion of the research quality' (Participant 9, STEM, University B) contributing to reputation and career growth.

Internal motivations driving engagement included faculty members' desire to further research by accessing modern laboratory facilities in industry sites, conducting experiments in the field, and gaining new research ideas. A few faculty members also believed that engagement in research partnerships was critical for improving the quality of higher education teaching and developing local innovation and regional development.

It is worth noting that faculty members' perceptions of the meaningfulness of industry partnerships differed between disciplines. Similar to previous studies, non-STEM faculty found their research less applicable for enterprises and, as such, in contrast to their STEM colleagues, perceived personal engagement in industry partnerships as less attractive.

5.2. Safety in industry research partnerships

Engagement in research partnerships also depended on the safety the faculty members experienced in industry partnerships. Safety means the feeling of security resulting from being supported, guided, encouraged, and welcomed in partnerships.

The data analysis showed that faculty members felt safer in partnerships when they experienced governmental and leadership support. The governmental support was primarily mentioned by faculty from STEM departments linked to raw economy who unanimously echoed positive expectations from recently introduced legislative changes in the Code of the Republic of Kazakhstan on Subsoil and Subsoil Use, according to which enterprises must transfer one per cent of the production costs to local research and science (Kapital, May 25, 2021). In addition, they referred to the Labour Code, the Ecological Code, and the Industrial Safety Law of the country which together require enterprises to seek professional expertise from university researchers. The university leadership support was primarily mentioned by faculty from University B where senior leadership promoted research partnerships through institutional development strategies and, having industry experience, used personal contacts to establish links with enterprises.

However, the majority of the participants expressed serious concerns about safety in partnerships. They mentioned experiences of being neglected and feeling insecure because of barriers they encountered in partnerships. The most frequently mentioned barrier in both types of universities was the lack of organisational support. For instance, the following excerpt is an illustrative example of criticism of the low efficiency of support structures at the public universities: 'There must be mediators between universities and companies. Techno parks must have played this role in our country. But they exist only on paper' (Participant 1, STEM, University C). The poor performance of support structures, such as research departments and recently introduced technology transfer

offices, technoparks, and commercialisation centres, was attributed to the lack of relevant knowledge and experience of the staff working in them, who had neither research nor entrepreneurship expertise. Lack of support meant that faculty had to independently negotiate contracts with industry and manage bureaucracy and a complex tax system in setting up start-ups and producing patents. This made them feel insecure about industry partnerships. In contrast, faculty from private universities, specifically E, F and H, insisted on the necessity to establish relevant outreach structures with paid administrative positions. Otherwise, they had to combine teaching and research with administrative roles that negatively affected their collaboration initiatives.

Faculty from public universities, specifically A, C and D, also referred to the absence of clear university-level mechanisms for industry partnerships as a frequent hindrance to engagement. Following the participants, even though their universities had well-written policies and strategic plans for partnerships, they were not implemented because of this barrier. The following excerpt demonstrates an opinion expressed by several participants: *'Every university has its own strategic goals and plans. They are all global but do not work at our level. We have everything, but all these are only from the tribune'* (Participant 14, STEM, University C). Interestingly, this barrier was not mentioned by faculty from private universities. This might be because, in comparison to private universities that are smaller and more independent in terms of budgeting and internal processes, public universities are more bureaucratic and less flexible which causes substantial challenges in developing partnerships.

Further, the second most frequent barrier to engagement was associated with low domestic demand for innovation. The most widely spread explanation for this was enterprises' disinterest in or low absorption capacity for innovation. The excerpt below is an illustrative example of such thinking:

Research partnerships are implemented with great difficulty. We have many innovative ideas for industry but our enterprises are disinterested in research. We stew in our own juice. I do understand that industries think today only about how to survive; however, this situation has been lasting for many years already (Participant 13, STEM, University C).

It seems that the export-oriented economy of the country and lack of manufacturing industries producing high-value-added products do not create demand for research and innovation and, as a result, for university-industry research partnerships. It is important to note that faculty members' perceptions of industry's demand for innovation varied across STEM disciplines. Those from the departments linked to core economic sectors of the country – oil and gas, metallurgy and agriculture – were more likely to find industry in their fields interested in innovation than the faculty from disciplines related to less developed economic sectors, such as mechanical engineering, IT, and transportation. This might be because enterprises from major economic sectors of the country and mainly with a national focus demonstrated a relatively greater interest in innovation due to higher income and the necessity to comply with national legislation. Another explanation for the low domestic demand for innovation, according to some faculty, lies in industry's low trust in local faculty's research and innovation capacity, especially of those from private institutions.

'They [enterprises] do not trust the competence of research groups, do not have sufficient confidence in their research results. They think nothing has changed in higher education in Kazakhstan and no sensible outcomes will be achieved. They still think research in Kazakhstan is a monkey business' (Participant 13, Social Sciences, University E).

Finally, some faculty members from both public and private universities also expressed disappointment with state research funding requirements and allocation. As noted, state research grant requirements were not flexible and did not take into account the unpredictable nature of research. The following excerpt illustrates such an opinion:

When we receive state research grants, we are expected to develop a new technology or material. Funding is not given just for doing research. Only concrete technological development is expected; however, research results

can be negative. Negative results are also research results with important implications (Participant 4, STEM, University C).

Because of this, faculty tended to be especially cautious in preparing research proposals and were reluctant to initiate risky endeavours because of fear to be punished if projects fail to achieve stated outcomes. Another reason for faculty members' insecurity related to the corrupted and bureaucratic research grants allocation procedure, which previously caused heated debates in the country (Nurkeeva 2018). Although significant measures have been taken to increase transparency in distributing state research funding within the last three years, some participants still expressed doubt, pointing to feeling insecure while applying for state research grants.

5.3. Availability for university-industry research partnerships

The engagement in industry partnerships was also shaped by the faculty members' availability, specifically their ability and readiness to collaborate. The data analysis revealed that the participants' availability, specifically from universities A and B, positively correlated to their social capital and university research infrastructure leading to greater collaboration, particularly in contract research. However, most participants complained about physically crumbling research infrastructure that caused difficulties in attracting industry partners.

Our findings also indicate that the faculty members felt less confident and capable of engaging with industry because of insufficient research funding, high workloads, and limited individual capacity. Funding-related barriers were the most often mentioned, specifically by faculty from private universities that could not participate in state programmes to ensure funding. Although faculty from private universities could apply for publicly funded research grants, similar to participants from public universities, they found this funding insufficient to conduct costly industrial experiments. Insignificant investments from industries mainly came in payments for consultancy and contract research. When seeking funding, some participants noted feeling like *'poor relatives begging industry for money'* (Participant 13, STEM, University C). Consequently, limited and undiversified funding negatively affected faculty members' availability for engagement.

High workloads were the second challenge that substantially reduced the faculty's availability. The issue of high teaching loads and paperwork was mentioned across all universities but to a lesser extent at university B. It is worth noting that in Kazakhstan, until 2021, faculty had up to 700–900 teaching hours per academic year (Ahn, Dixon, and Chekmareva 2018). Because monthly remuneration depended only on teaching workload, faculty members usually took additional teaching hours to ensure sufficient income, which negatively affected their availability. At university B that recently introduced differentiated career paths, the issue of high teaching loads seems to be of lesser concern among the faculty who were at research affiliated positions and, as such, had low teaching loads. According to them, this allowed them to focus on research and external partnerships.

Finally, our findings indicate that limited research experience and entrepreneurial skills were other reasons for the faculty members' low availability. Underdeveloped entrepreneurial skills were mostly mentioned by senior participants who felt they needed more skills for communicating with enterprises and managing business processes. The following excerpt is an illustrative example of this challenge: *'I can develop a prototype but I cannot move further in terms of commercialization. I am not an entrepreneur. I am a scientist'* (Participant 8, STEM, University B). The issue of insufficient research experience was brought up by faculty from both public and private universities. One of the reasons for that might be the decreased quality of research in the country after the collapse of the Soviet Union which led to formalism in research activities. Other reasons mentioned by participants are the ageing of academics with research experience, the low defence rate among PhD students, and the questionable quality of research training in Kazakhstani universities.

6. Discussion and conclusion

The study analysed faculty engagement in industry research partnerships in Kazakhstan. We were interested in exploring factors affecting faculty engagement across different disciplines, university types, and regions. Overall, we found that industry research partnerships are limited in Kazakhstani universities (Jonbekova et al. 2020). Most findings of our study are in line with previous research on university-industry partnerships and faculty engagement. For example, the demographic characteristics of Kazakhstani faculty engaged in industry partnerships are similar to those found in studies conducted in other national settings, that is male senior faculty members are more likely to partner with industry (Perkmann et al. 2013; Tartari and Salter 2015). Moreover, consistent with prior research we found that faculty industry partnerships are more likely to happen in STEM departments and (national) research-oriented universities (Chikoore et al. 2016; Franco and Haase 2015; Schneijderberg et al. 2021), which tend to employ a higher number of faculty with scientific degrees, focus on research-related outcomes, and receive greater government support.

The findings of this study also support the usefulness of Kahn's (1990) personal engagement theory for explaining faculty engagement, specifically factors affecting their engagement decisions. Consistently with this theory, faculty engagement is driven by the meaningfulness they assigned to industry research partnerships or extrinsic and internal motives for engagement. In contrast to findings from Western countries (D'Este and Perkmann 2011; Lam 2011), we found that faculty engagement in research partnerships in Kazakhstan is primarily driven by financial benefits pursued to complement insufficient basic salaries.

Our findings also suggest that faculty engagement is shaped by their perceptions of safety in and availability for industry partnerships. For example, we found that insufficient organisational support and low domestic demand for innovation in Kazakhstan negatively influence faculty members' feelings of safety and, as a result, their engagement decisions. While these findings support previous studies (de Wit-de Vries et al. 2019; Jongbloed, Enders, and Salerno 2008; Korff et al. 2014; Kwiek 2012; Muscio and Vallanti 2014), we also found that in Kazakhstan, faculty's safety in partnerships is diminished by their doubts in the transparency of state research funding allocation and stress associated with state research grants requirements found not flexible and not taking into account the unpredictable nature of research. Despite important measures taken within the last three years to improve faculty's experiences with state research grants, it seems that more work is needed to build their trust in grant allocation. Faculty's availability for industry partnerships was found to be hindered by insufficient research funding and limited individual capacity in research and entrepreneurship. Although most of the above-mentioned barriers and challenges to engagement were revealed in other settings, it seems that some of them are of special concern in the context of developing countries, which tend to suffer from corruption, have limited research capacity, and spend less on research, for example, in 2021, public investments in R&D in Kazakhstan was only 0.13 GDP (UIS). In line with Schneijderberg et al. (2021), our findings also show that private investment in research activities is not forthcoming. As such, despite being externally and internally motivated, faculty members in Kazakhstan seem to be challenged by structural-, organisational- and individual-level barriers hindering their engagement in industry research partnerships.

As mentioned above, our findings reveal that industry research partnerships are more likely to occur in STEM departments (Chikoore et al. 2016; Franco and Haase 2015). However, our study also adds to the existing literature on faculty engagement differences across STEM fields (Perkmann, King, and Pavelin 2011). Particularly, we found that in the context of a developing country heavily dependent on the export of fossil fuels, faculty engagement mainly takes place in STEM fields related to raw sectors of economy. Moreover, research partnerships in such sectors seem to be developed with national companies, which have bigger financial assets and need to comply with national legislation promoting university-industry collaboration.

Our study also supports the findings of research on the vertical stratification of universities and faculty engagement (Arvanitis, Kubli, and Woerter 2008; de la Torre, Rossi, and Sagarra 2019;

Schneijderberg et al. 2021). It also suggests that engagement differences exist between public and private universities. This finding is not surprising as private higher education institutions have limited budgets and are more likely to focus on teaching to ensure quick profits. As for regional differences, we did not find any substantial differences in faculty engagement as most universities in the sample are located in industrial parts of the country and it seems that university type was a much more important factor affecting faculty engagement.

Our study has several implications. First, to ensure innovation development in the country it is not enough to promote university-industry research partnerships through legislative changes and higher education policies. More government support is needed to ensure adequate research funding and absorptive capacity of industry by re-organizing the country's export-oriented economy into an economy with manufacturing industry producing high-added value products. Second, faculty need clear mechanisms and sufficient support at the organisational level, adequate individual incentives and support, and diversified and transparent funding to feel safe in and available for initiating and participating in industry research partnerships.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy and confidentiality issues and ethical restrictions.

Disclosure statement

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Appendix A. Coding scheme

Themes	Categories	Codes
Meaningfulness of industry research partnerships	Extrinsic motives	Additional income Career rewards Reputation
	Internal motives	To further research To contribute to society
Safety in industry research partnerships	Limited support	Leadership support Legislative changes Higher education bureaucracy Incompetent support structures Unclear mechanisms for partnerships development
		Low domestic demand for innovation
	State research funding issues	Transparency issue in state research funding State research funding requirements
	Availability for industry research partnerships	Need for sufficient and diversified research funding
Individual capacity for research partnerships		Social capital High teaching loads Paperwork Lack of entrepreneurship skills Individual research capacity Ageism