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# Understanding academic entrepreneurship: A signalling theory perspective

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**ABSTRACT**

**Objective:** The objective of the article is to apply signalling theory to explain researchers' engagement with the industry and the barriers to collaboration.

**Research Design & Methods:** A mixed-mode study was carried out among scholars to explain the role of signalling on academic entrepreneurial engagement. The links between signalling and entrepreneurial engagement were assessed in the quantitative part using a sample of researchers from Poland. Moreover, qualitative research helped identify additional forms and barriers of signalling, which were not considered in the quantitative part. The IBM SPSS Statistics and Atlas.ti software was used in the data analysis.

**Findings:** In line with signalling theory, scientists' signals were divided into three groups: individual and organizational characteristics, researchers' actions, and third-party endorsements. Results show that the third-party endorsements expressed by researchers' active involvement in professional organizations enhance entrepreneurial engagement. In the qualitative part the role of signalling through graduates and the problem of the signalling cost were identified.

**Implications & Recommendations:** Signalling sheds light on university-industry relationships through a new lens, explaining the matching process and cooperation barriers. Stimulating collaboration requires understanding the specific language of signals used by both scientists and business partners. Therefore, this research calls for action to strengthen scientists' communication skills, more frequent interpersonal contacts with business representatives, and communication of scientific and non-scientific competencies.

**Contribution & Value Added:** The theoretical focus on signalling theory can advance the extensive research on academic entrepreneurship. This theory explains how actors are selected for cooperation and describes the mechanism of partner selection. It also enables the reinterpretation of previous research related to the characteristics and activities of researchers and their relevance for undertaking collaborations.

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## INTRODUCTION

The growing importance of university-industry relationships stems from possible positive effects both for companies and academia. Previous studies indicate numerous benefits of entrepreneurial engagement for researchers, including the inspiration for scientific activity (Rohrbeck & Arnold, 2006; Rudawska & Kowalik, 2019; Siegel *et al.*, 2004), source of research funding (D'Este & Perkmann, 2011; Lai & Lu, 2016; Rohrbeck & Arnold, 2006; Welsh *et al.*, 2008) or improved researchers' financial situation (D'Este & Perkmann, 2011; Sobaih & Jones, 2015). Simultaneously, cooperation between universities and enterprises is considered inadequate, especially concerning the service industry (Thomas, 2012). The problem of mutual match-making between scientists and entrepreneurs interested in cooperation is a crucial reason for

poor university-business relations (He *et al.*, 2021). The article aims to solve this problem as signalling theory allows for a better understanding of mutual matching between university and business partners.

This study explores academic entrepreneurship from a new lens of signalling theory. Earlier studies on university-industry relationships explained the mutual links with a resource-based view (Kashyap & Agrawal, 2019), relational (Giuliani *et al.*, 2010), or entrepreneurial theory (Tijssen, 2006). Two main gaps were identified in the current literature. First, most research on academic entrepreneurship indicates that scientists with specific characteristics are more likely to collaborate, but they do not fully explain the underlying reasons for this. Second, as previous studies have been conducted mainly in the technological and pharmaceutical industries (Welsh *et al.*, 2008), research on the matching process in service industries is scarce (Thomas & Ormerod, 2017). The theoretical focus on signalling theory could advance the extensive research on university-industry collaborations. As a result, the paper is also relevant in terms of implications for theory and practice.

The study aims to apply signalling theory to explain researchers' engagement with the industry and the barriers to collaboration. This study contributes to the current research on academic entrepreneurship by exploring researchers' signalling activities and their impact on commercial engagement. Signalling explains how actors are selected for cooperation and enables the reinterpretation of previous research on scientists' characteristics and activities in terms of entrepreneurial collaboration. In line with Murray and Graham (2007), the commercial science market reflects the labour market with scientists representing supply-side and industry - demand for scientific knowledge. The signalling theory assumes that the informed party (scientist) can send observable signs to the less knowledgeable party (business partners) to disclose information asymmetry and promote exchange (Spence, 1973). In the university-industry knowledge market, scholars signal to companies that they offer a high-quality product (scientific knowledge and expertise) to get the contract.

## LITERATURE REVIEW

Scientific knowledge can be described as dual-purpose knowledge (Murray & Graham, 2007). It means that a researchers' work may contribute to both scientific research and, at the same time, be useful for commercial application (Murray & Stern, 2006). As a result, knowledge can be offered in two types of knowledge markets. The first is the traditional academic marketplace, where scientists pursue recognition and prestige through publication, peer review, and participation in scientific conferences (Dasgupta & David, 1994). This type of market is based on a collegiate reputation-based reward system. The second is the commercial marketplace, where scientists are trying to commercialize their knowledge. This article will consider these latter types of knowledge and market.

According to Perkmann *et al.* (2011), university-industry relationships result from a voluntary matching process between academic and industry partners. University-industry relations are similar to other matching strategies, including forming business relationships or even marriage and employment (Becker, 1973; Mortensen, 1988; Perkmann *et al.*, 2011). Both parties enter the relationship willingly and must agree if a match is achieved. Although previous studies have investigated this process, it is "still unclear what determines a good match between faculty and firms involved these relationships" (Mindruta, 2009, p. 2).

Calcagnini *et al.* (2015) studied the characteristics of the matching process between universities and innovative firms and found that the knowledge market implies trading externalities. It stems from the fact that "there is a high probability that a firm searching for a university collaboration will not meet a suitable researcher" (Calcagnini *et al.*, 2015, p.31). Stiglitz (2000) assumes that the imperfection of knowledge and information asymmetry is the primary source of market failure. Also, in university-industry relations, information asymmetry may be the primary reason for the contract limitation (Akerlof, 1970). Natural knowledge asymmetry is expressed because the seller has more information on the product than the buyer. In the scientific knowledge market, this problem is intensified by the fact that buyers (companies) cannot quickly identify suitable sources of knowledge (scientists) (Grover & Davenport, 2001). Scientific publications could serve as an essential signal for firms to recognize potential

academic partners (Polidoro, 2013) "as they allow companies to identify areas of expertise within universities" (Leitner *et al.*, 2020, p. 358). Still, as research shows, the best scientists are not always the best partners for cooperation with business (Perkmann *et al.*, 2011), and there are no direct complementarities and trade-offs between commercialization and academic engagement in research (Reymert & Thune, 2022). Moreover, scientists tend not to disclose their knowledge until published and assessed by the scientific community. It makes the scientific knowledge market even more insufficient and increases the costs of partner search and selection.

**Signalling in University-Industry Relationships**

Based on Spence (1973), two types of entities can be assumed from the industry perspective, e.g., high-quality scientists and low-quality scientists. High-quality researchers can be productive for companies and offer them the necessary knowledge and skills. Low-quality researchers are less effective and offer little or no value to businesses. High-quality scientists know their importance for business, but outsiders (e.g., companies, and investors) do not, so information asymmetry occurs (Connelly *et al.*, 2011). Consequently, each researcher has the opportunity to signal or not signal its true quality to companies. Signalling represents a reasonable strategy for high-quality scientists because it increases the possibility of getting a contract with higher remuneration. As a result, high-quality researchers are motivated to signal, and low-quality ones are not.

The review of signalling in the university-industry relations literature found almost no direct use of signalling theory. Fontana *et al.* (2006) conducted a study on signalling from a company point of view. They found that firms' openness to the external environment significantly affects the development of R&D projects with public research organizations. Moreover, those companies that signal competencies show higher levels of collaboration with research organizations. In this study, signalling in companies was linked with patents as "patents signal firms' competences and in this way help to identify potential partners and establish the terms of collaboration as negotiations progress" (Fontana *et al.*, 2006, p. 317). Moreover, Penin (2005) argues that firms use signalling to pass information about their technical and scientific capability to expand their networks and attract new partners for cooperation.

Some researchers utilize signalling theory elements (without mentioning it directly) and point out that scientists involved in comprehensive communication of capabilities can enhance cooperation (Shen, 2017). Moreover, studies on academic entrepreneurship focus on features of scientists and academia that contribute to greater collaboration. These studies confirm that industry partners perceive different scholars' features and behaviours as signals. Based on Courtney *et al.* (2017), three types of entrepreneurial readiness signals can be identified: researchers' characteristics, actions, and third-party endorsements.

**Researchers' characteristics signals**

According to D'Este and Patel (2007), academic status positively impacts the variety of interactions with industry. They argue that individuals who are well-established in their academic careers are more likely to capitalize on their reputation to increase engagement with the industry. The higher engagement of these scientists can also be explained by the fact that status can serve as an encouraging signal for business. Moreover, institutional characteristics can signal researchers' quality for business. The departmental scientific field was found to be a significant determinant of industry-university knowledge transfer. According to Schartinger *et al.* (2001), technical sciences departments in Austria are more involved in cooperation than others. In the UK, scientists affiliated with engineering, business, and media are the most prolific academic consultants (Abreu & Grinevich, 2013). In Switzerland, Arvanitis *et al.*(2008) found that institutes of economics and business administration, natural sciences, engineering, and medicine are more robust in transfer activities than institutes of mathematics and physics. Department quality can also serve as guidance for reaching researchers willing to cooperate.

Perkmann *et al.* (2011) found that the higher-rated faculty are in technical disciplines, the more engaged their staff are in business relationships. Better scientific performance is associated with stronger ties between industry and university (Balconi & Laboranti, 2006). Fontana *et al.* (2006) have found that firms searching for cooperation usually select scientists based on reputation and domains of competence. Thus signalling these features can lead to a higher propensity to cooperate. According

to Abreu and Grinevich (2013) and Tartari and Breschi (2012), researchers' individual ranks in the academic hierarchy positively impact academic engagement. Stuart and Ding (2006) have found that scientists from the best universities in the USA are almost three times more likely to engage in relationships with business. Similarly, academics who work in departments with a high research status have a higher chance of being involved in an entrepreneurial venture (Clarysse *et al.*, 2011). Taking these into account, the first research question is:

**RQ1:** What is the role of a researcher's characteristics signals in entrepreneurial engagement with the industry?

### Researchers' Actions Signals

Researchers' actions signals are linked with entrepreneurial experience or previous engagement in cooperation and can constitute a significant clue for companies to consider a particular scientist as a cooperation partner. D'Este and Patel (2007) and Schartinger *et al.* (2001) found that academics with previous experience of collaboration engage more frequently and with a greater variety of interactions. According to Leitner *et al.* (2020, p. 369), experienced scientists are "better equipped to join the interests of industrial partners with those of academic members to bridge the cultural gap between these very distinct areas." The action-based signals include scholars' social media activities and appearance in the media as an expert. Scientists can use social media to communicate and promote their knowledge. Information conveyed through social media indicates scientists' readiness and relevance for business and helps potential business partners contact each other. Despite the common-sense assumption that social media communication enables greater visibility (Carrigan, 2016), previous studies (Thomas & Ormerod, 2017) indicate no proof for the link between social media activities and non-academic impact. Public engagement can be perceived as a means to communicate unobservable warranties of the scientists' productivity. Expertise comments through social media channels can directly or indirectly indicate their cooperation potential as entrepreneurial scientists should also communicate effectively to non-scientists (Badgett, 2015). Building on previous studies, the second research question was proposed:

**RQ2:** What is the role of a researcher's actions signals in entrepreneurial engagement with the industry?

### The Third-party Endorsements

The third-party endorsements are signals that are validated externally and serve as an indicator of scientists' competence verified by an external third party. They are issued by external organizations and can influence the perceptions of researchers' quality (Courtney *et al.*, 2017). It includes membership in industrial organizations, prestigious associations, or rankings. As members of industrial organizations, scholars can communicate their knowledge and skills. This is presumably a reliable signal because lower-quality researchers would not be able to express their expertise. Based on these assumptions, the third research question (RQ3) is*:*

**RQ3:** What is the role of third-party signals in entrepreneurial engagement with the industry?

### Signalling and the Barriers to Academic Entrepreneurship

In this article, signalling means communication aimed at showing readiness and possible areas of cooperation. Constraints in active signalling can stem from a lack of interest in collaboration or the limited awareness of the signalling role and thus may create an intrinsic barrier to cooperation. If scientists choose not to signal, it results in inadequate knowledge among business representatives about what to expect or what needs can be met through cooperation with science.

The lack of signalling was also found in the stream of research on barriers to university-industry relationships. Kashyap and Agrawal (2019) found that lack of academic research output communication is one of the most critical barriers to university-industry cooperation. They found that the industry is unaware of research conducted in academia and that scholars cannot benefit from collaboration without being noticed by the industry. Similar problems were pointed out by Backs *et al.* (2018) and Maietta (2015). Berman (2008) reported that inadequate communication with scientists is a significant

problem for many industry partners interviewed. Similar results were reported by McCartney and Kwok (2022) in the latest study in the hospitality industry. According to Rybnicek and Königsgruber (2018, p. 231), "reciprocal communication (regularly, timely, adequately and accurately) is beneficial to establish positive expectations about the future behaviour of partners."

Given that there is a wide variety of signals that companies assess, there is a need to identify which impacts companies' decisions to cooperate. Linking signalling theory with previous studies on academic entrepreneurship, additional research questions were introduced:

**RQ4:** What are additional forms of signalling?

**RQ5:** What are the main barriers to signalling?

An empirical study was employed to get answers to that questions.

## RESEARCH METHODOLOGY

Tourism academia was selected as a subject of the research because the relationships between universities and companies in this sector are inadequately explored (Sobaih & Jones, 2015). Moreover, cooperation between these parties is sparse (Thomas, 2018) but potentially crucial for both universities and companies (Olszewski, 2021).

Considering the complex nature of the research questions, a mixed stance of analysis was employed. The quantitative part was carried out with an online survey. This method enabled gathering responses from geographically dispersed respondents and obtaining results in a convenient way for participants. The quantitative analysis enabled answering the first three research questions. The contact information was drowned from the Polish Science database maintained by the National Information Processing Institute, covering all academic researchers in Poland. An invitation with a link to the online survey was sent in 2018 to all researchers who declared tourism and hospitality specializations. Considering that 22 e-mail addresses were incorrect, the questionnaire could be completed by 303 respondents, and 76 questionnaires were received, representing a response rate of 25%, which is an acceptable result compared to other web-based studies (Goethner *et al.*, 2012). Table 1. presents the sample structure by age, gender, and the highest degree obtained.

The survey questions were adapted from previous research (D'Este & Patel, 2007; Thomas & Ormerod, 2017), with some new constructs added. The entrepreneurial engagement was measured as a dichotomous variable describing whether the respondent had collaborated with the industry three years before the survey. Industry partners were broadly defined as private sector companies, local governments, or government-owned corporations. The independent variables (predictors) were both dichotomous and ordinal and were grouped into three types. The first group (scientists' characteristics) includes the faculty level, the type of university, and the scientific position (measured by obtaining a habilitation). The second group (action signals) includes researchers' presence in the media as experts and scholars' professional involvement in social media. The third group of signals related to third-party endorsements was measured by researchers' activity in organizations and professional associations. The logistic binary regression was applied with the IBM SPSS Statistics version 27.0.

The second stage of empirical analysis was necessary to answer the last two research questions and included a qualitative approach often used in university-industry relations research (e.g. Rossi *et al.*, 2017; Shen, 2017). Open-ended questions from 49 scholars' responses on cooperation barriers were considered. Within these answers, manifestations of the signalling theory were tracked. Thematic content analysis was used with support from Atlas.ti software.

The qualitative part was based on the interpretative paradigm. Participants for the analysis were chosen based on their knowledge and intention to take part in the research. The first step in qualitative data analysis was coding, then codes were categorised and sorted into main themes matching research questions on forms and barriers of signalling. Findings were supplemented by suitable quotations.

**Table 1. Respondent profile**

| Variable | Category | Share |
|---|---|---|
| Age | under 36 | 10% |
| | 36-45 | 52% |
| | 46-55 | 20% |
| | 56-65 | 11% |
| | 66-75 | 7% |
| Gender | male | 59% |
| | female | 41% |
| Scientific degree | doctoral degree | 67.5% |
| | habilitation degree | 31.5% |

Source: own study.

## RESULTS AND DISCUSSION

Considering personal and organizational characteristics, 13.4% of researchers represent universities of economics; thus, they can be perceived as more business-oriented and better partners for cooperation. Moreover, 31.5% of scholars are experienced as they completed the habilitation process. This higher position in the academic hierarchy can help favour them as potential partners for business. A high faculty level declared by 42.5% of respondents could signal better quality for business. In terms of active signalling, 12.3% of researchers were highly involved in media as an expert, and 35.6% used social media for business purposes, which gave them a possibility to be found and appreciated by potential partners. Finally, 39.7% of scholars were engaged in professional organizations, which are platforms to signal knowledge and expertise.

Logistic regression analysis was employed to predict the probability of cooperation with the industry. The developed model estimates the effect of six predictors on the odds that scientists will undertake collaborations with businesses. The enter method was employed with a classification cut-off at 0.5 and maximum iterations at 20. The logistic regression model was statistically significant, $\chi^2(6) = 21.583$, $p < 0.001$. The predictive power measured by Nagelkerke R Square was 0.37. It means that 37% of the total variation of the dependent variable was explained by independent variables. Hosmer and Lemeshow's test was insignificant ($\chi^2(8)=13.307$, $p=0.102$) which means that model is well-fitted to the data.

In Table 2. the logistic regression coefficient, Wald test, and significance for each of the predictors are presented. Based on the 0.05 criterion of statistical significance, activity in professional organizations and faculty level have significant effects on cooperation involvement. Assuming all other variables are constant, scientists actively engaged in professional organisations are 2.7 times more likely to engage in cooperation with industry than scientists who are not involved ($p=0.017$). Moreover, scientists employed in higher-ranked faculties are less likely to cooperate with industry than scientists from lower-ranked units (ExpB = 0.251, $p=0.027$). Moreover, it was found that activity in social media ($p = 0.404$), being an expert in media ($p = 0.749$), academic experience ($p = 0.768$) and type of university ($p = 0.999$) did not add significantly to the model.

Social media and presence in media as an expert appeared irrelevant to establishing relationships between scientists and businesses. This may be because social media may be used more to communicate in the private domain and contribute less to establishing business relationships. As for the type of university, entrepreneurs pay more attention to the competence and ability of scientists to create value for business rather than their affiliation. In terms of experience, younger scientists can also offer more value than older ones. Experienced scientists may also take a more traditional approach to the role of the science sector and underestimate the benefits of collaboration with business (preferring research and teaching work).

A qualitative study was employed to understand signalling processes from a scientist's perspective. Three plots emerge from the data: signals used in communication with the industry, signalling enablers, and barriers. In terms of signalling enablers, researchers suggest organizing meetings with the industry to exchange mutual expectations. In this context, they emphasize the necessity of "facilitating

procedures, the assistance of knowledge transfer offices" (RES 5) and "regular meetings of practitioners with scientists at universities" (RES 13). The purpose of such activities is to be: an "easy flow of information from entrepreneurs about specific needs" (RES 6). The researchers believe that industry representatives do not sufficiently communicate their expectations and information needs.

**Table 2. Variables in the Equation**

| Predictor | B | Wald | Sig. | Exp(B) |
|---|---|---|---|---|
| Profesional organizations | 0.976 | 5.697 | 0.017 | 2.653 |
| Social media | -0.318 | 0.698 | 0.404 | 0.728 |
| Expert in media | 0.158 | 0.102 | 0.749 | 1.171 |
| Faculty level | -1.381 | 4.884 | 0.027 | 0.251 |
| Academic experience | -0.203 | 0.87 | 0.768 | 0.816 |
| Type of university | -21.587 | 0 | 0.999 | 0 |

Source: own study.

Scholars stress the lack of time as the crucial reason for limited commitment to signalling. Due to teaching, organizational and research responsibilities, they cannot engage in the search for collaborative business partners. According to RES 3, "there is a pressure to deal with strictly university matters; fear and negative attitude of universities towards business contacts (it is better to keep a low profile)."

Additional signals that increase outside observers' perceptions of researchers' quality were also identified. Scientists pointed out that a low level of education process can be a signal discouraging cooperation. One of the respondents emphasized that the way to intensify cooperation could be: "...first of all, a better level of teaching in bachelor's and master's studies, more adapted to the expectations of the market, demonstrating the applied nature of scientific research" (RES 5). The necessity to change the scientists' image stems from the fact that "currently we are perceived as useless relics, and it takes a long time to build a position of a good advisor, who can be trusted even though he has no idea about running a business" (RES 15).

Answering the first research question, it was found that researchers' experience is not an essential attribute that draws business partners' attention, similar to some previous results (D'Este & Patel, 2007). Contrary to Perkmann *et al.* (2011) it was found that the higher-rated faculty decreases the probability of industry engagement in business relationships. In line with Arvanitis *et al.* (2008), the type of university and its specialization can serve as a signal and increase researchers' propensity for cooperation. Researchers from universities of economics seem to be better partners and, as a result, industry representatives cooperate with them more often.

Answering the second research question, no impact of scientists' actions signals on entrepreneurial activity was found. Results on social media use and presence in media as an expert align with Thomas and Ormerod's (2017), which found that this kind of activity is noticed mainly by fellow academics and helps enhance academic rather than non-academic attention.

The third research question helps understand the role of third-party signals in entrepreneurial engagement with the industry. According to the findings, researchers' active involvement in the communication of knowledge within a professional organization can serve as a recommendation and enhance researchers' possibility of entrepreneurial engagement. It was found that the probability of cooperating with business is 2.7 times higher for scientists involved in professional organizations and lower for scientists from higher-ranked faculties. Signalling theory suggests that cooperation within professional organizations allows researchers' practical value to be recognized and valued. Such collaboration reduces information asymmetry – industry partners can assess and appreciate researchers and, as a result, decide to engage in a partnership. These results align with Thomas (2018), who found that professional associations are often considered valuable conduits for knowledge exchange between practitioners and universities.

Connelly *et al.* (2011) found that the cost of sending signals is a critical aspect that differentiates high-quality signallers from low-quality signallers. The qualitative study enabled the answer to the fourth and fifth research questions. This study found difficulty in signalling because it is costly and

time-consuming. Researchers indicate they are not active enough in the signalling process due to a lack of time and focus on current teaching and research activities. It can be hypothesized that the limited action in the academic knowledge market results from the existence of information asymmetry and high non-financial costs of signalling, which discourage researchers from being active in this market. Students and educational activity were found an essential avenue for communication with industry. Scholars perceive risks connected with education and anticipate that practitioners can be discouraged based on the perception of students and their abilities.

## CONCLUSIONS

Information asymmetry is one of the sources of knowledge market inefficiency. This study contributes to the literature by establishing the link between the signalling process and researchers' entrepreneurial engagement. An ambiguous impact of signalling on scientists' involvement in cooperation was found.

The results indicate that signalling theory offers both alternative and complementary possibilities for the university-enterprise relationship explanation as it helps to understand the mechanism of mutual matching of cooperation partners. Moreover, it is a new research perspective on barriers to knowledge exchange. It is based on the premise that signalling high productivity and encouraging collaboration implies a cost (financial and non-financial) for researchers and entrepreneurs. Intensification of cooperation will occur if these costs are reduced and researchers are encouraged to signal more. Furthermore, signalling theory sheds new light on the importance of graduates and their "promotional role" in fostering collaboration. Finally, it offers an alternative to proximity and relational approaches (Azman *et al.*, 2019; Bruneel *et al.*, 2010) to explain the significance of cooperation within professional organizations. According to signalling theory, professional organizations serve as a platform to communicate competencies and preselection mechanisms for scholars interested in collaboration.

These findings have implications aimed at increasing collaboration between academia and industry. Both companies and universities need cooperation to succeed and sustain their competitive advantages (Azman *et al.*, 2019). According to this study, scholars should actively communicate that they can solve particular problems of companies. Moreover, signalling opportunities by organizing platforms to share mutual expectations should be created to intensify the knowledge exchange. Such platforms (online or on-site) can also help reduce the signalling cost, which is a crucial barrier in university-industry relationships. It is also recommended to increase attention to developing the scientists' competencies to communicate with the world outside academia. Quoting the conclusion of Hardy *et al.* (2008, p. 33), "researchers should learn how to be bilingual, i.e., they should learn the language of the industry."

When interpreting the results of this research, one has to bear in mind that this study has several limitations. First, it was carried out in Poland, and future studies should include different national settings. Second, it is essential to note that this study only explored the problem of signalling from the perspectives of scientists. Future research should take into account the way entrepreneurs interpret signals. This sampling bias limits the generalizability of findings because it threatens external validity. It should be considered that the sample was also restricted to the tourism academia. Results from such a sample can only be generalized to populations that share characteristics with the sample. An additional limitation of this study is related to the fact that the data were collected at a single point in time, and therefore we need to treat causal inferences with caution. Therefore, in-depth longitudinal studies are necessary, further exploring the matching process's complexity and signals interpretation. Future research could also analyze what makes the matching process works better. It could result in the recommendation to reduce information asymmetry and thus improve exchange in the university-industry knowledge market.

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## Conflict of Interest

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